REGENERATIVE DESIGN
AN EXPLORATION
OF PROCESS, PRACTICE, AND THE ROLE OF PLANNERS

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Thank you,

Devon Miller
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Most modern-day innovations in sustainable development practices are not sufficiently different from traditional practices to make the necessary improvements required for a lower carbon future. Programs such as Leadership in Energy and Environmental Design (LEED) and Green Building certification aim to minimize degradation and improve efficiency.

While these programs are steps in the right direction, their approach to sustainability continues to degrade the global ecosystem and does not achieve the kind of improvement of function that is needed in our communities and ecosystems. Therefore, an exploration of more radical approaches to planning, design, and construction is needed.

Regenerative design is one such approach that holds promise, and the feasibility of its implementation needs to be rigorously examined. This project will seek to do so, and will explore the question, What is regenerative design, how is it approached, and what role can planners play in its implementation?

John T. Lyle, considered to be the founder of the regenerative design discipline, described the process as “replacing the present linear system of throughput flows with cyclical flows at sources, consumption centers, and sinks” (1994, p. 10). Regenerative design occurs when the development process takes into full account the people and environment in which it is situated, and becomes regenerative when choices of the materials used enable other renewable resources which might be depleted in the surrounding ecosystem to recover. This approach intends to reduce waste, increase efficient use of resources, and heal the surrounding environment. Beyond being zero energy or carbon neutral, it is a proactive and all-encompassing approach to building that argues that we can make a positive contribution to human and natural systems through development.

This project will explore the concept of regenerative design and how it pushes the notion of sustainability beyond the current paradigm of ‘doing less harm.’ Drawing from the literature as well as from case studies, this project will begin with a description of the history of regenerative design, as well as the philosophical roots, core tenets, and practical applications of the practice. This first chapter is meant to equip the reader with a base knowledge of the concept of regenerative design. In Chapter 2, a description and analysis of the Integrated Design Process (IDP) will be undertaken. The IDP is a strategy for undertaking an inclusive design process with a focus on community engagement, and these are two key principles of regenerative design. Following this, in Chapter 3, a critical examination of three recently proposed frameworks for guiding the regenerative design process will be undertaken.

Reflecting on concepts covered in the first three chapters, an assessment of a recent, innovative and high profile case study (The Centre for Interactive Research on Sustainability on UBC Campus) will be provided in Chapter 4. This assessment will look at the building design and its consistency with the core principles of regenerative design and the Integrated Design Process.

Lastly, in Chapter 5, an expanded discussion of key concepts discussed in Chapters 1-4 will be provided as well as an exploration of the role that planners can play in the regenerative design process.

The concepts explored in this project stem from a personal passion for sustainable design as well as a critical view of current green building techniques, which simply are not rigorous enough, as currently practiced, to achieve the results that are necessary as we move toward an uncertain future. A goal of providing benefit
to surrounding ecosystems and communities through development offers hope with regard to the role that the design of the built environment can play in creating a more sustainable, resilient, and harmonious future.

While the term ‘regenerative’ is increasingly used to describe projects that have achieved a certain level of innovation in sustainability through design, definitions for what makes a development regenerative remain inconsistent. Therefore, a critical exploration of this concept is an important undertaking in order to assess whether the goals and objectives of regenerative design are as beneficial (and attainable) as proposed.

If these goals and objectives are not attainable, it is important to understand what the barriers to realizing these goals are so that they may be overcome. If they are attainable, it is important to understand how best to approach these goals so that this information can become more widely disseminated to other individuals interested in the sustainable use of the built environment. This project is a modest step towards answering these questions.
This chapter will begin with an elaboration of the theoretical roots and practical goals of regenerative design, drawing primarily from literature from academics and practitioners of regenerative design.

This chapter will also include a description of some of the criticisms and challenges of approaching regenerative projects, and will provide a summary of the core tenets of this approach to planning, design, and construction. These core tenets discussed will provide a critical lens that will be used to assess topics discussed in the remaining chapters.
Regenerative design is a relatively new term in the planning and design field. However, many of the core tenets of what is known as regenerative design today have been built upon the past work of planning and design professionals in the fields of ecological design and pattern literacy.

01.1 - History

Regenerative design is a relatively new term in the planning and design field. However, many of the core tenets of what is known as regenerative design today have been built upon the past work of planning and design professionals in the fields of ecological design and pattern literacy.

01.1.1 - Ecological planning and design

In the planning and design literature, there has been much written on the ways in which natural and human systems can be better integrated through the design of the built environment. Indeed, there is a long list of individuals in history that have contributed to these concepts in their own way.

Ian McHarg’s seminal book Design with Nature (1969) was one of the first to push forth an ‘ecological worldview’, and his step-by-step breakdown of how regions should be planned according to natural processes was far ahead of its time.

Similarly, in A Pattern Language (1977) and The Timeless Way of Building (1979), Christopher Alexander was one of the first individuals to identify the importance of reading the landscape and designing according to the patterns that are present in a place.

More recently, in their book Cradle to Cradle (2002), William McDonough and Michael Braungart took the notion of patterns in nature, such as closed-loop-systems, and applied this thinking to the way we build and design.

All of these important works have contributed in important ways to modern-day concepts of ecological restoration, urban ecology, and regenerative design.

01.1.2 - Regenerative design

While concepts of ecological design, pattern literacy, and closed-loop systems have been present in the planning and design literature since the 1960s and 1970s, it was not until the 1990s that the term ‘regenerative design’ was coined.

The term was first introduced with the work of John Tillman Lyle and his books entitled Regenerative Design for Sustainable Development (1994) and Design for Human Ecosystems (1984). Lyle, a landscape architect, was an avid environmentalist who viewed the current development paradigm as leading us to an unavoidable environmental catastrophe unless a paradigm shift occurred that would lead us to building in harmony with nature.

Like many environmentalists before him, Lyle saw that drastic shifts in policy, development practices, and consciousness needed to occur in order to avoid the potentially disastrous effects associated with environmental degradation. Recognizing that simply minimizing degradation is not enough to reverse the deleterious effects of climate change, Lyle sought a way to provide benefit to surrounding ecosystems and communities through development. The result was regenerative design, which he described as “replacing the present linear system of throughput flows with cyclical flows at sources, consumption centers, and sinks” (Lyle, 1994, p. 10).

According to Lyle, a development becomes regenerative when the process takes fully into account the people and environment in which it is situated to create a project that is in harmony with the local community and ecosystem. He described twelve strategies that a regenerative process must utilize if it is to be an effective design (see callout below).

12 Strategies for Effective Design*

1. Let nature do the work
2. Consider nature as both model and context
3. Aggregate, do not isolate
4. Seek optimum levels for multiple functions, not the maximum or minimum level for any one
5. Match technology to need
6. Use information to replace power
7. Provide multiple pathways
8. Seek common solutions to disparate problems
9. Manage storage
10. Shape form to guide flow
11. Shape form to manifest process
12. Prioritize for sustainability

*From Lyle, 1994
In order to push the ideas of regenerative design further, to experiment with real projects, and to teach the practice to a wider audience, Lyle founded the Center for Regenerative Studies at California Polytechnic in Pomona, California. Much of Lyle’s book *Regenerative Design for Sustainable Development* (1994) is devoted to highlighting the regenerative design attributes that the Center possesses. Since Lyle’s passing in 1998, the Institute has continued to fulfill the mission statement set out by Lyle, which is “to advance the principles of environmentally sustainable living through education, research, demonstration and community outreach” (Lyle Center website, 2012).

### 01.2 - MODERN-DAY ROOTS AND DEFINITIONS

Since Lyle’s death in 1998, the individual who has been most commonly associated with regenerative design is Bill Reed, founder of the Integrative Design Collaborative (IDC) and Regenesis Group, two firms that are at the forefront of the regenerative design movement in North America.

According to Reed, the regenerative design process begins by:

> attempting to understand how the systems of life work in each unique place. Our role, as designers and stakeholders is to shift our relationship to one that creates a whole system of mutually beneficial relationships. By doing so, the potential for green design moves us beyond sustaining the environment to one that can regenerate its health – as well as our own (2007, p. 1).

Thus, regenerative design requires a change in mindset, such that the intention is not to simply do less damage to the environment, but instead to learn how we (as planners, designers, developers, and other stakeholders) can participate with the environment, using the health of ecological systems as a basis for design (Reed, 2007; Plaut *et al*., 2012). With this change in mindset, the goal becomes to achieve designs that, as Cole (2012a) put it,

> support the co-evolution of human and natural systems in a partnered relationship. It is not the building that is ‘regenerated’ in the same sense as the self-healing and self-organizing attributes of a living system, but by the ways that the act of building can be a catalyst for positive change within the unique ‘place’ in which it is situated (p. 1).

Mang and Reed (2012) elaborate on this idea of place, and use it as the basis for all of their work with Regenesis Group, which they approach using what they call ‘A Story of Place’ (see section 01.5.4 - Designing from Place on page 17 for more on this).

### 01.3 - DEGENERATIVE VERSUS REGENERATIVE

While regenerative design has its theoretical roots in the broader sustainability movement, it differs from the current sustainability paradigm in the sense that it moves beyond goals of ‘doing-no-harm’ or ‘minimizing harm and degeneration.’ These are goals that are embodied by the current green building movement with checklists such as LEED and BREEAM (Cole *et al*., 2012; Mang and Reed, 2012; du Plessis, 2012). Instead, the regenerative paradigm “…provides an alternative that is explicitly designed to engage with a living world through its emphasis on a co-creative partnership with nature based on strategies of adaptation, resilience and regeneration” (du Plessis, 2012).

Acknowledging that individuals often conceptualize paradigms in a sliding scale...
fashion, some academics and practitioners such as Plaut et al. (2012) and Reed (2007) have conceptualized regenerative processes as being on one end of a scale from degenerative processes to regenerative process (See Figure 1.1 on previous page).

Using this sliding scale as reference for description, degenerative processes are those that reduce the functioning of surrounding systems, sustainable processes are those that sustain the functioning of surrounding systems, and regenerative processes are those that restore or improve the functioning of surrounding systems (Plaut et al., 2012; Reed, 2007).

01.4 - LIMITATIONS OF THE CURRENT SUSTAINABILITY PARADIGM

01.4.1 - The Green Building Industry
In the last two decades, the Green Building Industry has grown at an unprecedented rate. The US Green Building Council (USGBC) alone has seen membership increase 30 fold since 2000, from roughly 500 members in 2000 to over 16,000 members in 2011 (USGBC website, 2011). This expansion is in part due to a recognition of the important role that building professionals can play in reducing greenhouse gas (GHG) emissions.

The building sector accounts for nearly 40% of GHG emissions in the United States, more than either the transportation or industrial sectors (Environmental Protection Agency, 2012). Moreover, with increasing populations in North America, some estimate that nearly 14 million new buildings will need to be built by 2020 in order to meet this demand (Masnick et al., 2010). Considering these facts, it is perhaps unsurprising that the green building industry has grown so much in the past two decades.

Despite this growth in the green building industry, however, CO₂ emissions from buildings are projected to grow faster than any other sector through to 2030 (USGBC, 2011). This suggests that while the goals of the green building movement are admirable, they are perhaps not enough. The ethos of the green building movement is to reduce, minimize, or otherwise limit the damage associated with building. Statements like this one illustrate this thinking well: “The average LEED* certified building uses 32% less electricity and saves 350 metric tons of CO₂ emissions annually” (USGBC press release, 2011).

While reducing CO₂ emissions and using less electricity are undoubtedly admirable aims for a project, when one extrapolates this thinking to a national or global scale, the result is simply a slightly slower rate of degradation. In other words, the system (in this case, the global ecological system) is still being degraded on aggregate. So, if the goal of the green building movement is to slow down the rate of destruction of the global ecological system, it will fulfill its goal. If, however, the goal of green building is to reverse the deleterious effects that buildings have on their surrounding ecosystem, and to lead the way to a truly sustainable, harmonious future, then it will likely fail in its goal.

01.4.2 - Sustainability and Community Planning
While significant challenges to the efficient functioning of our communities have undoubtedly resulted from poor planning decisions in the past, planning has also rapidly adopted strategies to ensure the sustainable use of the built environment. Improvement of transit infrastructure, transit-oriented development, urban ecology strategies, and building efficiency requirements are common strategies that planners employ today.

Smart Growth and New Urbanism are two strategies for development that seek to address issues facing cities today, such as heavy traffic, sprawling development, and automobile-dominated streets.

However, much like the case of the green building industry, it seems as though these strategies are not enough. Smart Growth and New Urbanism offer formulaic fixes that are anything but locally specific or culturally sensitive, and so while they may offer a certain level of improvement in terms of reducing environmental damages associated with our neighborhoods, they do not offer an obvious improvement to the human or cultural systems present in our neighborhoods.

Clearly, more ambitious thinking is required in the design and development of the built environment as we move toward an uncertain future. A statement in a 2007 Intergovernmental Panel on Climate Change (IPCC) report supports this claim:
While buildings offer the largest share of cost effective opportunities for GHG mitigation among the sectors examined in this report, achieving a lower carbon future will require very significant efforts to enhance programmes and policies for energy efficiency in buildings and low-carbon energy sources well beyond what is happening today (Levine et al., 2007, p. 390).

04.1.3 - Response to these Limitations

Recently, some building professionals have realized the limitations of the current green development movement and have worked to expand it to be more ambitious in its goals and objectives. One of the results of this concerted effort is the development of the concept of regenerative design.

As mentioned earlier, the concept of regenerative design is relatively new, first discussed in the academic or professional arena less than twenty years ago. As the green building and industry and sustainable planning field has matured in the past two decades or so, proponents have begun to push forward more rigorous and ambitious goals for the built environment, yielding such entities as The Living Building Challenge and regenerative design.

Indeed, after nearly two decades of minimal academic or professional literature on regenerative design, the journal Building Research and Information (BRI) set out an issue entirely dedicated to the topic of regenerative design in January of 2012. This issue contained articles on everything from the current state of regenerative design in its theory and practice (Cole, 2012a) to discussions regarding what the core tenets and goals should be of regenerative design (Mang and Reed, 2012; Hoxie et al., 2012; and du Plessis, 2012), as well as some recently developed frameworks for approaching regenerative design processes (Svec et al., 2012; Cole et al., 2012; and Plaut et al., 2012). These frameworks will be discussed in greater detail in Chapter 3.

The BRI issue potentially marks a watershed moment for the practice, and it has coincided with the widespread use of the term regenerative design and regenerative development. The increasingly frequent (albeit inconsistent) use of the term was undoubtedly a primary reason for the fact that much of the BRI articles included definitions for what regenerative design is and how it is approached.

In the following section, the core tenets of regenerative design are explored, drawing primarily from the literature put forth in the aforementioned BRI issue.

01.5 - CORE TENETS OF REGENERATIVE DESIGN

In light of the fact that regenerative design is a relatively young discipline, with the first journal issue dedicated to the topic released this year, it is perhaps unsurprising that there are a multitude of opinions as to what actually defines the practice.

Some individuals form their definitions based primarily on the theoretical underpinnings that set it apart from the conventional sustainability paradigm (e.g., du Plessis, 2012), while others focus on the human and cultural aspects that set it apart (e.g., Hoxie et al., 2012) and still others focus primarily on the ecological systems functioning aspects that set it apart from other design approaches (e.g., Pederson-Zari, 2012).

In addition to differing definitions regarding what regenerative design is, some practitioners have criticized the interchangeable use of the term design and development in these definitions. Mang (2011) differentiates between regenerative ‘design’ and regenerative ‘development’, positing that the former builds the regenerative and self-renewing capacities of designed and natural systems (i.e., the designed interventions) while the latter creates the conditions necessary for its sustained, positive evolution (i.e., the benefits which come from regenerative design). Regenerative development, according to Mang, “builds the capacities of people to design, create, operate and evolve regenerative socio-ecological systems in their place” (Mang, 2012).

