SBSP Topics Class
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Regenerative Development Processes: Beyond Systems Thinking

Introduction

Albert Einstein said: "One cannot alter a condition with the same mind that created it in the first place" (The Ultimate Quotable Einstein, 2005). This essay emerges from the desire to move towards a concept of maximizing human activities that restore and regenerate ecological and human processes and enhance their capacity to co-evolve over time. Brought forth is the need to go beyond the current sustainability framework and shift from a fragmented vision to a holistic systems model. It further emphasizes the importance of processes within a new framework, and how patterns can highlight these processes.

From a Mechanistic to a Regenerative Mind

It is argued by McDonough and Braungart (2002), that concepts associated with environmental sustainability have tended to include words such as: limit, avoid, reduce, and minimize. The emphasis and language of this narrative is largely one of reducing resource use and adverse environmental damage by minimizing human industries and systems (Cole *et al*., 2012). In other words, the idea is to increase efficiency in order to make systems less damaging.

These authors posit that since the industrial revolution, the desire to minimize the destructive impacts of industry has been a central tenet of the environmental movement. Focus on minimizing impacts has resulted in the framework of 'eco-efficiency'. In other words, this means creating more goods and services while using fewer resources (McDonough and Braungart, 2002). This focus on eco-efficiency has translated in the current conceptualization of the green environmental discourse; resulting in a dominance of technology solutions and a loss of focus on social systems and well-being. Within this mindset, the role of practitioners is to design systems which "use a fraction of the matter and energy throughput required to produce the same products in conventional industrial processes" (Robinson, 2004: 375). A concrete example of this green environmental discourse is the most popular third-party certification program and an internationally accepted benchmark for the design, construction and operation of high performance green buildings – Leadership in Energy and Environmental Design (LEED) – which focuses on "reducing site disturbance, minimizing energy requirements, optimizing energy performance, reducing water use, meeting minimum indoor air quality performance, etc." (CAGBC, 2013). Although the LEED certification system has been crucial in moving beyond conventional buildings by setting higher environmental standards thus shifting the building industry towards more environmentally responsible behaviours, its sole focus on reducing the impacts of buildings is not enough. Green or eco-efficient design is insufficient because it "misses the real potential that arises out of the human presence on this planet: the possibility of organizing human activities so that they continuously feed and are fed by the living systems within which they occur" (Mang and Reed, 2012: 26).

Sustainability is not likely to be achieved through a reduction of human impacts (du Plessis and Cole, 2011; du Plessis, 2012). It is not enough, neither inspiring, to focus on mitigating the effects of

human activity (Robinson, 2004). From this perspective, it is necessary to redefine the way practitioners conceptualize the world, and what sustainability means and requires. It is incremental to create a framework based on co-evolution, or on the "reconnection of human aspirations and activities with the evolution of natural systems" (Mang and Reed , 2012; 26).

Regenerative Sustainability

The central tenet of the regenerative paradigm is one of shifting focus away from the idea that we should minimize activities that are degenerative and move towards a concept of maximizing activities that restore and regenerate ecological systems (Cole, 2012a ; Cole *et al*., 2012; Svec *et al*., 2012; Plaut *et al*., 2012).

The regenerative framework can be metaphorically compared to an estuary, which is a body of water formed where freshwater from rivers and streams flows into the ocean, mixing with the seawater. Combining the individual properties of fresh water and sea waters creates a whole that is greater than the sum of both bodies of water. The mixing of the flows of sea water and fresh water provide a complex mix of nutrients, making estuaries among the most productive natural habitats in the world (McLusky and Elliott, 2004). As an estuary, regenerative systems can best be understood as a flow of inputs which creates a whole that is greater than the sum of its parts. In this way, the regenerative framework is based on complex adaptive systems which have properties that function as wholes in the sense that their behaviour cannot be fully understood solely in terms of their component parts. Cole (2012b), articulates that regenerative design "emphasizes a co-evolutionary, partnered relationship between humans and the natural environment… that builds, rather than diminishes, social and natural capitals". This fundamental re-conceptualization of sustainability means that the interdependence of the system's parts creates a whole that can and should be net-positive – where the outcome is more positive than negative – in terms of both ecological and human systems (Cole, 2012a; Reed, 2007).