However, when one distills down these various definitions to their essence, the core tenets of regenerative design begin to come to light. These core tenets include: an aim of providing benefit to surrounding ecological and cultural systems, the importance of community engagement and dialogue, understanding and identifying patterns present in surrounding ecosystems and communities, and the importance of designing from place. These core tenets are discussed in detail in the following four subsections.
**01.5.1 - Benefit the surrounding systems**

Rather than striving for minimized degradation associated with projects, the goal of regenerative projects is to achieve net-positive or beneficial impacts on both the ecological (natural) and cultural (human) systems of which a project is a part. Put simply, the community and ecosystem surrounding a project should function better as a result of a regenerative project than they did before the project.

From a technological viewpoint, this can mean striving to create buildings or neighborhoods that produce more energy than they use, that improve the functioning of the local watershed through on-site restoration, and that even improve the quality and fertility of the soil through the planting of native species.

From a community standpoint, this can mean creating institutional relationships with entities outside of the building or community, providing opportunities for education and dialogue, and allowing for other creative endeavours sought after in the community.

**01.5.2 - Importance of community engagement**

While definitions and approaches to regenerative design tend to differ, community engagement remains an integral component of all definitions and approaches (Cole et al., 2012; Hoxie et al., 2012; Mang and Reed, 2012). As Sarkissian et al. (2009) have said, “communities are the heart and hands of the sustainability movement. Engagement helps communities articulate, develop and achieve their goals” (p. 6).

Meaningful community dialogue is viewed as being vital to regenerative design because a community that has been engaged in a meaningful way will develop shared goals and will establish leaders to ensure progress towards these goals over time (Hoxie et al., 2012; Mang and Reed, 2012). Moreover, effective community engagement allows the designer to more fully understand the human or cultural context of the project and therefore identify opportunities for connecting the project with the community.

Some individuals, recognizing the importance of community engagement in the regenerative design process, have offered some important factors to consider when engaging others in the design process, such as the importance of including non-traditional stakeholders(Cole et al., Svec et al., 2012) and the power of stories in achieving meaningful, on-going engagement and learning (Mang and Reed, 2012). These are discussed in the following two sub-subsections.

**01.5.2.1 - Engaging non-traditional stakeholders**

Due to its holistic nature and focus on systems thinking, an important aspect to the community engagement strategies evoked by regenerative design is to engage individuals that have unique, important, and otherwise unvoiced perspectives to bring to a development project. The strategy most often utilized to engage these individuals is the use of an Integrated Design Process (IDP), which is a way of approaching design that engages all stakeholders (including non-traditional ones such as botanists, ecologists, and hydrologists) early on in the process, to foster interdisciplinary communication and collaboration and to yield a more holistic, integrated design (Perkins + Will, Stantec Consultants, 2007). The IDP will be described in greater detail in Chapter 2.

Engaging a wider variety of stakeholders allows for what Cole et al. (2012) describe as

...an open process to facilitate and expand the thinking, discussion, and actions amongst and between different stakeholders and disciplines; as well as identifying opportunities, synergies and benefits relating to a specific place (p. 96).

It also forces a design team to consider new and at times, conflicting perspectives on how best to proceed with the project. As such, it forces the process to be more holistic in nature, and in best case scenarios can yield more efficient, synergistic system design.

However, engaging non-traditional stakeholders is not without its challenges. A primary challenge of engaging non-traditional stakeholders is the issue of facilitating communication between individuals that have little or no experience talking to one another. For example, an ecologist may not have ever worked on a project with a structural engineer before, or may not have even worked on a project concerned with the built environment before. These facts pose interesting challenges, and they will be discussed in greater
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01.5.2.2 - The Use of Stories

Stories allow us to contextualize information and to pass information through social groups or even generations, and enable individuals and groups “…to grasp and share complex wholes and collectively imagine the future differently” (Mang and Reed, 2012, p. 29). Indeed, some have argued that planning is performed through story, and that this fact has been neither fully understood nor sufficiently valued in the planning field (Sandercock, 2003).

Often in community or public participation processes, planners or designers will develop an event to allow as many people as possible to tell their story about their community, neighborhood, or street; this is what is referred to as drawing on local knowledge. However, as Sandercock (2003) has noted:

*What is not always clear is how these collected stories will be used in the subsequent process, but the belief operating here is that it is important for everybody to have a chance to speak, and to have their stories heard (p. 15).*

Regenesis Group acknowledges this lack of defined intention that Sandercock points out and endeavors to incorporate stories into their approach to design work using what they call ‘A Story of Place’.

They describe this approach as being “…a method for deepening connection to and growing harmony with place” (Mang and Reed, 2012, p. 29). As elaborated upon in their website, “a compelling story becomes the meta-framework that, over the course of a project:

- Enables different specialists to find their specific niche without losing sight of how their contribution serves the whole, and how it is co-dependent on the work of others
- Ensures that sustainability goals and indicators for the parts (water, energy, etc.) are tied to the desired evolution of the whole, and
- Builds a foundation of shared meaning and purpose that supports deep collaboration across old divides” (Regenesis Group website, n.d).

This method simultaneously ensures that designs are context-appropriate and that they sufficiently and effectively engage community members in the design process.

Through the telling of stories, the goal is to deepen the connection that stakeholders feel to the place where the project is to be undertaken, as well as the connection that stakeholders have to each other, creating collective identity, meaning, and purpose to bridge divides and foster collaboration (Mang, 2009). Moreover, the ‘Story of Place’ forms the foundation for the project, whereby the stories told help to formulate the guiding principles for the design of the place (Mang and Reed, 2012).

In addition to providing the basis for design, stories offer a change agent with longevity, which is vital to regenerative design because the intention is “…to extend a regenerative process beyond the design or even construction phase of a project” (Mang and Reed, 2012, p. 30). Finally, stories offer the opportunity for a ripple effect, whereby the process that people engage with throughout a project is described to the surrounding community, making it possible for more educational opportunities to arise.

In regenerative projects, the result of an effective community engagement strategy is a deep understanding of the core concerns and aspirations of the community that will be affected by the project. The designer can then work to ensure that these concerns are addressed and these aspirations are realized in the design.

01.5.3 - Understanding and identifying patterns in the landscape

In order to properly care for a living entity such as a landscape or ecosystem (of which the built environment is a part) it is vital to understand how it works. How does one develop sufficient understanding of one’s living place? Some practitioners, such as Mang and Reed (2012) and Plaut *et al.* (2012) have suggested that the concept of pattern literacy offers a solution, and discuss how reading or understanding patterns “…reveals the underlying energy flows, both actual and potential, shaping a system” (Mang and Reed, 2012, p. 29). When using pattern literacy to ‘read’ the landscape, you become better equipped to design a built environment that harmonizes with and contributes to these flows.

A strategy that is often used in regenerative
Design is the use of permaculture principles to identify and design in harmony with patterns in the landscape. Bill Mollison (1988), considered to be the founder of permaculture, describes the practice as being:

...based on an integrated and functional approach to design where the use of ecological principles guides the weaving together of earth, water, plants and animals into complex balanced landscape patterns which have the diversity of natural ecosystems while providing food, energy, shelter and the recycling of wastes (p. 10).

Mang and Reed describe the importance of using permaculture principles in regenerative design, stating that the patterning skill developed through the use of permaculture:

...enables the assessment and articulation of the distinctive character or essence of a place, which is then reflected in a wide array of optimizing design solutions and management techniques that have the effect of beneficially linking elements that are often treated as discrete (e.g. road systems that serve as water harvesting structures and erosion control features while supporting windbreak, wildlife habitat, and firebreak functions) (p. 31).

In regenerative projects, these patterns are discovered through rigorous assessments of the site (which can include community asset mapping and energy, water, and material flow mapping) as well as through effective community engagement (discussed in previous subsection).

CASE STUDY - SUNDANCE RESORT
Consultant: Regenesis Group
Location: Sundance, Utah, USA

Sundance Resort is a ski resort located 13 miles (21 km) northeast of Provo, Utah, which spans over 2700 acres on the slopes of Mount Timpanogos in Utah’s Wasatch Range. The client wanted to build an environmentally responsible five star resort for visitors to come and enjoy the incredible scenery the area had to offer. Having worked together on a previous project, the client brought in Regenesis to undertake an Integral Assessment™ and Story of Place™ in order to gain an understanding of how this place functioned as a whole.

Regenesis was brought in at the end of a 3-year master planning process that proposed new lifts, a spa, lodges and a hotel. Sundance is a glaciated Karst landscape with extremely steep slopes, variable vegetation and soil types, and major alpine streams. Regenesis’ site assessment brought to light previously unrecognized insights into constraints to future development that would need to be addressed for public safety.

The Integral Assessment™ revealed that the proposed siting of the new five star hotel would be located on a glacial moraine at the point it was intersected by a previously unrecognized, active fault.

Although geotechnical engineers, soil scientists and hydrologists had already assessed the site, no one had integrated the information to see the larger pattern of how that landscape is working as a system. Other insights highlighted avalanche hazards, fire liabilities, and flooding potential. These insights clearly pointed to the need for reconsideration with regards to planning, design and structuring of the resort.

By alerting Sundance to the danger represented by its siting choices, Regenesis was able to save the resort millions of dollars and minimize future liability. As well, the insights enabled Sundance to rethink the pattern of its development and its relationship to its community and the environment. For example, subsequent phases began to incorporate water sensitive and permaculture design principles that were appropriate to that place.
Once these patterns that are present in the landscape surrounding the site are identified, the designer essentially has a list of considerations that must be addressed in the project.

An illustrative example will help to describe how design is approached under guidance from the patterns and flows of the landscape (See callout on previous page).

01.5.4 - Designing from Place

Expanding upon an understanding of patterns and flows in the landscape that are uncovered in a design process through community engagement and site assessments (discussed in the previous section), it is possible to define those distinctive patterns that need to be addressed and generated by a project in order to be in harmony with the larger patterns of the landscape. This is what Mang and Reed (2012) refer to as ‘pattern harmony’, and this term describes a situation where “…buildings and infrastructure improve land and ecosystems, and the unique attributes of the land improve the built environment and those who inhabit it” (p. 33).

From this notion of pattern harmony is the requirement of building to place, not to formula. This requires a strong understanding of the patterns of the place (described above), as well as:

…close attention to the uniqueness of a site, using the particularities of a given place as parameters for determining the kind of engineering and design solutions that are appropriate and possible in that place (Haggard, 2002, p. 26).

An example to illustrate this kind of thinking comes from a project undertaken by Regenesis Group in Baja California, Mexico (see callout).

01.6 - CRITICISM AND LIMITATIONS

Considering regenerative design’s relative youth in practice, it is perhaps unsurprising that there are criticisms, limitations and a general lack of understanding regarding its applicability. These criticisms and limitations include a lack of an agreed-upon definition, a lack of examples of successful projects, the peri-urban and rural dominance of existing examples, and the difficulty of widespread adoption. These will be described in order.

01.6.1 - Lack of an agreed-upon definition

As mentioned at the beginning of this chapter, there have been many different definitions proposed for regenerative design, such as those put forth by Cole et al., 2012, du Plessis, 2012, Hoxie et al., 2012, Mang and Reed, 2012, and Pederson-Zari, 2012.

Some would say that it is vital that there be an agreed-upon definition in order to avoid ‘green-washing’ or other forms of incorrect labeling of sustainable projects. Indeed, Mang and Reed (2012) devote a good portion of their paper to describing regenerative design and how it should be practiced in order to be truly regenerative.

A master planned community was to be built upon a degraded estuary (this fact was previously unknown to the developers).

Following an assessment of the site and extensive engagement of local community members, it was discovered that the site had once been a thriving estuary.

The design of the community was altered to allow for the recovery of the estuary and watershed and the community members were re-connected with their local ecological systems.

In this example, the first master plan was not site-specific or appropriate (did not identify or design in harmony with patterns of water flow in the landscape), and the second master plan was site-appropriate, using the idiosyncrasies of the place as parameters for design.
Others take the opposite stance and say that a lack of clarity is a good thing because it encourages innovation and critical analysis.

While continual analysis and innovation are undoubtedly primary goals of the sustainability and regenerative movement, green-washing still remains an issue, and many projects have been retroactively called regenerative.

So, while it is agreed that continual questioning and a lack of clarity in terms of a definition can lead to innovation in regenerative design, there must be at least an agreed upon threshold for when a project can be considered to be regenerative (for example, when it is net-positive on energy and creates a beneficial arrangement with the community). This kind of thinking nonetheless remains at odds with such practitioners as Mang and Reed (2012), who stress the importance of the regenerative process and place-specificity rather than on tactile end-results of design.

01.6.2 - A lack of examples of successful projects

While the firm most often associated with regenerative design, Regenesis Group, has undertaken dozens of projects that they describe as being regenerative, a common criticism of regenerative design is that because the discipline is relatively young there have not been successful examples of built projects (Pederson-Zari, 2012; Cooper, 2012). This, of course, stems from a lack of clarity regarding what a regenerative project actually entails (see above) in terms of both process and design deliverables.

01.6.3 - The non-urban dominance of existing examples

As mentioned, the firm that has produced the greatest number of examples of regenerative projects is Regenesis Group. However, these projects tend to be in peri-urban or rural environments, and as of yet there has not been a documented regenerative project in a dense, urban environment. This has sparked criticism from some practitioners who say that exemplary cases tend to “refer to the planning of more idealistic new communities rather than dealing with the complexity of existing urban contexts where most projects reside” (Clegg, 2012, p. 366).

Regardless, this criticism is fair and points to the importance of creating case studies of successful projects, framing them in a regenerative lens, and discussing ways in which future projects can improve upon them. As Svec et al. (2012) noted:

...case studies tell the stories of regenerative projects, demonstrating that they can be done in various settings, what was accomplished, and how it was accomplished. These stories can inspire people to learn more and to begin to change their practices (p. 2).

In addition to the point made by Svec et al., case studies can help to break down some of the conceptual barriers that individuals have in practicing regenerative design in that they show that these concepts can indeed be practiced ‘on the ground’.

Therefore, it is important that as more firms begin to incorporate regenerative thinking into their practice, they document their approach thoroughly so that other, future, projects can learn from and improve upon their approach.

The Centre for Interactive Research on Sustainability (CIRS) at the University of British Columbia is one such project that has done an excellent job of documenting their approach to design, including providing descriptions of lessons learned from all aspects of the process and a thorough description of the integrated design process that they undertook. See Chapter 4 for a more thorough description and assessment of the CIRS case study.

Moreover, the need for urban examples of regenerative design is particularly important if the goal is to regenerate those environments that are most in need of regeneration; which would include many urban environments. Similarly, from a planning perspective it is important that
this issue is tackled, as it becomes more important to refrain from the development of greenfield sites and to favour previously developed sites, neighborhoods, and corridors.

While practitioners say that the concept of regenerative design can be applied to all contexts, regardless of density or access to natural capital (Reed, 2012), the examples to support this view have been few to none.

**01.6.4 - The difficulty of widespread adoption**

A common criticism of regenerative design stems from the fact that it requires a more highly involved design process than is practiced conventionally. While it is generally agreed amongst green development professionals that a highly involved and integrated design process can yield positive results in terms of both economic and environmental performance throughout the life cycle a project, there remains a strong voice that questions whether the intensification of the design process is warranted, with some stating that “added complexity in the design process does not ensure a better building” (Clegg, 2012, p. 367). Indeed, much development occurs with tight budgets and tight timelines, such that investing in in-depth design processes is viewed as being out of the question.

Therefore, this criticism points to the fact that few projects have the vision, capability, and money to initiate such an involved process. If it is agreed that regenerative design principles are a necessary goal in the sustainability movement, then a central issue is how to make a highly involved and integrated design process more accessible and acceptable in the development industry.

A related criticism is the role that a project champion plays in regenerative design projects. Many green projects suggest that there is a need for a champion, or an advocate, who steers the project to ensure that sustainability goals are met. A recent example of this is CIRS, which John Robinson steered from the beginning and ensured that the agreed-upon vision was maintained throughout the design process.

However, the presence of a project champion is rare in most development projects. This is likely due to many factors, but some possibilities include a lack of interest from project team members in forming (or filling) the role, a design process or design team structure that precludes the presence of such a role (such as projects where design iterations are handed off from one professional to another with little discussion), and a general lack of awareness of how such a role could be beneficial to a project.

These two criticisms point to the fact that some of the nuances of regenerative design are unfamiliar to many project leaders and this unfamiliarity is a real barrier to widespread adoption of the practice.

A similar criticism to this unfamiliarity stems from a lack of ability, or knowledge of how to undertake the studies and address the patterns required in regenerative design. Many - if not most - planning and design professionals are not trained in pattern literacy and do not have the ability to read a landscape in such a way that would be useful in design.

Moreover, even if an individual has these abilities, they are not necessarily skills or services that are in demand. The expectations of clients and regulatory authorities, including time and budgetary concerns, are a significant barrier to the widespread adoption of regenerative design. However, the role that planners can play in such development projects offers some hope with regard to overcoming these barriers, and this will be discussed in greater detail in Chapter 5.

**01.7 - CHAPTER SUMMARY**

Regenerative design offers a potentially powerful re-conceptualization of the sustainability movement and the role that the built environment can play in it.

As Cole (2012a) has noted, it is not the core elements of regenerative design (utilization of systems thinking, focus on community engagement, importance of place-sensitive design) that are overly special or novel, but it is rather the fact that regenerative design begins to tie these previously disparate entities together. While this is true, it is also true that the shift in mindset from ‘minimizing damage’ to ‘creating benefit’ is quite novel, and is what makes regenerative design such a powerful concept.
This chapter outlined the key attributes and tenets of regenerative design, including:

- A recognition of the interdependence of humans and nature, and the fact that individuals and societies are all embedded in and dependent upon the cyclical processes of nature (therefore traditional linear anthropocentric processes need to be replaced with cyclical ones) (Lyle, 1994; Reed, 2007; Plaut et al., 2012)

- Rather than striving for minimized degradation associated with projects, seeking for net-positive or beneficial impacts on both the environmental (natural) and cultural (human) systems of which a project is a part (Cole, 2012b; du Plessis, 2012).

- A focus on effective community engagement and incorporation of non-traditional stakeholders in the design process (Hoxie et al., 2012, Cole et al., 2012, Svec et al., 2012)

- Incorporating systems-thinking and identifying patterns in the design process. “This shifts the focus from specific objects within a system to a focus on underlying patterns and interconnected, interdependent relationships between the objects.” (Mang and Reed, 2012; Plaut et al., 2012)

- A focus on place-based design (Mang and Reed, 2012) and the importance of engaging the place (engaging community stakeholders, ecosystem-analysis, understanding the community context) in the design process

Also discussed in this chapter were the criticisms and weaknesses of regenerative design in its current state, such as:

- The lack of an agreed-upon definition of regenerative design
- The lack of examples of successful regenerative projects
- Its non-urban predominance in actual cases and the large-scale implications of this in terms of sustainability
- The need for a champion or advocate and the difficulties of widespread adoption

While discussing community engagement and the importance of including non-traditional stakeholders, the Integrated Design Process (IDP) was mentioned, particularly with regard to its role in regenerative design. In the following chapter, we return to this and explore the IDP in greater detail.
As elaborated upon in Chapter 1, an important aspect to approaching a project using a regenerative process is to engage all of the stakeholders early on in the process, and to engage non-traditional stakeholders as well.

The Integrated Design Process (IDP) is an approach to design that does just that, and is one that is increasingly being used in green development projects.

This chapter will begin by providing a definition for the IDP, including how it differs from the conventional design process. Following this will be a discussion of some of the key features of an IDP as well as some of the challenges that are often encountered when undertaking one. This discussion will include an elaboration on these challenges in the context of decision-making, and will conclude with some thoughts regarding ways of overcoming these challenges.
Integrated Design Process

02.1 - Background and Definition

In the green building world, it is generally agreed upon that the successful design, construction and use of high performing buildings requires an approach to design that is more cooperative and engaging than is conventionally practiced (Pulaski & Horman, 2005; Rohracher, 2001). The Integrated Design Process (IDP) - also called the Whole Systems Integrated Process and the Integrative Design Process - is one such approach that is becoming more widely used. Indeed, leading green building rating systems such as LEED and The Living Building Challenge encourage the use an IDP, and it is being adopted widely by both public and private design entities.

There are many different definitions for what constitutes an IDP, but in general it is a process of engaging multiple stakeholders early and often in order to achieve the most holistic and resource-efficient design solution. Despite the differences in approach and definition, something that is generally agreed upon is the difference between an IDP and a conventional design process. See Figure 2.2, 2.3, 2.4, and 2.5 on the following spread (pages 24 and 25) for a description of the difference between these two.

In addition to agreeing upon the difference between a conventional design process and IDP, it is generally agreed that the process should include the formation of an inter-disciplinary design team (which should include a variety of design professionals, non-traditional stakeholders, and building end-users), and should engage these stakeholders as early as possible in the process.

Moreover, an IDP should include a series of design charrettes or workshops to clarify project goals and vision. These workshops should become more technical in nature as the process progresses, with each team member contributing his or her expertise to achieving the highest performing building possible (Kibert, 2008).

Acknowledging the increasingly accepted view that IDPs are required in the creation of high performance buildings, the BC Green Building Roundtable put forth their Roadmap for the Integrated Design Process in 2007 in order to define IDP and to offer strategies for overcoming barriers to wide implementation. In this document, they define the IDP in the following way:

The Integrated Design Process (IDP) is a method for realizing high performance buildings that contribute to sustainable communities. It is a collaborative process that focuses on the design, construction, operation and occupancy of a building over its complete life-cycle. The IDP is designed to allow the client and other stakeholders to develop and realize clearly defined and challenging functional, environmental and economic goals and objectives. The IDP requires a multidisciplinary design team that includes or acquires the skills required to address all design issues flowing from the objectives.

IDP proceeds from whole building system strategies, working through increasing levels of specificity, to realize more optimally integrated solutions (Perkins + Will, Stantec Consultants, 2007, p. 1).

Described more generally, IDP is: a flexible method rather than a formula; not pre-determined and instead tailored to each specific project, and; an iterative process with opportunities for ongoing learning and emergent features (Perkins + Will, Stantec Consultants, 2007). The Roadmap (2007) document goes on to elaborate on the set of principles that make up IDP. This set of principles includes:

- The use of a broad, collaborative team. The team should ideally comprise all relevant disciplines and stakeholders in the project, and the team should be present through all phases of a project. This way, it can be ensured that all unique skill-sets and perspective are brought to the table at all phases of the project.

- Having well-defined scope, vision, goals and objectives. This stresses the importance of an outcome-oriented mindset. To achieve effective outcomes, the team must develop a shared vision of what they are trying to achieve. This requires dedicated time at the start of project in a visioning session or charrette, and requires questioning the underlying assumptions surrounding the scope of the project.

- Practicing effective and open communication. This is essential throughout the process, as transparent methods of communication build trust and allow...
participants to have a sense of ownership over the process. Also, effective communication helps to reduce conflicts and allows the project to benefit from each stakeholder’s unique contribution. A suggestion provided in the Roadmap is to involve a facilitator at the start of the process in order to set an example and instill effective communication skills within the group.

- **Creating environments to foster innovation and synthesis.** Open-mindedness and creativity should be fostered, and should be done early and regularly, as it is a key component to encouraging high levels of innovation.

- **Using a systematic and structured decision-making process.** This is very important, and each stakeholder must understand their role and how they will be involved in the decision-making process. Decision-making tools such as modeling programs, green building certification systems, and life-cycle analysis can be used to help facilitate effective decision-making.

- **Designing an iterative process with feedback loops.** Unlike a conventional design process where decisions and assumptions are often left unchallenged, an integrated approach includes feedback mechanisms to evaluate all decisions and allow for continuous learning and improvement. Generally, these feedback loops ensure that decisions reflect the entire design team’s collective knowledge and vision and that connections between systems are considered. More specifically, these loops can include the creation of several design iterations, post-occupancy evaluations, and the use of focused team workshops, as well as cross-project learning, whereby the lessons learned from one project are used to improve upon future projects.

### 02.1.1 - Phases of the IDP

While IDPs will have the aforementioned core principles, they also tend to be organized into design phases, where certain activities are undertaken by the design team, certain milestones are achieved, and project documentation is organized and disseminated.

Each of the phases of the IDP proposed in the Roadmap (summarized in Figure 2.1) will be described, beginning on the page 26.

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**Figure 2.1** - A summary of the seven stages of the Integrated Design Process (from Perkins+Will, Stantec Consultants, 2007).
CONVENTIONAL DESIGN PROCESS

ISOLATED DESIGN TEAM

Conventional design involves a series of hand-offs between the various design professionals involved in a project (see Figure 2.2). For example, typically the architect will work with the client to come up with a schematic design. The architect will then pass the schematic design to mechanical, structural, and electrical engineers who will then design the necessary structural and systems elements in the building (such as where load-bearing walls will be, where the heating and cooling system will be located, where electrical will be wired, etc.). Once the engineers have signed off on the design and a building permit is acquired, the plans are sent to the building contractor who begins the construction process.

ISOLATED SYSTEMS DESIGN

In addition to a fragmented design process, the building systems are similarly treated as separate entities in a conventional design (See Figure 2.3). For example, the electrical system is designed in isolation from the heating and cooling system, which is designed in isolation from the water system. These are then simply layered on and treated as completely disparate systems.

Figure 2.2 - The organizational structure of a conventional design process, whereby the client typically is in contact only with the architect, who coordinates with other team members in a hierarchical structure (adopted from Perkins+Will, Stantec Consultants, 2007).

Figure 2.3 - A conventional design. Systems are design separately and synergies are not capitalized upon.
INTEGRATED DESIGN TEAM

In an integrated design process, all of the individuals involved in the conventional design process (architect, engineers, building contractor, client) are involved from the start of process, as are stakeholders who are not traditionally involved in building practices, such as ecologists, botanists, hydrologists, artists, and anthropologists (see Figure 2.4). The intention with this approach is to ensure that all unique perspectives regarding how a project should be undertaken or completed can be voiced from the outset and have an opportunity to influence the process. IDPs often use visioning workshops or charettes to get all stakeholders in the same room in order to make decisions that will yield the best result.

INTEGRATED SYSTEMS DESIGN

In addition to a highly coordinated and holistic design process, the building systems are similarly designed holistically in an IDP (see Figure 2.5). For example, potential interconnections are sought after throughout the design process, redundancies are removed, and opportunities for synergies are explored.

Figure 2.4 - The organizational structure of an IDP, in which the core team includes the contractor, facilitator and key consultants, and the core team is given support from specialists as needed (adopted from Perkins+Will, Stantec Consultants, 2007).

Figure 2.5 - An integrated design. Systems are integrated and synergies are capitalized upon.
1 - Pre-Design
This phase of the IDP is when the design team is chosen and brought together, the project facilitator is chosen, the goals and vision of the project are decided upon, and a site assessment is undertaken. As well, key meetings that are to take place in the next phase are planned (charrettes, regular meeting schedule, partnership meetings, and so on).

2 - Schematic Design
This phase builds upon the vision developed in the pre-design phase. It is the phase where design brainstorming sessions occur, innovative strategies are explored, preliminary feasibility studies (e.g., financial estimates, energy models) are undertaken, and concept designs are proposed. This is also the phase where the design team should be taking steps to coalesce and work more efficiently and effectively with one another.

3 - Design Development
This is when choices are validated and decided upon with regard to design. All architectural, mechanical, and electrical systems are assessed based on their expected performance. The result of this is that a schematic design concept is selected and approved by the client. At this point, meetings are much less focused on brainstorming, and are more geared toward making decisions with regard to specific issues.

4 - Construction Documentation
In this phase, construction documents are prepared based on the approved designs decided upon in the design development phase. Performance criteria are reviewed, green features are integrated into the documentation, and tender documents are prepared. It is useful if the contractor is engaged in this phase as early as possible so that the project vision and goals can be described to them.

5 - Bidding, Construction and Commissioning
In this phase, the design plans are realized and the focus of the core team transitions from design to construction. Meetings with the chosen contractor are important in this phase in order to ensure the green features are translated from design concept to reality. An important output of this phase is the record of drawings for the built project, as certain systems may be slightly different in reality than as conceived in the design drawings.

6 - Building Operations
In this phase, the design team transfers the knowledge and responsibility of operations to the building’s new stewards (the owner, occupants, and operations staff). The new stewards are engaged and educated as to how the systems work, and how best to interact to optimize and monitor performance.

7 - Post-occupancy
Integrated design does not end when construction is complete and the building has been occupied. In the post-occupancy phase, feedback mechanisms are created and monitoring programs are established so that lessons can be learned and improvements in performance can be made.

The formation of an appropriate design team is a crucial aspect of an IDP, both in terms of controlling budgets while meeting green targets, as well as ensuring that the project is approached as holistically as possible to achieve the most innovative and sustainable result. Indeed, as elucidated in the Whole Building Design Guide:

The key to achieving a sustainable building is to assemble a project team with both the experience and the desire to employ a systematic, integrated design. It is important to take a team-oriented, multi-disciplinary approach in which all members of the project team recognize and commit to the steps and actions necessary to achieve the project vision (2006).

In an IDP, project stakeholders are engaged on three levels. First, stakeholders are encouraged to develop a shared vision for the project. Second, stakeholders are encouraged to work together to envision the structure in a holistic manner. And third, each stakeholder agrees to commit to provide his or her unique perspective and expertise as needed throughout the phases of the project (Popcock, Kuennen, Gambatese, & Rauschkolb, 2006).

In the Roadmap (2007), the BC Green Building Roundtable describes the ideal IDP team as one in which:

- The client takes an active role throughout the
A broad range of expertise and perspectives are represented by the stakeholders.

A team leader is elected and responsible for the coordination of the project from pre-design through to occupancy.

A facilitator is engaged in order to help guide the process.

There is no change in the make-up of the core team for the duration of the project.

There is strong collaboration amongst the team members.

Moreover, BC Green Building Roundtable suggests the formation of a core team that is responsible to identify and bring in additional members into the project as necessary. They suggest that the following individuals make up the core project team:

- Client or owner’s representative
- Project manager
- Architect
- IDP facilitator
- Project champion (optional)
- Structural engineer
- Mechanical engineer
- Electrical engineer
- Green design specialist
- Civil engineer
- Facilities manager/Building operator
- Cost consultant
- Landscape architect
- General contractor or construction manager

They also suggest that the additional members who may be brought into the project by the core team be specialists, and be individuals that can offer their expertise either for the duration of the project or simply for a few workshops. Some examples for additional members provided are:

- Ecologists
- Building program representative
- Planning/regulatory/code approvals agencies representatives
- Interior designer
- Lighting or daylighting specialist
- Soils or geotechnical engineer
- Surveyor
- Marketing expert
- Academics and/or students with knowledge of a relevant subject
- Members of the community who are affected by the project

Generally speaking, in addition to being technically competent individuals, it is important that the team members selected are effective communicators, have a collaborative approach, and are open-minded (Perkins + Will, Stantec Consultants, 2007).

In addition to the importance of choosing the right team, it is also important to bring these team members into the project at the very beginning. This is important for several reasons. First, it provides an opportunity for the entire team to be present when developing a common vision and set of goals for the project, and therefore the individual team members have a stake and a sense of ownership in the project. Second, if done correctly, a collaborative spirit can be fostered from the beginning, which will help the team to solve problems, make decisions, and develop a holistic approach (Kibert, 2008). Lastly, because an interdisciplinary team consists of so many unique perspectives and expertise, it is vital to have the team present from the beginning so that their expertise can be maximized throughout the project (McLennan, 2006).

02.3 - BENEFITS OF USING AN IDP

There are several benefits associated with using an IDP, and these include benefits resulting from increased quality and innovation of the design process and final design, benefits associated with expedited approvals and community buy-in, and benefits associated with project budget efficiency.