From this framework emerges the desire to have human systems improve both human and ecological system functioning through time using "approaches that engage and focus on the evolution of the whole of the system of which we are part" (Reed, 2007: 677). To achieve this goal, systems must be adaptive in that they must be designed to have the capacity to change and learn from experience, to self-correct through feedback.

Literature on regenerative sustainability is valuable in the sense that it shifts focus from a mechanistic to a co-evolutive, integrated world view. It goes beyond the common understanding of systems as a sum of their individual parts to a holistic and integrated approach. In order to be fully holistic, the regenerative framework aims at seeing beyond systems and understanding how processes can promote regeneration. In other words, designing integrated systems is not enough; it is also necessary to envision the processes which link systems and promote their co-evolution over time.

On this topic, Mang and Reed (2012) differentiate between regenerative design and regenerative development. They suggest that the former builds the regenerative and self-renewing capacities of constructed human and natural systems. The latter creates the conditions necessary for a sustained positive evolution of the designed systems (Waldron and Miller, 2013). At the Summit on Regenerative Neighbourhoods (2013), Mang explained: "there is no such a thing as a regenerative building. Buildings should be seen as catalysts towards the generation of regenerative processes". In this sense, it is not the building that is regenerative, but the process in which the building takes part.

By understanding regenerative developments – buildings, neighbourhoods, cities – as an amalgamation of parts, we lose track of why we design and build in the first place. One way to understand these regenerative developments as processes is to look more deeply at the reasons behind

creating these developments (Kennedy, *et al*., 2007). For that purpose, backcasting is a planning methodology that is particularly helpful when dealing with complex systems such as regenerative developments. It is a method used to envision the future desired outcomes of a project and builds steps to attain those outcomes (Holmberg and Robert, 2000). In other words, when planning a project, the starting point for planning is the desired outcome. Instead of a step by step strategy, planning focuses on strategies that can be flexible over time, adjusting to the social, environmental, and economic evolution of the project over time. Through focusing on guiding principles, a frame for many possible desired outcomes can be cast.

Under the regenerative umbrella, the fundamental outcomes of every regenerative developments is to enhance human and ecological systems. These desired outcomes can be broken down into different sub-goals. For example, in order to enhance human systems, it is crucial to design with the intention of increasing health, well-being and social systems. In order to enhance ecological systems, the man made systems must be designed to produce more than they consume in areas such as carbon, water, energy, materials, nutrients, etc. By breaking down the fundamental goals and desired outcome of regenerative developments, is it possible to understand that these developments are not an end goal in themselves – they are processes towards achieving greater human and ecological strength. In this way, regenerative design represents a shift in perspective about the role of buildings themselves. From the primary subject of interest, they become processes supporting the mutually beneficial co-evolution of the human and natural systems in a partnered relationship (Cole, 2012b; Reed, 2007).

The importance of seeing regenerative developments as processes is fundamental for design teams to make informed decisions on processes to be integrated to systems in order to fulfil the desired outcomes of the projects. In practice, the rationale for explicit decision making, such as mechanical systems design, methods and techniques for example, is always explicit and well documented (Mang and Reed, 2012). Conversely, the rationale for implicit decision making such as processes is, most of the time, nearly invisible (*ibid*). Implicit decision making is unavoidably embedded in the systems of beliefs and worldview held by the individuals involved in the decision making process. These coherent systems of beliefs unconsciously shape how individuals interpret and interact with the world; how they think and what they think about. This becomes a significant barrier when seeking to design regenerative systems, since each practitioner sees and interprets what it means to be regenerative in a different way. When a worldview complex becomes invisible, it circumscribes the capacity to evolve one's work. On the other hand, when conscious, it can provide a methodology for the ongoing evolution of human systems, fostering their improvement over time. In other words, implicit but practical decisions on processes must be seen as fundamental in the success of designing and building regenerative development processes (RDP) (*ibid*). An explicit methodology on process decision making is the missing piece towards unleashing the capacity of RDP to co-evolve over time.