02.3.1 - Innovation built in to the design process

The benefits in terms of the quality and efficiency of the design process have been discussed, but will be elaborated here. By using a broad and collaborative team from the beginning of the project, it is ensured that the necessary expertise and perspectives are present throughout the process, and the opportunities for useful input are maximized. As well, this approach capitalizes on the design team’s best effort and collective wisdom. By having a well-defined scope, vision, and goals, it can yield a more streamlined process, and can elicit a common understanding and buy-
02.3.3 - Potential for budgetary benefits

While it may seem counter-intuitive, involving all of the stakeholders in the project from the beginning can in fact be the most cost-effective approach in the long run (Perkins + Will, Stantec Consulting, 2007). One reason for this is that, because there are more ‘eyes’ on the project, there is an increased likelihood that potential inconsistencies or problems are addressed and solved as they arise (as opposed to later, when solving them can cost a project in terms of construction or permitting delays).

Moreover, because of the inclusion of decision-making tools such as LCA, the integrated design process allows for better forecasting of future costs associated with a project. Therefore, more informed decisions can be made as to what the most cost-effective solution to a given problem is, and life cycle operating costs can potentially be minimized.

02.4 - KEY CHALLENGES OF USING AN IDP

Successful IDPs tend to have a decision-making process that is agreed upon by the project team, and these tend to be processes whereby decision making abilities are not bestowed upon a single project team member (The American Institute of Architects, 2007). Rather, decisions tend to be made using a process resembling consensus, whereby all members of a group make the decisions in the best interest of the project.
This kind of decision making can be difficult to engender in a project for several reasons, however, including preconceived notions of power amongst the team, outside influences (be it budgetary, political, or administrative) and a lack of experience in interdisciplinary communication or this kind of decision-making process.

Moreover, even if a consensus model of decision-making is agreed upon, projects will always have a person whose interest (usually, financial interest) is at stake and who will have the final say to determine whether the result is in their best interest of not. In development projects, it is often assumed that the project manager (who is often represented by the architect) or client should have final say when it comes to a decision, regardless of whether an IDP is being followed or not. Community planning projects are a bit different in this regard, as the financial interest is shared amongst the community and there is not necessarily one person whose interest is at stake more than others.

Nonetheless, these preconceived notions can be difficult to overcome and must be addressed early on in the design process so that everyone is aware and agrees.

As mentioned earlier, a key to the success of an IDP is strong interdisciplinary communication and the ability to foster dialogue amongst all stakeholders. This can be another challenge because oftentimes these stakeholders have little or no experience communicating with one another.

For example, ecologists may have little experience working with engineers and architects, and may in fact have little experience working on built environment projects in general. Therefore, in addition to having a facilitator that is able to foster communication between stakeholders in order to make decisions regarding the project, it is important to have an over-arching strategy for fostering interdisciplinary communication (Cole et al., 2012).

A final key challenge to the IDP stems from unfamiliarity and uncertainty on behalf of the design team. It is not atypical for design team members to express concern - or even a lack of commitment - due to the fact that the IDP is so different from the design process they normally practice. These retreats to conventional operation can be difficult to overcome in some projects, and are typically based on a perception of risk; for example, concerns regarding project budget and timeline, return on investment, and the replicability and predictability of the project.

The remaining three chapters build upon concepts discussed in Chapters 1 and 2 and provide a more systematic way of looking at integrated and regenerative projects.

**02.5 - CHAPTER SUMMARY**

It is generally agreed amongst green building professionals that the successful design of high performance buildings requires a cooperative and engaged project team and a design process that fosters collaborative work (Pulaski & Horman, 2005; Rohracher, 2001). The Integrated Design Process (IDP) is one such approach for achieving this, and it was described in this chapter, including how it is approached, who should be involved, and what some of the benefits and challenges are of using it.

While the IDP requires significant investment in terms of engaging stakeholders early and often in a design project, it nonetheless has the potential to save money in the life of a project, and has a strong potential for creating holistic, innovative designs. A key challenge to the IDP is fostering inter-disciplinary communication amongst professionals who have little experience in this regard.
Coinciding with the emergence of the green building industry in the past two decades has been the development of a host of tools to support green building design practice and evaluate performance (Cole, 2012). The majority of these tools have their roots in the current sustainability paradigm, which focuses on minimizing damage caused by development, and until recently, none attempted to offer strategic guidance for regenerative design processes.

However, recently there has been a push by academics and practitioners in the building profession to create support tools and frameworks to assist designers and community stakeholders bridge the divide between the theory of regenerative design and actual practice.

This push to adopt frameworks is in some ways counter to the notion of regenerative design and its focus on being entirely place-based and therefore not formulaic. It can be argued that regenerative design cannot be mechanized such that a framework will reflect the mindset and steps needed to create a locally appropriate and regenerative project. However, others do not share this view, and instead suggest that the creation of metrics or frameworks is vital to the widespread adoption of regenerative design.

This chapter will outline three frameworks that have recently been proposed: the REGEN framework proposed by the US Green Building Council (USGBC) (Svec et al., 2012), the LENSES framework proposed by Colorado State University’s Institute for the Built Environment and the Rocky Mountain Institute (Plaut et al., 2012), and the Perkins + Will framework proposed by Perkins + Will and the University of British Columbia (Cole et al., 2012). Each framework will be described and analyzed according to its consistency with the goals and aims of regenerative design and the regenerative design process.
The framework itself is partially based on the Principles of Biomimicry developed by Janine Benyus (1997), The Living Building Imperatives (International Living Building Institute, 2009), and the LEED 2012 Impact Categories (USGBC, 2012), and it includes four nested quadrants (see Figure 3.1):

- Robust and Resilient Natural Systems,
- High-performing Constructed Systems,
- Prosperous Economic Systems, and
- Whole Social Systems (Svec et al., 2012).

It was designed to respond to a key question posed by the USGBC team: “How can a tool foster a more informed dialogue about place that will shift the consciousness of the community and result in a collective will to work for the benefit of all life?” (Svec et al., 2012, p. 85).

The tool consists of three components:
1. a framework that encourages systems thinking and shows the inter-connectedness of specific strategies to the whole and to other strategies for building and design;
2. place-based resources which provide data and other information regarding a particular project site, and;
3. a repository of regenerative project examples (Svec et al., 2012).
REGEN specifically does not propose a strict, universal definition of regenerative design nor does it require a specific process for carrying out regenerative projects. Rather, it is designed to build off of location-specific inputs to stimulate dialogue and help professionals to discover the story of place for a particular project (Svec et al., 2012).

### 03.1.3 - Use of the framework

The framework is designed to be highly place-based, and to work as an interactive web-based tool that a practitioner (be it a planner, designer, community stakeholder, or other interested party) can access and input the parameters of a particular project, such as the scale and location.

Following this input, the tool is populated with all of the information available in the database about that place and its current state of health (See Figure 3.2) (Svec et al., 2012). It is designed to be a project database that is continually updated and expanded as more projects are completed, and the information provided by this tool can then be used to inform project goals and strategies. For example, a project located in an area with minimal water supply could perhaps use that information provided to prioritize a goal of becoming self-sufficient with water and improve the water flows surrounding the project site.

In addition to providing information about the site, the REGEN tool helps to identify strategies for addressing project goals and highlights the interconnected nature of these goals. For example, a goal for reducing water has many positive impacts, including reducing municipal operating costs, public health benefits, and reduced strain on the local watershed. The tool works to graphically show these interconnections and therefore encourage the practitioner to think holistically and in a systems-based manner (See Figure 3.2).

Lastly, the REGEN tool provides a catalogue of examples of regenerative design projects. This part of the tool, much like the site-specific data, is designed such that it can be updated and expanded as regenerative projects are completed.
03.1.4 - Assessment

The strengths of the REGEN framework come from its understanding of the importance of place-based design, its focus on graphically showing connections and synergies, and the fact that it is designed to be iterative and built upon by practitioners that use it (the findings from one project can be uploaded to the site to provide more information about a particular area for the next user).

REGEN is also the most easily accessible of the three frameworks. Because it is designed to be web-based, it provides opportunities for non-traditional stakeholders or other interested parties to use it. As discussed in Chapter 1, this is an important aspect to the regenerative design process. While, as of yet, there is not a defined strategy for engaging these other stakeholders beyond initial exploration phase of a design process, this remains a moderate strength of REGEN.

The main weakness of the framework is that, at this time, there simply is not much information out there regarding ecosystem health and functioning for many sites since these measures are rarely taken into account or coordinated with development projects. It remains unclear how this information will be coordinated and organized in a digestible, usable form.

However, the REGEN team somewhat addresses this weakness by saying that missing or insufficient data could still yield positive results since this scenario “…could stimulate dialogue about the data that are or are not available for the region and also whether those findings coincide with the perceptions of the community” (Svec et al., pg 88). In other words, as long as the community is discussing ways of improving or accessing that data, then according to the REGEN team the tool has achieved a certain level of success.

Finally, REGEN does not directly state that it can be used for projects that are larger than building scale. The notion of going beyond the building is an important one in regenerative design and therefore this omission is a weakness of the tool.

03.2 - LENSES

03.2.1 - Background and theoretical underpinnings

LENSES (Living Environments in Natural, Social, and Economic Systems) is a framework developed by academics and practitioners from Colorado State University and the Rocky Mountain Institute. The intention of LENSES is “to shift mindsets toward regenerative thinking and to inspire positive action throughout the life cycle of a project” (Plaut et al., 2012, p. 113). While sharing certain attributes with other regenerative frameworks discussed in this section, LENSES moves away from prescriptive metrics and instead uses descriptive metrics to allow for flexibility and contextually appropriate solutions. Unlike other frameworks discussed in this section, LENSES is designed such that it can be used as a complement to other green building tools and rating systems by offering on-going guidance during the design, construction and operations phases of a project (Plaut et al., 2012).

03.2.2 - Overall scope and structure of framework

LENSES uses a layered visual model that is designed to illustrate the interconnections between systems and to assist users in understanding whole systems thinking and design. It is meant to be a guidance tool that “will lead users to appropriate, contextual, and regenerative decisions and actions” (Plaut et al., 2012, p. 115). Moreover, it is intended to be multi-scale, from single buildings to large-scale urban planning, as well as multi-sector, from development projects to organizational sustainability and logistics planning (Plaut et al., 2012).

The three system elements incorporated in the framework are natural, social, and economic systems. They refer to these three as the ‘triple’ or ‘integrated’ bottom line. Like the other frameworks discussed in this section, LENSES moves away from prescriptive metrics and instead uses descriptive metrics to allow for flexibility and contextually appropriate solutions. Unlike other frameworks discussed in this section, LENSES is designed such that it can be used as a complement to other green building tools and rating systems by offering on-going guidance during the design, construction and operations phases of a project (Plaut et al., 2012).
03.2.3 - Use of the framework

As the name suggests, the framework is designed as a series of three lenses (see Figure 3.3):

- The Foundation lens represents the guiding principles and values of sustainability, and includes descriptors such as partnership, health, spirit, stewardship, etc.

- The Aspects of Place lens (Figure 3.4) contains important categories of the built environment and includes descriptors such as energy, water, materials, health and comfort etc.

- The Flows lens highlights the various elements that flow throughout a site, and includes descriptors such as water, air, heat, light etc.

Each of these lenses is layered one on top of another, and this layering encourages users to contemplate interconnections between the various elements (Plaut et al., 2012).

In addition to the Foundation, Aspects of Place, and Flows descriptors (mentioned above), each lens includes space for considering factors that influence the triple bottom line (natural, social, and economic) as well as a series of open spaces, which allow users the opportunity to add elements to consider as they see fit (See Figure 3.4). This is meant to provide flexibility and adaptability, and to communicate to the user the importance of stakeholder engagement and humility on the part of the designers.

Thus, LENSES provides a systematic way that project stakeholders can assess their project and see how it addresses their goals and the opportunities presented by the site. This assessment is not limited to one phase of a project; LENSES is designed to change over time, depending on which phase a project is in. Nor is it limited to one type of project, as LENSES is designed to accommodate different kinds of projects and different project scales (for example, new build, restoration or reinventing operations).

03.2.4 - Assessment

The primary strength of the LENSES framework is its focus on highlighting connections between systems and strategies, as well as its focus on place-based design. As well, by placing an emphasis on social systems in the development process, the LENSES framework differentiates itself. Social system health is one aspect that is alluded to in both REGEN and the Perkins + Will framework, but is not prioritized to the same degree as it is in LENSES.

The main weakness of the LENSES framework at this point is its inaccessibility. It has a somewhat
complicated, non-intuitive structure that does not necessarily lend itself to use by non-designers. Although the tool offers some ‘open space’ in each lens for input from stakeholders, it seems unlikely that someone who is not well versed in building design would be able to fully comprehend and take advantage of this potentially powerful tool.

Another weakness of the LENSES framework is a lack of clarity over how to engage non-traditional stakeholders. The authors’ purport that engaging non-traditional stakeholders is vital to a regenerative process, yet despite the ‘open space’ afforded in each lens, the LENSES tool (much like the REGEN tool) makes little mention of strategies to engage non-traditional stakeholders in the design process.

**03.3.2 - Overall scope and structure of framework**

The framework uses a set of diagrams that represent the various human and ecological systems present in a particular project. Within the human and ecological system diagram (See Figure 3.5 on the following page), human needs are organized into four categories:

1. Factors that enhance individual human health and well-being, including greater access to clean air, water, energy and healthy food;
2. Factors that enhance social vibrancy and connection to the local community;
3. Factors that enhance cultural vitality through a reinforced sense of place and connection with nature, and;
4. Factors that promote a healthy economy through minimizing future operating costs and enhancing business and job opportunities (Cole *et al.*, 2012).

Like the other frameworks discussed, the Perkins + Will framework is designed to be context and project specific, rather than a tool designed to rate and compare the performance of different projects in different locations. As well, like LENSES, the framework is designed for use in multi-scale (individual building to neighborhood planning) and multi-sector (healthcare, education, commercial, residential) projects.

**03.3.1 - Background and theoretical underpinnings**

The Perkins + Will framework, developed in partnership with the University of British Columbia, is a question-based framework that is meant to guide (rather than prescribe) a regenerative design process (Cole *et al.*, 2012). The authors’ decision to pursue a question-based framework was based on the notion that questions are the most effective basis for initiating a different and expanded dialogue between the design team members and client, allowing the consideration of “a broader range of possibilities by moving beyond the immediate building and site boundaries” (Cole *et al.*, 2012, p. 95).

The framework is intended to emphasize the importance of the Integrated Design Process and the inclusion of non-traditional stakeholders such as ecologists, botanists, and hydrologists in the design process. The stated objectives of the Perkins + Will framework are:

- To initiate an alternative, expanded dialogue between the design team and the clients and users, moving beyond the immediate building and site boundaries;
- To emphasize the opportunities of the built environment to relate to, maintain, and enhance the health of the ecological and human systems surrounding the site;
- To highlight the ecological and human benefits that accrue from regenerative approaches, and;
- To facilitate the broader integration of design professionals with members of other disciplines that are not traditionally involved in the design process, such as ecologists, botanists, and hydrologists (Cole *et al.*, 2012).

Like the other frameworks discussed, the Perkins + Will framework is designed to be context and project specific, rather than a tool designed to rate and compare the performance of different projects in different locations. As well, like LENSES, the framework is designed for use in multi-scale (individual building to neighborhood planning) and multi-sector (healthcare, education, commercial, residential) projects.

Within the human and ecological system diagram (Figure 3.5 on following page), ecological system needs are organized based on the categories of ecosystem services as put forth by de Groot *et al.* (2002). These include items that provide support in the:

- Provision of habitat
- Incorporation of ecosystem service regulation processes, and;
- Harnessing of local production functions.
The view put forth in this framework is that the role of designing buildings is to engage in the resource flows (energy, water and materials) such that when resources are returned, “they support the maintenance of ecosystem functions to enable them to provide necessary services” (Cole et al., 2012, p. 100). Therefore, once the human and ecological system needs have been identified for a given project, and the resource flows have been mapped, design strategies can be conceived for addressing these needs.

They categorize these design strategies for engaging resource flows and cycles using four quadrants:

- **PRODUCE** - whether the resource is produced renewably and generated either onsite or locally;
- **USE** - whether resources are used effectively in satisfying human needs;
- **RECYCLE** - whether resources are used for multiple purposes and benefits, and;
- **RESTORE** - whether resources are replenished rather than diminished during the production of resources and assimilation of waste (Cole et al., 2012).

As previously mentioned, the framework does not have a score or comparative ranking system; rather, it involves a set of broad capabilities that frame the regenerative capabilities of the system. In the Perkins + Will framework, the key regenerative capabilities of a project include whether it:

- Restores and enhances local ecosystem function capacity
- Creates positive synergistic connections between resource cycles and local ecological systems

Figure 3.5 - The representation of place, showing both ecological and human systems in the Perkins + Will framework (Cole et al., 2012).
Regenerative Design | an exploration

03.3.3 - Use of the framework

Using the four resource-cycle quadrants mentioned above (PRODUCE, USE, RECYCLE, and RESTORE), the project team asks questions as they relate to the community or client, as they relate to the design team, and as they relate to design tasks. See Figure 3.6 as an example of how this is carried out.

A project using the Perkins + Will framework would unfold as follows. First the project engagement and education

- Improves the effectiveness of life cycle resource use
- Generates opportunities for cultural development
- Generates economic wealth within the local community
- Acts as a catalyst to generate positive change beyond the site boundary (Cole et al., 2012)

The framework offers a general guide for approaching regenerative projects, however it is designed to be tailored to specific projects and is not meant to be a generic guide to follow regardless of where a project is situated. The framework is meant to ascertain the above-mentioned information through site analysis and question-based community engagement.

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>Community/Client/User</th>
<th>Team Meeting/Charrette</th>
<th>Design Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTENT</td>
<td>Identify project goals and aspirations related to energy flow cycle</td>
<td>Drill down to more detailed strategies, understand the potential of strategies to “give back” more than they demand</td>
<td>Examine design strategies, their technical feasibility, implications and synergistic benefits</td>
</tr>
<tr>
<td>QUESTIONS</td>
<td>How can this strategy be constructed/applied/designed so that it enhances resource cycles as a whole?</td>
<td>What potential synergies can this strategy have with other resource cycle strategies?</td>
<td>How can these synergies act as an agent to positively affect the future regenerative capabilities of the energy cycle?</td>
</tr>
<tr>
<td>CYCLE</td>
<td>Direct</td>
<td>Indirect</td>
<td>Direct</td>
</tr>
<tr>
<td>Produce</td>
<td>How can the energy required by the project be acquired and used in such a way that there is a net benefit for the health of the inhabitants, the community and the affected ecosystems?</td>
<td>What natural place-specific energy resources can be harvested?</td>
<td>What future changes may influence both onsite and offsite energy generation?</td>
</tr>
</tbody>
</table>

Figure 3.6 - A table showing example questions asked regarding the different resource cycles (PRODUCE, USE, RECYCLE, RESTORE) in the Perkins + Will framework (from Cole et al., 2012).
team would introduce the stakeholders to the framework and the concept of regenerative design, while facilitating a session with the intention of developing overarching project aspirations. This would be followed by a goal setting charrette that is meant to identify “high-level place-specific regenerative project goals related to the framework cycles” (Cole et al., 2012, p. 109). An example question that may be asked at this stage is “What are some opportunities presented by the water flows on-site to provide a net benefit for ecosystem health?”

Following this would be a ‘strategies and synergies’ stage, which is meant to identify areas, goals, or aspirations that are synergistic in nature and that therefore can be viewed under the same lens. Building upon the example question given in the previous stage, a question that may be asked at this stage is “What opportunities are there to restore on-site hydrology?” Note that this question begins to hone in on certain strategies discussed in the goal setting charrette.

Lastly is the whole systems stage, which builds upon the strategies and synergies stage by linking strategies and approaches to “achieve maximum ecological human benefit” (Cole et al., 2012, p. 109). An example question that may be asked at this stage is “How can this strategy be constructed/applied/design in such a way that it supports ecological functions and enhances human systems health?”

Continuing on with the water flow example used in the previous two stages, a possibility may be (assuming there are water flows and potential for restoring on-site hydrology) to create a constructed wetland sanctuary that simultaneously improves on-site water quality as well as human health through the creation of relaxing place where one has access to nature.

03.3.4 - Assessment

The strengths of the Perkins + Will framework include its focus and emphasis on the inclusion of non-traditional stakeholders in the design process, its insistence on focusing on a question-based structure for enhancing dialogue, and its recognition of the importance of thinking beyond the scope of the site.

The main weakness of the framework is that it is not very accessible to those outside of the design realm. For all of the focus on engaging non-traditional stakeholders in the design process, the framework is still designed from the mentality that the architect/urban designer would be leading the charrette process and engaging other stakeholders, as opposed to a more egalitarian form of engagement that they seem to suggest using in their description.

As well, one of the strengths of other frameworks such as REGEN (Svec et al., 2012) is its focus on learning from other projects, almost crowdsourcing with its open, iterative stance. The Perkins + Will framework is much more constrained as it is designed to be used by Perkins + Will employees only. This, in some ways, dampens its intent to be iterative and outward focused.

In this chapter, these three frameworks (the REGEN framework put forth by the USGBC, the LENSES framework proposed by Colorado State University Institute for the Built Environment and the Rocky Mountain Institute, and the Perkins + Will framework put forth by Perkins + Will and the University of British Columbia) were described in detail, including their background and theoretical underpinnings, their overall scope, and how they are used. Each framework was then assessed in terms of its ability to address the elements of regenerative design (referring back to Chapter 1) and the Integrated Design Process (referring back to Chapter 2). See page 41 for a summary assessment of the strengths of each of these frameworks, and page 42 for a detailed summary of the characteristics of each framework.

From these assessments, what becomes clear is that none of these tools – at this stage of their development – fully addresses all of the elements of either regenerative design or the Integrated Design Process. While they all demonstrate a commitment to shifting the developmental mindset from one of minimizing degradation to one of benefitting all systems, and generally...
REGEN is strong in terms of facilitating the notion of designing from place, and shows a reasonable commitment to community engagement and facilitating holistic or systems thinking. However, it fails to demonstrate strategies for engaging non-traditional stakeholders and fostering interdisciplinary communication; two vital aspects to the Integrated Design Process.

LENSES, on the other hand, is strong in terms of facilitating holistic and systems thinking, but fails to demonstrate community engagement strategies, strategies for engaging non-traditional stakeholders, or strategies for fostering interdisciplinary communication.

Perkins + Will, perhaps the most robust of the three frameworks on its own, is strong in terms of facilitating the notion of engaging non-traditional stakeholders in the design process, and in terms of identifying strategies for fostering strong inter-disciplinary communication. However, while it is moderately strong in terms of facilitating the notion of designing from place and facilitating holistic or systems thinking, it largely fails to demonstrate how it will carry out its community engagement strategies.

There are several encouraging things to note about these frameworks. First of all, these are first iterations of these frameworks and the authors have acknowledged that there is much more work to be done on them. Moreover, the authors have incorporated feedback mechanisms into each of these frameworks, so that they can create iterative improvements as weaknesses become apparent.

A second encouraging aspect of these frameworks is, because they have few areas of convergence in terms of strengths, they can potentially be used in concert to create a strong regenerative design process.

For example, the REGEN tool is designed to be more of an information source, where stakeholders can access information regarding a particular site or past project in order to inform their designs. There is no reason why this tool cannot be used as a supplemental tool to the LENSES or Perkins + Will framework, which are both much more design-process oriented and could benefit from the information gained from the REGEN tool. Similarly, these tools can be helpful and supplemental to other green building checklists and frameworks.

Finally, it is encouraging to see these three frameworks proposed, as it signals the growth of the regenerative design discipline and its increasing application in various contexts and project types.

Despite the encouraging signs mentioned, it is worth noting that regenerative design may not lend itself to being mechanized into a framework. Some individuals (most notably, Bill Reed and Pamela Mang) are strongly opposed to this mechanization, and view that it is contrary to the local-specific nature of the regenerative approach. This difference of opinion will undoubtedly continue to be a sticking point in the dialogue surrounding the advancement of regenerative design.
A three-point scale was used to assess the degree to which each framework addresses the core tenets of regenerative design. Based on this assessment, what becomes clear is the fact that none of the frameworks strongly address all of the core tenets of regenerative design. While the Perkins+Will scored the best (having 4 ‘strongly addresses’ versus 3 each for REGEN and LENSES), it scored poorly on Community Engagement, and only moderately addressed the notion of Designing from Place and Holistic Thinking.

This suggests that further work must be done on these frameworks so that they better address the core tenets of regenerative design. A more detailed summary table of the characteristics of each of the regenerative frameworks can be found on the following page.
## Core Tenets of Regenerative Design

<table>
<thead>
<tr>
<th>Benefit all systems</th>
<th>REGEN</th>
<th>LENSES</th>
<th>Perkins+Will</th>
</tr>
</thead>
</table>
| Benefit all systems | Four nested quadrants in tool:  
- Robust and Resilient Natural Systems,  
- High-performing Constructed Systems,  
- Prosperous Economic Systems, and  
- Whole Social Systems. | Each of the Foundation, Aspects of Place, and Flows lens includes space for considering factors that improve the triple bottom line (natural, social, and economic). | Goals presented:  
- Improve well-being of community members  
- Restore local ecosystem functioning  
- Generate opportunities for cultural development |
| Beyond building scale | Minimal mention of this core tenet. | Intended to be multi-scale, from single buildings to large-scale urban planning, as well as multi-sector, from development projects to organizational sustainability and logistics planning. | Designed for use in multi-scale (individual building to neighborhood planning) and multi-sector (healthcare, education, commercial, residential) projects. |
| Non-traditional stakeholders | Web-accessibility and open-source nature breaks down barriers to engaging non-traditional stakeholders. | No explicit strategy for engaging non-traditional stakeholders, non-intuitive nature may present barrier to non-traditional stakeholders. | Emphasizes the importance of the Integrated Design Process and the inclusion of non-traditional stakeholders in the design process. |
| Inter-disciplinary Communication | No strategy provided for fostering interdisciplinary communication. | No strategy provided for fostering interdisciplinary communication. | Questions-based framework requires, and fosters, strong communication amongst the design team. |
| Design from Place | Designer inputs project data and tool is populated with all of the information available in the database about that place and its current state of health. | Tool is populated with place-specific information that are then used to inform design solutions. | By asking designers and community members questions, place-specific data is ascertained so that the design will reflect the unique attributes of the place. |
| Holistic/Systems Thinking | Tool graphically shows connections between systems and offers potential synergistic solutions. | Layered visual model illustrates the interconnections between systems and assists users in understanding whole systems thinking and design. | Assesses the various human and ecological systems present in a particular project with the goal of improving their functioning. |
| Community Engagement | Web-accessibility and open-source nature breaks down barriers to community engagement. | No strategy provided for engaging the community, non-intuitive design may present barrier to community. | Proprietary nature of the framework provides a barrier to effective community input. |
In this chapter the design process and features for the Centre for Interactive Research on Sustainability (CIRS) on UBC campus will be described. The chapter will begin by providing a general description of the project in terms of its goals and vision, its timeline, as well as the features which make it an innovative building.

After this general project description, the Integrated Design Process (IDP) for CIRS will be described, and the accomplishments made by the design team at each of the phases of the IDP will be outlined. Following this, the IDP for CIRS will be assessed in terms of how well it adhered to the core principles of the IDP described in Chapter 2.

In the final section of this chapter we will return to regenerative design. CIRS has recently been described as a regenerative building, and with this in mind, the CIRS design process and features will be assessed in terms of their consistency and adherence to the core tenets of regenerative design described in Chapter 1.
The Centre for Interactive Research on Sustainability (CIRS) on the University of British Columbia’s Vancouver campus is described as “a regenerative building [that] goes beyond LEED Platinum building” (CIRS website, 2012). Since construction has been completed, CIRS has been called the “greenest building in North America” by the University (UBC Public Affairs, 2011) and has been lauded for its innovative, integrated systems design.

Located on UBC Vancouver campus, CIRS produces more energy than it consumes, captures and treats all of its water on-site, is a carbon sink due to its wood construction, and is a regional hub for research on sustainability.

The CIRS project is unique, not only in terms of its architectural design, systems-design, and green features, but also because of its design process. The design process spanned over 10 years and the building moved from three different prospective sites (one on UBC Vancouver campus, one on the Great Northern Way Campus, and a third – final - site back on UBC Vancouver campus). Throughout the process, the design team followed an Integrated Design Process (IDP), led by the primary architects at Busby Perkins + Will (BP+W).
Stakeholders representing all project partners were present throughout the design process, and these included individuals from Stantec, BP+W, BC Hydro, UBC Sustainability Initiative (USI), BC Institute of Technology (BCIT), Honeywell, Haworth, Corix and Brooks Corning (see Figure 4.1 on previous page).

Throughout the design process, and more specifically during the visioning charrette, 22 goals and 205 strategies were identified for the project. These goals and strategies were then synthesized down to three summary goals: to be green, to be smart, and to be humane (see callout).

One of the goals for CIRS was “to function as a living laboratory exploring how the ways we construct and inhabit buildings can support a sustainable future” (Busby Perkins and Will, CIRS Goals Summary, 2008). The website for CIRS (http://cirs.ubc.ca/) is a good example of how this goal has been translated into action, as it is quite comprehensive in terms of providing information regarding system design, lessons learned, and operational data. Individuals can therefore access the website and interact with CIRS to learn about sustainability and push the concepts forward.

**04.1.2 - Timeline and milestones**

As mentioned previously, the design process for CIRS had several iterations, with different prospective sites and stakeholders involved over a period of twelve years. The timeline on the following page (Figure 4.2) highlights some of the milestones from the final design process for CIRS on UBC campus, which began in 2008. The design process for this final iteration was informed by the work that had been done in the previous iterations which began in the early 2000s.

One thing to note in the timeline is the multitude of charrettes that took place during 2008; these charrettes are integral to the IDP as they provide a venue for collaboration and brainstorming amongst the diverse design team and stakeholder groups. In addition to these charrettes, weekly meetings were held at the BP+W office with the integrated design team. These meetings are not shown on the timeline, but were attended by the primary stakeholders shown in Figure 4.1.

Also of note in the timeline are the funding releases (which would often follow approvals), memorandums of understanding (MOUs) and letters of intent (LOI) that were signed by various partners (industry and academic). The MOUs and LOIs with industry partners are important to note as they were sought after to contribute to CIRS’ goal of becoming a hub for sustainability research, with partnerships in industry and other academic institutions. Again, only those signed after 2008 are shown on this timeline; many more were agreed upon in the previous iterations of the design process for CIRS.

These funding sources are particularly noteworthy because in some cases they guided the systems design. For example, funding from the Canadian Foundation for Innovation (CFI) and Sustainable Development Technology

**CIRS GOALS**

**GREEN:** Look outward from the building to the health of ecological systems. What we build can be constructed, operated, adapted, and disassembled in ways that go on and on without using up non-renewable resources or burdening future generations with wastes. Moving beyond “less bad,” CIRS goals are regenerative—leave our campsite better than we found it.

**SMART:** Apply human design intelligence augmented with monitoring and feedback to get the most out of the available energy and material flows afforded by the site and its surroundings. Feedback is key to ensuring that the system of the building and its inhabitants performs well. By taking this approach, CIRS aims to develop approaches towards meeting human needs at the lowest life-cycle costs, solutions that can be replicated and adapted into buildings worldwide economically.

**HUMANE:** The reason we construct a building is to provide a healthy environment for its inhabitants. CIRS aims to provide a healthy functional environment for human habitation which adapts to changing needs and uses over time.

*from Busby, Perkins + Will, CIRS Goals Summary, 2008*
Figure 4.2 - Design process timeline for CIRS (2008-present).
Canada (SDTC) was attained (prior to 2008) to install PV, solar hot water, and geothermal heating. Once this funding was secured, the decision to go with these systems was made.

04.2 - ANALYSIS OF THE IDP FOR CIRS

An assessment of the IDP for CIRS offers an opportunity to learn from the process so that other, future projects can have an efficient, effective design process. In the following subsection, the IDP for CIRS will first be described in terms of what was accomplished during the various phases of an IDP (these phases are those described in the Roadmap for the Integrated Design Process put forth by the BC Green Building Roundtable in 2007).

Following this, an assessment of the IDP for CIRS will be completed, using three factors as a critical lens; its level of community engagement, the selection of the design team, and the decision-making processes employed.

04.2.1 - Description of IDP for CIRS

Phase 1 - Pre-design
As previously mentioned, there have been several iterations for CIRS, and therefore several periods of time that could be described as pre-design or schematic design. For purposes of this project, I will describe all of the iterations prior to 2008 (the final iteration which yielded the building we know today as CIRS) as being in the pre-design stage.

In the Roadmap for the Integrated Design Process (2007), the BC Green Building Roundtable describes the pre-design phase as a period of time when the design team:

explores the relationships between the project and its surrounding environment to help reveal the optimum choices for the site, the users, and the owner (Perkins + Will, Stantec Consultants, 2007, p. 23).

Key outputs from the Pre-Design phase in a typical IDP are:

- Vision statement, goals and targets
- Preliminary budget and feasibility studies
- Communication pathways established

What occurred during the Pre-Design phase for CIRS?

Key outputs from the Pre-Design phase for CIRS were:

- CIRS goals and vision
- Site feasibility report from BP+W
- Preliminary energy modeling studies
- Collaborative spirit fostered amongst the design team

In the pre-design phase for CIRS, BP+W carried out several feasibility studies and Stantec did the energy modeling. The first visioning charrette was also held in this phase. In this charrette, the primary goals and vision were developed, which became the principles that guided the design process for CIRS. Lastly, in this phase researchers at UBC assessed whether the use of Building Information Modeling would be beneficial to the project.
Phase 2 - Schematic Design

In the Roadmap (2007), the BC Green Building Roundtable describes the schematic design phase as a period of time when the design team:

builds upon the vision developed in Pre-design. It is the phase for thinking “outside the box,” for exploring innovative technologies, new ideas, and fresh application methods in working towards the broad goals and objectives set out in Pre-design (Perkins + Will, Stantec Consultants, 2007, p. 25).

Key outputs from the Schematic Design phase in a typical IDP are:
- Preliminary energy analysis
- Preliminary financial estimate
- Schematic Design Report

What occurred during the Schematic Design phase for CIRS?

Key outputs from the Schematic Design phase for CIRS were:
- Site-specific energy models
- The idea of a heat exchange with Earth and Ocean Science (EOS)
- Decision to go with a constructed wetland for wastewater treatment
- Incorporation of a daylighted auditorium into schematic design
- Schematic Design report from BP+W

In the schematic design phase for CIRS, the four charrettes were held in order to advance various ideas that had been developed in the pre-design phase (i.e., that had been developed in the previous iterations of CIRS). These charrettes included one to do with overall design, one to do with water systems, one to do with daylighting, and a final one, which had to do with energy systems.

Because of the work that had already been completed in the previous iterations for CIRS, these charrettes took the form of a focused workshop rather than an open brainstorming event (which is more typically the purpose and structure of a charrette). Indeed, many of the ideas for the energy and water systems were carried forward from the work done in previous workshops for CIRS.

Of course, the final iteration was carried out on a new site on UBC campus and, therefore, with a new location, the design had to be altered to fit and work within the constraints of the site. This provided some challenges (such as orientation of the building to maximize solar gain) and some opportunities (such as the presence of an adjacent building that rejected excess heat, leading to the idea for a heat exchange).

Phase 3 - Design Development

In the Roadmap (2007), the BC Green Building Roundtable describes the design development phase as being:

a time to firm up and validate choices, resulting in a schematic design concept being selected and approved by the client (Perkins + Will, Stantec Consultants, 2007, p. 26).

Key outputs from the Design Development phase in a typical IDP are:
- Energy simulation report
- Detailed financial report (including LCA if possible)

What occurred during the Design Development phase for CIRS?

Key outputs from the Design Development phase for CIRS were:
- Working drawings for the various systems (electrical, mechanical, water and waste)
- Validation of the feasibility for the heat exchange with Earth and Ocean Science
- LCA for structural and energy systems

There often is a certain degree of muddling between the design development and schematic design phases, depending on which system is being looked at. This therefore tends to involve some back-and-forth between the engineers, architects, and other stakeholders to ensure that the design is realized in a way that is agreeable and feasible.

In the CIRS case, the design development phase involved taking the systems that were proposed in the various charrettes and deciding which ones were to be explored further. These decisions occurred during the charrettes, and therefore (as mentioned above) the line between schematic design and design development became somewhat blurred.

Despite the muddling, decisions were made in this phase to move ahead with the heat exchange with EOS, and the building envelope, BIPV, and Solar Aquatic System designs were finalized.
Phase 4 - Construction Documentation
In the Roadmap (2007), the BC Green Building Roundtable describes the construction documentation phase as a period of time when:

The construction documents (CDs) are prepared based on approved Design Development documents as well as final calculations and specifications (Perkins + Will, Stantec Consultants, 2007, p. 27).

Key outputs from the Construction Documentation phase in a typical IDP are:
- Tender documents
- Commissioning plan

What occurred during the Construction Documentation phase for CIRS?

Key outputs from the Construction Documentation phase for CIRS were:
- Updated project budget and schedule
- Final funding release and approvals from the BOG
- Tender documents and commissioning plan

UBC’s development approval body is the Board of Governors, and the Board is responsible for releasing funding throughout the course of the project. The CIRS project received final approval from the Board of Governors in September, 2009, which, along with the final funding release, meant that site preparation could begin.

Phase 5 - Bidding, construction, commissioning
In the Roadmap (2007), the BC Green Building Roundtable describes the bidding, construction, and commissioning phase as a period of time when:

the main design plans are realized. Qualified contractors are chosen, communication procedures are set in place, and the expanded team works to transform the abstract into actuality (Perkins + Will, Stantec Consultants, 2007, p. 28).

Key outputs from the Bidding, Construction and Commissioning phase in a typical IDP are:
- Selection of construction team
- Site preparation and commissioning reports

What occurred during the Bidding, Construction and Commissioning phase for CIRS?

Key outputs from the Bidding, Construction, and Commission phase for CIRS were:
- Selection of main building contractor
- Selection of sub-contractors and trades
- Site preparation at UBC campus

In the bidding, construction, and commissioning phase for CIRS, Heatherbrae was selected as the main building contractor to coordinate the construction process. They were under considerable pressure to reach the desired occupancy date of September, 2011. That deadline meant that the entire construction process (from site preparation to occupation) had to be completed within 2 years, a difficult task for any large building project.

Phase 6 - Building Operation
In the Roadmap (2007), the BC Green Building Roundtable describes the building operation phase as:

a key transition phase during which the design team must ensure responsibility for and knowledge of the building is properly transferred to the building’s new stewards: the owner, occupants, and operations staff (Perkins + Will, Stantec Consultants, 2007, p. 29).

Key outputs from the Building Operation phase in a typical IDP are:
- Training and education materials
- Completed commissioning documentation

What occurred during the Building Operation phase for CIRS?

Key outputs of the Building Operation phase for CIRS were:
- Building operation education for occupants (USI, SALA, UBC operations etc.)
- Final commissioning documentation

In the building operation phase for CIRS, the design team educated the owners and operations staff with regard to how the building was to operate. Because the owners and operations staff, as well as some occupants, were present throughout the process, this transition phase was smooth and the owners, operators, and occupants were quickly made aware of their responsibilities with regard to becoming the building’s new stewards.
This required educating occupants on items such as the heating system (for example, when to open a window and when not to) and the water system (for example, signage for non-potable water in toilets).

**Phase 7 - Post-Occupancy**
In the *Roadmap* (2007), the BC Green Building Roundtable describes the post-occupancy phase as a period of time where it is important to:

> provide feedback loops, which facilitate continuous optimization of the building’s performance (Perkins + Will, Stantec Consultants, 2007, p. 29).

**Key outputs from the Post-Occupancy phase in a typical IDP are:**
- Continuous monitoring
- Building performance evaluation results

**What is occurring during the Post-Occupancy phase for CIRS?**

**Key outputs of the Post-Occupancy phase for CIRS are ongoing, and:**
- Feedback and monitoring mechanisms are coming online and being continually updated.

CIRS is currently in this phase of the IDP. Building operators and researchers are waiting for many of the system feedback and monitoring devices to go on-line. When this happens, there will be real-time data available for the amount of energy and water the building is using at a particular time. This data will then be used to make changes to the system as necessary to optimize performance.

**04.2.2 - Assessment of CIRS IDP**

CIRS offers a model for success for the IDP in terms of its community engagement process and choice of design team, but it also offers some important lessons for future projects in terms of the adoption of decision-making structures the anticipation of pressures and constraints on project timelines. In this sub-section, these successes and lessons learned will be discussed in turn.

**Successes in the IDP for CIRS**

In terms of successes, CIRS did a laudable job in engaging the community. The initial charrettes were open to the public, and several UBC students were involved throughout the entire design process, offering insights and attending charrettes. Following a common model for undertaking an IDP, engagement with the wider community was tapered off as the design process evolved, with the final meetings and charrettes resembling targeted workshops rather than open brainstorm events.

As well, the integrated design team seems to have been chosen fairly well, as it had members from traditional (engineers, architects, planners) and non-traditional (ecologists, energy modelers) professions. However, the non-traditional professionals seem to have been engaged only periodically. For example, an ecologist was brought in to offer insights with regard to landscape design, but not for other purposes. On the other hand, energy modelers were engaged more consistently throughout the design process, and were relied upon to present updated models to show tradeoffs between system options.

Moreover, having a project manager (Alberto Cayuela) on the design team ensured that communication channels would be open between members of the design team, and the presence of a project champion in John Robinson helped to ensure that the project vision was maintained throughout the design process.

**Weaknesses in the IDP for CIRS**

A major weakness in the design process for CIRS is that there was not an agreed-upon decision-making process that the design team could turn to when making difficult decisions. While many of those involved have said that what evolved was a process resembling consensus, there was not a point in time whereby this was explicitly decided upon.

The *Roadmap for the Integrated Design Process* (Perkins + Will, Stantec Consultants, 2007) stresses the importance of using a systematic and structured decision-making process in order to ensure that quality decisions are made in an efficient manner, yet this seems to have been overlooked by the project leads (who, ironically, came from Perkins + Will and Stantec themselves).

Without a structured decision-making process, the onus was on the designers to present arguments in favour of their designs, and to convince the group to make a decision to move ahead with their designs.
Pressures and Constraints

While it is important to acknowledge the weaknesses in the design process for CIRS, it is equally important to acknowledge the fact that there were several pressures that may have impacted the design team’s adherence to the principles of an IDP, such as time and budgetary constraints. These are pressures and constraints that are not atypical in development projects, and therefore it is important to acknowledge these constraints so that future projects can work toward overcoming them.

While the design process took place over a period of more than a decade, the last iteration took place over only four years, and during the design development phase, pressure mounted from UBC to begin construction. This pressure came from funding allocations, the need for extra auditorium space on UBC campus (this led to the addition of the auditorium at CIRS, which was previously not a part of the design), and the usual rush that is often associated with budgetary constraints in construction.

Similar challenges and constraints are typically encountered in most development projects, and indeed tend to be encountered even more so in projects that are not located in the relatively favourable administrative environment of a university campus. This is an environment where the land owner, administrator, building operator, and primary financier all come from the same organizational entity.

In non-university projects, there is an added layer of complexity by way of the need for coordination amongst these organizations and stakeholders. Therefore, it is important to anticipate that these pressures and constraints will occur in a development project, and work toward overcoming these barriers to innovation through better project planning and communication amongst stakeholders.

04.3 - IS CIRS REGENERATIVE?

Amongst the positive things that have been said about CIRS and its design and performance has been a growing voice calling CIRS a regenerative building. Indeed, it is described as such on the CIRS website, and this designation is a result of the fact that the building is net-positive on energy, it captures and treats all water on-site, and it is an educational hub or ‘living laboratory’ where community partners can come to learn and push forward concepts of sustainability.

It is only relatively recently (within the past two years) that the term ‘regenerative’ has been used to describe the building, and it was not used during the design process for CIRS. As discussed in Chapter 1, many individuals state that process is the most important aspect of regenerative design, and therefore this brings into question the validity of the use of such a term to describe CIRS, which despite its exceedingly innovative, net-positive design, did not undertake the design process with a regenerative goal in mind.

Also mentioned in Chapter 1 was the fact that there are minimal examples of regenerative projects from which to learn from and use as precedents, and the practice of creating case studies should be encouraged in order to increase the pool of information available regarding innovative projects and their adherence to regenerative design features.

Considering this, the following two subsections tackle the question of whether CIRS is a regenerative building so that this case may be added to the pool of information available describing innovative projects. In the first subsection, the design features of CIRS will be described in detail, both in terms of their general design as well as their performance measures.

Following this, an assessment of the design process for CIRS will be completed, and this will be undertaken using the core tenets of regenerative design (discussed in Chapter 1) as a critical lens.

04.3.1 - Description of systems

Energy System

CIRS is net-positive on energy, and this is due to the integration of several energy systems: building integrated photovoltaics (BIPV), solar hot water, a ground source heat pump (GSHP), and a heat exchange with adjacent Earth and Ocean Sciences (EOS) (See Figure 4.3 and 4.4 on the following page). In total, the estimated energy savings for UBC due to the energy system at CIRS is over 1 million kilowatt-hours per year.

BIPV

CIRS provides roughly 10% of its electricity from its 25-kilowatt BIPV. While the Pacific Northwest is not the ideal climate for PVs in...
terms of efficiency, the decision to integrate them with the building was viewed as being important as an educational tool and to address CIRS goal of being a hub for research and learning on sustainability. When one looks at the building and sees the BIPV, they are forced to think about the dual purpose of these panels; to be both an energy producing device and a shading system.

**Solar hot water**
The 40 square meter evacuated tube array on the roof provide heat for the domestic hot water in CIRS. This array provides a significant amount of heat annually (over 15,000 kilowatt-hours) but a weakness is that any heat excess is dissipated to the atmosphere. One of the stated lessons learned for CIRS is that in future projects a goal would be to recapture this heat.

**GSHP**
The GSHP supplements other space-heating systems such as the heat exchange with EOS (described next). This system accepts heat from the earth when needed in the building and rejects heat when the building overheats.

**Heat exchange with EOS**
The heat exchange with EOS is an innovative design whereby excess heat from EOS (which ejects much excess heat due to its numerous labs) is harnessed and used by CIRS. What is left over (i.e., what is not used by CIRS) is then sent back to EOS, closing the loop. This was a major energy decision made for CIRS, as it went beyond the scale of the building to create synergies in the built environment.

**Water System**
CIRS seeks to capture and treat all water on-site, and this has led to the design of rainwater collection and reuse system, a stormwater infiltration system, and a reclaimed water Solar Aquatic System.

**Rainwater System**
Rainwater is harvested from the roof of the building and is stored in a 100m³ cistern (See Figure 4.5). The rainwater is filtered on-site and distributed through the building for potable water consumption. One of the programmatic realities of CIRS that helps this system to function most efficiently is the fact that the time of year with the least amount of rain (the summer months) is also the time of year with the least demand for water, as student, staff and faculty populations are at their lowest. This latent demand in the dry months nonetheless requires the storage of large quantities of water.

The demands for water at CIRS including sinks, showers, the Loop Café, janitorial services and building maintenance, amounting to an estimated demand of 2,000 litres per day. Due to the extensive use of wood in the building, an additional 57,000 litres of water are required to be available at all times for the fire suppression system. These demands are able to met because of the large annual rainfall in Vancouver (1226 millimeters per m²). With this, the harvest
operations so that adjustments can be made to improve the performance of the building, and to better understand how the design features can be optimized in this project as well as others.

### 04.3.2 - Adherence to the core tenets of regenerative design

In order to address the question of whether CIRS is in fact truly regenerative, in this section an assessment of the design process for CIRS will be completed. This assessment will be undertaken using the core tenets of regenerative design (discussed in Chapter 1) as a critical lens.

**Benefit the surrounding systems**

CIRS is net-positive on energy, captures and treats all of its water on-site, and is an incubator for innovative research on sustainability. Because of its presence on UBC campus, the campus-wide energy demands are lower (primarily due to the heat exchange with EOS). Also, because of its presence on campus, the campus-wide impact on the storm sewer system is decreased (due to its stormwater system).

When looking at UBC en masse, it is possible to criticize the heat exchange with EOS as it is only possible due to the inefficiencies of EOS. However, EOS is not the first inefficient building, nor will it be the last, and the idea of harvesting a neighbouring building’s excess heat provides a replicable model for others to use and benefit from.

The fact that building operators are documenting the entire design and operating process with potential for CIRS is over 1.2 million litres of rainwater per year, enough to be cover all demands.

**Stormwater**

CIRS has a series of channels that lead to a drainage basin located on Sustainability Street (see Figure 4.6). Stormwater is collected from the living roof and landscaping and then channeled to the drainage basin. From there, the water is allowed to filter back into the local aquifer. This reduces demand on the local sewer system, which is aging and heavily used.

**Solar Aquatic System**

All of the reclaimed water used at CIRS is treated onsite and reused within the building (see Figure 4.7). The Solar Aquatic System, designed and built by Eco-Tek Ecological Technology Inc., filters water using processes that exist in nature for breaking down human biological waste to produce clean water. The water that is collected from the building is treated and reused within the building for irrigation and toilet flushing, effectively closing the loop of the water cycle.

The ecologically engineered system is designed to mimic the purification processes that occur in natural water systems such as streams and wetlands. The system is located in a visible, glass-walled room in the southwest corner of the building, and its visibility is meant to encourage users to interact with the building and learn about the system.

**Living Laboratory**

One of the original goals for CIRS was to be a Living Laboratory; a place where research could be conducted to accelerate sustainability. In order to achieve this mandate, CIRS continually seeks to create opportunities to educate and make connections with community groups, and to foster relationships with industry partners.

As well, one of the major goals for operations is to track and compile data on day-to-day operations so that adjustments can be made to improve the performance of the building, and to better understand how the design features can be optimized in this project as well as others.

### Figure 4.6 - Stormwater recovery system for CIRS (from cirs.ubc.ca).

### Figure 4.7 - Reclaimed water system and Solar Aquatic System for CIRS (from cirs.ubc.ca).
the intention of learning from mistakes and improving performance is another way that CIRS is benefitting the community. The research done at CIRS will have a ‘ripple effect’ in that it will be shared with other interested parties from around the community, nation, and world.

Therefore, CIRS addresses the notion in regenerative design that speaks to reframing the mindset from minimizing damage to one of benefitting surrounding systems.

**Importance of Community Engagement**

The CIRS design process brought members of the UBC community to the table, and students were present at all of the design charrettes. This, as well as the fact that there were four charrettes held during the design process of the most recent iteration, is unusual and is a sign of the commitment of the design team to community engagement.

Therefore, the design process for CIRS demonstrated a commitment to this core tenet of regenerative design.

**Engaging non-traditional stakeholders**

The design process for CIRS included input from student researchers, ecologists (once, during the landscape design), energy modelers, and life cycle analysis specialists.

While some non-traditional stakeholders (such as anthropologists and artists) that are described by Cole et al. (2012) as being useful additions to a design process were not engaged, overall the design process engaged far more stakeholders (non-traditional and otherwise) than a typical green project.

Therefore, the design process for CIRS demonstrated a commitment to this core tenet of regenerative design.

**Conclusion**

Considering all of this, what can be said about the design process for CIRS is that although it was

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**Designing from Place**

This is the tenet of regenerative design that was least adhered to during the design process for CIRS. Due of the fact that there were three different sites considered for CIRS throughout the 12-year period from inception to construction, an appreciation of the site context was bound to be sacrificed.

Efforts were made on behalf of the design team by way of asset and flow mapping exercises and an extensive community engagement strategy to gain feedback from local community (university) members. Moreover, the fact that CIRS is a university building almost predisposes the building to be context-appropriate considering the fact that it provides unique spaces not common in non-university buildings such as auditorium, office, and workshop space.

However, the goal and vision for CIRS was to be innovative and a leader in the world of green building, and nowhere in the mandate or vision did it make mention that the design should be informed from the place.

Therefore, the design process for CIRS did not demonstrate a commitment to this core tenet of regenerative design.

**The use of stories**

John Robinson worked to maintain a constant narrative throughout the design process, and this narrative of becoming a ‘living laboratory’ and a place to ‘accelerate sustainability’ was a powerful way to motivate the design team to achieve something innovative.

Therefore, the design process for CIRS utilized this strategy that contributes to one of the core tenets of regenerative design.

**Understanding and identifying patterns in the landscape**

In the design process, CIRS undertook an asset and energy flow mapping exercise whereby the design team mapped out the flows and patterns in the area surrounding the site.

One of the results from this thinking was the inception of the heat exchange with EOS (tapping into the energy and heat flows in the landscape), which has been described several times in this chapter. Another result of this thinking was the water recapture and treatment system (tapping into the water flows in the landscape). Finally, there was some effort in the landscape plan to incorporate native plants that would attract local fauna to the site (tapping into the wildlife and natural system flows in the landscape) to some success.

Therefore, the design process for CIRS demonstrated some commitment to this core tenet of regenerative design.
not continually consistent with the regenerative design process (unsurprisingly, as it did not set out to follow a regenerative design process), many of the manifestations of that process (i.e., the final designs) were consistent with the core tenets of the regenerative design process.

Some of the inconsistencies in process (such as a truncated process in the final iteration) were due to outside influences and political pressures such as UBC Properties’ rushed timeline and insistence to keep on schedule. These influences are typical in large development projects such as these, however, and should be planned for in future projects.

The focus at CIRS to be a living laboratory that continually strives for innovation offers some consistency with the long-term goals of regenerative design. Indeed, regenerative design is meant to be an ongoing process, without a specific end-goal. Rather, what is sought after in regenerative projects is the continual co-evolution of human and natural systems, and a desire to continually learn, innovate, and improve the functioning of these systems.

Despite these consistencies, I hesitate to call CIRS a regenerative building due to its inconsistency with the “design from place” mandate, which is a hallmark principle of the regenerative design process. Instead, it is best described as a highly-innovative, net-positive building that is striving to be regenerative.

In this chapter, a description of the design process for CIRS was provided, along with a comparison of the process with the core tenets of the Integrated Design Process (IDP) and regenerative design.

As a high-profile green building, CIRS provides an opportunity for learning with regard to successes earned and challenges met throughout the design process.

Recent descriptions of CIRS have hailed it as a regenerative building. After describing the integrated design of the systems and the innovative nature of the building in general, an assessment of the design features and process was provided. This assessment included an analysis of how the design process and features for CIRS adhere to the core tenets of regenerative design (first described in Chapter 1).

While many of the net-positive features for CIRS are consistent with the aims of regenerative design, the design process was not consistent with two of the core tenets of regenerative design; designing from place and a goal of becoming regenerative from the beginning of the design process. Therefore, it is best described as a net-positive building that is striving to be regenerative. However, recognition must be made with regard to the commitment CIRS has made to continually improve and learn, and to continue to strive to become regenerative. This is an innovative mindset and is one that leaders in development projects should consider adopting.
While there is a long history of work completed in the planning and design fields with regard to ecological restoration (Higgs, 2003), urban ecology (McHarg, 1969), pattern theory (Alexander, 1977), and cradle-to-cradle design (McDonough & Braungart, 2002), the term 'regenerative design' has its roots in landscape architecture (Lyle, 1994), and has most recently been explored primarily in the architecture field (Cole et al., 2012, Plaut et al., 2012, Mang and Reed, 2012).

However, due to the nature of this unique approach to development, it is argued here that planners should play a major role in the regenerative design process, and that there is much opportunity for injecting regenerative concepts into planning processes.

This final chapter delves into this important argument, and compares the core tenets of regenerative design with those of planning, pointing out consistencies between the two and potential opportunities for incorporating regenerative thinking into planning practices.
0.5.1 - COMPARING PLANNING AND REGENERATIVE DESIGN

While there have been several articles that have explored the role of planning in the green building movement (Retzlaff, 2005; 2009), with the exception of a Ph.D thesis that explored the role of planning in regenerative design (Mang, 2009) there has been an absence of formal recognition of the apparent alignment of the skills of planners and the regenerative design approach. It is therefore important for planners to take hold of practices that lend themselves to their unique skill-set; notably, strong communication and facilitation skills, holistic thinking, understanding of process, and understanding of large-scale systems dynamics.

This section will provide an exploration of some of the general aspects of regenerative design and how the planner’s skill-set is suited to addressing them (and in many cases, already addresses them). The aspects of regenerative design that will be explored include the focus on community engagement, the consideration of a wider spatial scale, and the importance of inter-disciplinarity and holistic thinking.

0.5.1.1 - Importance of community engagement

An emphasis on effective community engagement is a shared tenet of both regenerative design and contemporary planning (Plaut et al, 2012, Sarkissian et al., 2009), and the practice of effective engagement requires particular skill-sets and clear objectives.

The regenerative design perspective

As described in Chapter 1, while there may be differing definitions and approaches to regenerative design, community engagement remains an integral component of all definitions and approaches (Cole et al., 2012; Hoxie et al., 2012; Mang and Reed, 2012).

Effective community engagement allows a project lead or designer to fully understand the cultural context of the project and therefore increases the possibility that the project will benefit that community. Moreover, meaningful and effective community dialogue is viewed as being vital to regenerative design because it yields a community that is engaged and that will have a sense of ownership over a project and will establish leaders to ensure progress towards the project goals over time (Hoxie et al., 2012; Mang and Reed, 2012).

The main strategies for engaging communities effectively in regenerative design include the use of stories in dialogue with community members, the use of a facilitator in the design process, and the importance of engaging non-traditional stakeholders in the process (this last point is discussed in the following sub-section).

The planning perspective

Similarly, community engagement is a core principle in planning theory, and many planners would agree with Capra’s statement that “sustainability always involves the whole community. This is the profound lesson we learn from nature” (2005, p. 24).

However, many planners also would suggest that current forms of engagement are not working, and have pushed for ways of engaging more meaningfully with community groups (see, for example, Sandercock, 2003; and Sarkissian et al., 2009). Strategies for improving engagement range from improving facilitation skills, choosing the appropriate engagement medium and venue (virtual or live), engaging a more diverse range of stakeholders, using stories in the planning process, and creating a more accountable and transparent environment.

This commitment for improvement on behalf of planners stems from the all-important notion that community engagement is vital to the planning process as effective plans are those that reflect the aspirations of the communities involved. Similarly, there is an awareness that plan implementation is more likely with genuine community engagement.

0.5.1.2 - Incorporating non-traditional stakeholders

Related to community engagement, the incorporation of non-traditional stakeholders is a shared principle in both regenerative design and innovative planning.

The regenerative design perspective

An important aspect of community engagement strategies in regenerative design processes is bringing individuals that have unique and otherwise unvoiced perspectives to the table. These so-called non-traditional stakeholders (so-named because they are individuals who traditionally have not been directly involved in projects to do with the built environment) allow a project to gain insights it otherwise would be
without, and encourages the design team to think holistically – a key insight that is required in the regenerative design process. Engaging a wider variety of stakeholders allows for what Cole et al. (2012) describe as

...an open process to facilitate and expand the thinking, discussion, and actions amongst and between different stakeholders and disciplines; as well as identifying opportunities, synergies and benefits relating to a specific place (p. 96).

The planning perspective

Planners, too, stress the importance of getting a representative group to the table. A successful engagement process is one that engages the community in question – that is, that receives input from community members of all socioeconomic groups, demographics and political stances.

In their book *Kitchen Table Sustainability*, Sarkissian et al., (2009) stress the importance of inclusion in the planning process, and suggest ways to break down assumptions with regard to power and the knowledge of experts.

They suggest that bringing in individuals that have other forms of knowledge into planning processes contributes to a sustainable process, and point to Jon Hawkes’ statement that “just as biodiversity is an essential component of ecological sustainability, so is cultural diversity essential to social sustainability” (2001, p.14).

A powerful, compelling vision for any new street revitalization, or community plan update is compelling and powerful because it resonates with the individuals it will effect; that is, the community members.

So, on the engagement side, it is important to have dialogue with a diverse range of individuals from the community. After the community engagement period, it is vital to be able to effectively translate the community’s aspirations and concerns into a thoughtful plan.

In order to do this most effectively it is important to have input from a diverse range of professionals and other individuals that can bring a unique perspective to the process. For example, the incorporation of ecologists and botanists into landscape plans and urban-ecology studies will strengthen the ecological-sensitivity of the project and ensure it will be most beneficial for native species; the incorporation of artists and tradesmen into the design process for a new building will create an iconic structure with local flair; and the incorporation of anthropologists into community plan amendments will ensure that they are locally appropriate and reflect the cultural history of the area.

05.1.3 - Facilitating inter-disciplinary work and holistic thinking

One of the challenges of initiating dialogue with a diverse range of individuals in a design process has to do with communication. While it is beneficial to have such a wide variety of community stakeholders and design professionals at the table, often these individuals will have little experience communicating with each other, and therefore holistic thinking can be suffocated by a lack of effective communication.

Therefore, it is useful to engage an effective facilitator in regenerative projects so that inter-disciplinary communication and holistic thinking can be fostered.

The regenerative design perspective

In addition to the incorporation of non-traditional stakeholders (discussed above), regenerative design relies much on the functioning of an inter-disciplinary design team. This means having a design team that is made up of all relevant (as well as non-traditional) professions, and a team that can communicate effectively with one another.

The presence of such a team fuels holistic thinking and the ability to identify synergistic solutions to challenges – that is, solutions that address various challenges or factors.

As mentioned in Chapter 2, communication can be a challenge in situations where a design team is made up of individuals who have little experience working with one another, and the presence of a facilitator can often help to improve this situation.

The project manager or architect often assumes the role of facilitator, but this can be an added burden to those that are in this role and can lead to an unbalanced power structure amongst the design team whereby the architect/project manager has more power than the other members of the team. Moreover, architects and
landscape architects typically do not receive any educational training in facilitation, so they may not be the best choice available for project facilitator.

**The planning perspective**

Planners are often placed in the role of facilitator in their professional lives, and they typically gain facilitation skills through both educational or professional experience.

In terms of educational experience, many planning schools incorporate facilitation skills courses into their curricula. In fact, because planners are placed in this role so often, it can be argued that planning students should in fact receive even more training in facilitation, negotiation and mediation.

In terms of professional experience, planners have a professional mandate to look after the public good and balance competing objectives, and this often means that planners are placed in the role of facilitator for many community initiatives and workshops. This requires the development of good facilitation skills.

Good facilitation skills include the ability to allow all stakeholders the chance to speak (for example, drawing out responses from reticent individuals and ensuring that nobody dominates the conversation too much), keeping a conversation moving forward (parking certain issues and returning to them later if they are important but not germane to the discussion at hand), reminding stakeholders what the objectives are for the particular meeting, and synthesizing and summarizing ideas back to the group.

As well, planners are taught to be multidisciplinary and to be fluent in the language of various disciplines, from architecture and engineering to ecology. Often, a planner liaises between multiple stakeholders and must therefore become adept at reading architectural or engineering plans, or analyzing an environmental impact assessment. Having this broad skill-set allows planners to be effective facilitators as they will be able to ‘translate’ information between the various stakeholders, who may use terminology that is unknown to others.

Another way that planners are demonstrably adept at facilitating and fostering holistic thinking is through an understanding of the importance of process. Many planners would describe themselves as process-oriented thinkers, and this is a vital skill to have when undertaking a regenerative design process.

As mentioned in Chapter 1, many proponents of regenerative design stress the importance of the process, and the fact that a regenerative design is never fully realized, but instead is continuously evolving and ongoing. The focus on process in planning therefore lends itself very well to facilitating a regenerative project.

**0.5.1.4 - Consideration of a wider spatial scale**

The notion that improvements in one building in isolation can lead a sustainable community is false, and this thinking is becoming less adhered to as individuals realize the impacts that can occur upstream and downstream from a project, as well as the potential benefits that can be realized at a larger scale.

**The regenerative design perspective**

Many proponents of regenerative design discuss how the planning for a project should first look at the watershed-scale, and discuss how surrounding ecological and cultural systems must be engaged in order to achieve a regenerative design (Cole *et al.*, 2012, du Plessis, 2012, Mang and Reed, 2012).

Indeed, many of the tenets of regenerative design have little to do with building-scale solutions or detail. Therefore, these considerations lend themselves to more large-scale, neighborhood planning efforts where building detail is not necessary.

**The planning perspective**

Planners are taught to look at the broader neighbourhood, city and regional scales - rather than the building scale - and to consider the impacts that development can have on entire communities and watersheds. Moreover, planners are taught to think holistically and identify opportunities for connections amongst systems and communities to create a more livable, sustainable built environment.

By including notions of regenerative design into their thinking, planners can impact neighborhood-scale and regional sustainability. Some opportunities for large-scale regenerative thinking in planning include the promotion of district energy systems, integrated water resource...
management policies, watershed renewal programs, urban agricultural development, community educational hubs and urban ecology and wildlife corridor development. See the callout below for an example of how this kind of large-scale thinking can be incorporated into planning and regenerative design.

**05.1.5 - Other Skills that Planners can Provide in Regenerative Processes**

Planning operates at a regulatory level that can require the implementation of large-scale regenerative thinking through plans and bylaws that establish objectives for energy and water conservation, ecosystem restoration, and landscaping, design and servicing requirements for developments.

Indeed, with proper incorporation of regenerative thinking in regional or neighbourhood plans, by the time the building-scale is considered, a large percentage of the decisions will have been made that dictate how the building will function as a part of that neighbourhood or region (e.g., how large is the building, how close is it to transit, what energy efficiency rating does it need to have, does it connect to a district energy system, how does it treat its water and create energy, how close is it to greenspace, etc.).

Moreover, in terms of guiding process, planners are highly adept at goal setting, policy making, and hosting and facilitating public educational events where capacity building can occur around the value of concepts such as regenerative design. These are useful skills to have when engaging in regenerative processes.

In terms of interacting with clients or regulatory authorities, planners also are in a favourable position because of the fact that they are representing the common good. By representing the common good, planners by definition do not have a particular stake in the process and therefore can manage expectations and goals with regard to the project in a credible way (i.e., their positions on matters will not be construed as being biased or selfish).

This position is also ideal in terms of facilitating a design process, because not having a particular stake in the process and therefore can manage expectations and goals with regard to the project in a credible way (i.e., their positions on matters will not be construed as being biased or selfish).

Therefore, because planners address questions of scale that architects and landscape architects do not address, and because the skill-set and mindset of planning lends itself so well to guiding a regenerative design process, it can be concluded that large-scale regenerative thinking is best addressed and implemented by planners.

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**LARGE-SCALE THINKING IN PLANNING AND REGENERATIVE DESIGN**

Natural systems restoration is most effective at a larger scale, so that real strategies for addressing synergies and identifying sources and sinks can be made. If a community group is looking to daylight a stream in their neighbourhood, several factors should be considered, most of which reside at a large, watershed scale.

First, it is important to understand the extent of the water system that is being regenerated, because projects such as this tend to have the goal of improving a large system that is not functioning properly through a localized intervention. There may be certain portions of the stream (or watershed) that would be most beneficial for the entire system were it to be restored, and these should be mapped and described. As well, there may only be certain sections of the stream that are able to be restored from an economic or engineering feasibility standpoint, and therefore it is important to be able to identify these sites within the watershed. Finally, it is more compelling if multiple issues can be addressed and synergies are created. For example, there may be a location in the watershed where a new development is planned and that is in need of more greenspace. A daylighted stream would provide the neighborhood with a natural amenity, an homage to the historical state of the community, and a reminder of the impacts of development. It would also provide the new developer with an economic benefit due to the potential for homes with a view of a stream and access to greenspace.
Indeed, planning could play a role in the widespread promotion and adoption of regenerative design. Using the diffusion of innovation concept promoted by Rogers (1962), perhaps planners can play the part of early majority, whereby we are informed by the innovators that have pushed the concepts forward (John Lyle, Bill Reed, and the other architects and landscape architects mentioned in Chapter 1) and we learn from the early adopters (those who came up with the frameworks from Chapter 3) to become the ones to take the concept and make it more widely applicable to the design of the built environment (see Figure 5.1).

05.2 - FUTURE WORK: WHAT WOULD A REGENERATIVE PLAN LOOK LIKE?

In the previous section an argument was made for the important role that planners can play in the regenerative design process due to the fact that the planner’s skill-set is ideally suited to facilitating such a process. In this section, the idea of how regenerative thinking can inform large-scale planning processes is expanded upon and explored.

It is believed that future work in regenerative design should look at how to implement this thinking at the neighborhood and city scale, and this final, exploratory section begins to tackle this large and complex question by offering some thoughts as to what a regenerative plan would include in terms of features and performance measures.

This is a question that an entire project or thesis could be dedicated to, and therefore the approach taken here will be to provide some ideas for questions that may be asked, synergies that may be sought after, and measures that may be used in the development of a regenerative plan.

05.2.1 - Questions asked

While developing a regenerative plan, a strategy for community engagement may be to use a questions-based approach to understand the place as conceived by the community members. These questions would need to address both social and ecological considerations. Some potential questions that could be asked include the following:

Ecological considerations
- How has the landscape changed in your community through your lifetime?
- Are you able to connect with nature in your community?

Social considerations
- What is most important to you in your community?
- What are your aspirations and concerns regarding the future for your community?
- What is your favourite place in your community?

The aim of asking questions such as these is to provide the planner with a true sense of the community (the place) so that future changes are in line with the aspirations and concerns of the community.
**05.2.2 - Synergies in the landscape**

After a useful and thorough community engagement process, where a true understanding of place is uncovered, the next step would be to identify strategies that acknowledge multiple concerns and issues felt by the community.

For example, if a community is concerned about pedestrian safety and a lack of access to greenspace, a potential strategy would be to retrofit road systems such that they serve as pedestrian pathways, water harvesting structures, and erosion control features while simultaneously supporting windbreak, wildlife habitat, and firebreak functions.

**05.2.3 - Measures**

A regenerative plan would be best assessed based on measures of ecological functioning and social and cultural vibrancy. A key point here is that the measures would be based on improvement of functioning and benefit to the community, rather than the level to which damage is minimized.

**Ecological Functioning**

These measures could include things such as the presence of ecosystem restoration projects, wildlife corridor development, collection and natural filtration of stormwater runoff, and habitat creation. The goal here would be to provide benefit to natural systems through the realization of the plan.

**Social and Cultural Vibrancy**

These measures could include things such as the presence of cultural learning hubs, improved access to nature, and space for community interaction. The goal here would be to provide benefit to the social and cultural systems through the realization of the plan.

These questions asked, synergies identified, and measures used would necessarily be different for each neighbourhood or region, and therefore it would be important to design a process to create a regenerative plan to be malleable based on the context. As well, it would be important for the process to include the adoption of strategies such as transit-oriented development, alternative travel mode infrastructure and pedestrian-friendly environments that are typically incorporated into sustainable plans.

In conclusion, these concepts of large-scale regenerative thinking are not yet fully developed. While it is beyond the scope of this project, these concepts should be explored in future work in order to push the practice of regenerative design further and expand the role that planning can play in creating regenerative communities.

**05.3 - CHAPTER SUMMARY**

This final chapter explored the role that planners can potentially play in the regenerative design process, and the opportunities for injecting the notion of regenerative systems into planning processes.

While landscape architects and architects have traditionally been the main practitioners and leaders in regenerative design, it is argued that the ethos and approach of regenerative design makes it a natural practice for planners to take a leadership role in.

In order to make this argument, the main concepts of regenerative design were described and compared with the skill-sets of planners and the traditional roles that planners play. The result of this comparison suggests that planners are an underutilized profession in regenerative design today, and that there is a real opportunity for achieving sustainability through the incorporation of regenerative principles in large-scale planning processes.
This project has explored a unique and innovative way of approaching development that pushes the notion of sustainability beyond the current paradigm of ‘doing less harm.’ The basis of this thinking is a recognition of the destructive nature of conventional development, and the insufficiency of current green building and development strategies such as LEED, Built Green, and New Urbanism.

Indeed, while the green building industry has grown to unprecedented heights and more green buildings are built each year, the building industry remains a major – and increasing – contributor to global carbon emissions and ecosystem degradation. Such green building strategies are based on efforts to improve efficiency or minimize degradation, and as more of this kind of development occurs, global reductions of carbon emissions and ecosystem degradation will be negligible, as the system will be continuously degraded on aggregate.

As well, larger-scale green development strategies such as New Urbanism are too formulaic to provide the kind of localized, contextually appropriate solutions to human and natural systems decline. This suggests that a more audacious approach to sustainable development is needed.

In this conclusion, key concepts covered in Chapter 1-5 are reiterated and commented upon, and a final argument is made for thinking beyond the current paradigm of ‘doing less harm’ that has permeated the green development industry.
Regenerative design offers one potential approach to sustainable development that seeks to go beyond harm reduction and into the realm of improving human and natural systems functioning through development. A relatively new discipline, regenerative design has many proponents and detractors, and has several definitions for what actually constitutes the practice.

In this project, Chapter 1 was dedicated to describing this practice, drawing from the early work of John Lyle as well as the current work done by such firms and organizations as Regenesis Group, the US Green Building Council (USGBC), the Rocky Mountain Institute, Perkins+Will, and the University of British Columbia.

An important aspect of regenerative design is a focus on the design process, and how to engage the correct people in that process. One approach to design that achieves this, and that is promoted as being a key part of regenerative design, is the Integrated Design Process (IDP), and this process was described in Chapter 2. A key challenge that needs to be addressed in this approach is how to foster effective inter-disciplinary communication amongst stakeholders and design team members that have little experience working with one another.

While regenerative design has much promise, and is certainly a step in the right direction in terms of its ethos when it comes to concepts of sustainability, it remains unclear how these proposed strategies translate on the ground. As currently described, it can be difficult for many individuals to digest the core concepts proposed by regenerative design, and a strategy for widespread adoption remains unaddressed.

Another criticism of regenerative design that has recently been addressed is a lack of measurability or ability to guide a regenerative design process. This was addressed by the development of frameworks that are meant to help designers ask the right questions and obtain the information needed in order to undertake a regenerative design process. Chapter 3 provided an overview and critique of three such frameworks: the REGEN tool developed by the USGBC, the LENSES framework developed by the Rocky Mountain Institute and the Perkins+Will framework developed by Perkins+Will and the University of British Columbia.

What became clear from these assessments is that these frameworks approach the concept of regenerative design in very different ways. While they offer unique opportunities in terms of novel ways of approaching development and design, the fact that they are so different highlights the fact that the concept of regenerative design remains loosely defined.

Some individuals believe that this lack of clarity is a good thing, as it forces individuals to continuously question and push forward the concept. However, this lack of clarity can easily lead to green-washing, which we have seen much of as regeneration has become a more popular term. Many projects that were completed prior to the emergence of the concept of regenerative design have since been described as regenerative, and many individuals have equated being net-positive on certain systems (namely, energy and water) to being regenerative.

While it is true that being net-positive can equate to providing benefit to these systems, one cannot help but wonder why giving a project the designation of net-positive (a meritorious designation in its own right) is no longer enough for these projects, and why regenerative has overtaken this term. This thinking forms the root of the criticism that states that ‘regenerative is becoming the new sustainability’, in that it is a term that is becoming so ubiquitous that it is at risk of becoming meaningless.

In order to explore one example of a project that has been retroactively called regenerative, Chapter 4 described the design process and features for the Centre for Interactive Research on Sustainability (CIRS) on UBC’s Vancouver campus. By assessing the design process, it was possible to understand how a highly ambitious project with goals of innovation in sustainability was approached.

What became clear in this assessment is that what makes the CIRS case innovative is not the design features themselves, but the functioning of the building as an experiment; a learning centre where research on sustainability can be conducted and disseminated to wider audiences.

This is a major turn from the focus on systems
efficiency and production that traditionally permeates throughout green building strategies, and the commitment to being an experiment that is continually striving for innovation is an admirable aspect of CIRS.

However, it is a largely untested aspect as well, as many of the systems in place at CIRS are not operating correctly as of yet. This begs the question of whether the best approach to sustainable development is through increasingly sophisticated designs or whether a more passive approach is more suitable.

The decision to move beyond the scale of the building was novel, and the heat exchange is a feature that separates CIRS from other green projects. By capturing waste heat from an adjacent building for space heating requirements, CIRS provides a demonstration of large-scale thinking that should be incorporated into contemporary building design.

However, the recent designation of ‘regenerative’ that has been placed on CIRS appears to be a question of terminology and framing, rather than one based on an analysis of the foundation of regenerative design.

CIRS is called regenerative because it is net-positive on energy and water, is a hub for education and research on sustainability, and has created relationships beyond the scale of the building. While these are consistent with some of the principles of regenerative design, there are other aspects that are not consistent, such as the notion of designing from place and the importance of having goals of regeneration form the basis of the process. Therefore, it was concluded that perhaps CIRS is best described simply as a net-positive building, (which, again, is a highly admirable designation in its own right) that is working toward becoming regenerative.

One of the most important aspects of regenerative design is assessing the wider spatial scale in projects. This suggests that it would be beneficial to incorporate professionals that are taught to work at this scale. Chapter 5 explored the role that planners can play in the regenerative design process and the possibilities for incorporating regenerative thinking into planning practice.

This chapter was not meant to be an attack on the architects and landscape architects who have traditionally been leaders in this practice but, rather, it was meant to be an exploration of how another discipline can contribute to furthering the practice of regenerative design. Moreover, it was meant to be the start of a conversation exploring how the planner’s unique skill-set can contribute to a practice as innovative and important as regenerative design. Planners have a unique role to play in the design and stewardship of the built environment and natural systems, and similarly have a potentially unique role to play in regenerative design.

While it is only one aspect of achieving a sustainable community, the design and development of the built environment is, and will continue to be, one of the most important arenas for sustainability as we move toward an uncertain future. Moreover, the current global rural to urban shift suggests that the design and development of the urban built environment will become increasingly important in terms of sustainability. Indeed, more than half of the global population currently lives in urban areas, and this number is only expected to increase, suggesting that urban environments should perhaps be targeted for innovations in the design and development of sustainable communities.

Some estimates state that the demand for new buildings in North America will be close to 14 million by 2020 in order to meet rising populations (Masnick et al., 2010). The building sector accounts for nearly 40% of GHG emissions in the United States, and this is more than either the transportation or industrial sectors (Environmental Protection Agency, 2012). These figures are similar in Canada and other parts of the world, and while the green building industry has grown substantially in the past two decades, CO2 emissions from buildings are nonetheless projected to grow faster than any other sector through to 2030 (USGBC, 2011). While these are worrisome facts, they only account for the GHG impacts of building.

The built environment has similarly detrimental impacts in the form of habitat destruction and loss of biodiversity (i.e., disruption and destruction of the web of life that we rely upon) that will have to be reconciled if we are to achieve a sustainable condition. Moreover, all of these challenges will have to be met in addition to those associated with increasing resource scarcity, aging infrastructure systems, and water shortages due to mismanaged watersheds.
These are issues that will be faced by rural and urban environments alike, and all of these factors pose significant challenges for planning, architecture, engineering, landscape architecture, and other professions involved in the development of the built environment.

It is therefore important that members of these professions understand the severity of the situation and the need for audacious steps in the realm of creating a sustainable built environment. Similarly, it is vital that these professions use the tools available to them to enable the sustainable use of the built environment.

What is becoming clear is that the current mandate of minimizing damage adhered to by the green building industry is not addressing the challenges mentioned above. We know this because those same challenges have been with us for the past several decades, with minimal progress made. Therefore, at present, it seems as though the goal of benefitting ecosystem and cultural system functioning espoused by regenerative design is the best possible mindset for development practices, and this should be encouraged and adopted by those that work with the built environment. Planners can – and should – play a large part in this adoption as we move toward an uncertain future.
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CHAPTER 1


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**CHAPTER 2**


**CHAPTER 3**


CHAPTER 4


CHAPTER 5


CONCLUSION