Patterns as a Methodology

The regenerative methodology should begin by: "attempting to understand how the systems of life work in each unique place" (Reed, 2007: 1). In other words, it is about understanding the patterns that are unique to a place. It has been argued that patterns are clues to defining the rationale behind place-based processes in order to maximize the potential of a RDP (Capra, 1996).
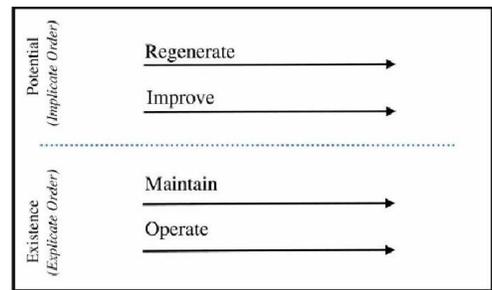
Processes can be viewed as a systematic series of patterns, which are a web of reciprocal relationship directed to some end, in this case towards the co-evolution of RDP. The core focus is based on understanding patterns of relationships between systems as clues to understanding how both systems and processes are sustained, how they self-organize and how emergent outcomes are produced. Patterns have the potential to reveal implicit processes by explicitly unveiling the emergence, directionality,

strength and nature of processes (Marvick and Murphy, 1998; Michael and Meacham, 1998). Patterns provide a place-based understanding of processes, which is required as a rationale to design processes harmonized with and contributing to the co-evolution of the RDPs over time.

This approach requires that the practitioner designing RDPs sees the project as a living system process. Before starting the design process, the practitioner needs to understand what are the core processes of a system around which the system organizes and orders itself. In this way, regenerative design focuses on place-based process integrated to the inner working of living systems in order to generate new and healthier processes which will promote the co-evolution of the RDPs over time.

Manifesting Potential into Existence

Mang and Reed (2012: 27) popularized a framework which highlights how to manifest potential into existence. Evolution takes place within four levels of processes, in which each level is essential to a system's continuing vitality, viability and capacity for evolution. The lower two levels, operate and maintain, focus on what is already manifested. Existence is tangible and mechanistic, it can be best understood as 'what is'. It is the current existence of the system itself, which can either be improved in efficiency and performance, or maintained through proper

Illustration 1: (Mang and Reed, 2012: 27)

effectiveness of resources. Without proper management of the existence of a system, of the first two levels, the whole system itself is threatened. At the same time, engaging in only operating and maintaining systems completely discards the system's potential to evolve as existence is ruled by entropy. For example, the green building movement focuses on increasing efficiency, and is thus grounded in the 'operate' level of work. At the 'maintain' level of work are efforts focused on resilience (*ibid*). The upper levels, improve and regenerate, involve work on potential, or what exists but is not yet manifested. "It introduces potential life and creativity by asking what is a system's unique role in advancing the whole" (Mang and Reed, 2012: 27). The end goal, regeneration, aims at continually evolving the value-generating capacity of the complex system by revealing its potential in relationship to existing systems. In order to get to this level, all four levels must work in consonance. This framework aims at manifesting potential into existence.

FUTURE DIRECTIONS

Proposed is a new framework, working in parallel with the previous framework of potential, and thus keeping as an end goal to manifest potential into existence. The first paragraph of this essay argued that in order to design regenerative systems, one must shift from a mechanistic world view to a regenerative mindset. This evolution from mechanistic to regenerative complex systems is based on four levels of existence of the framework of potential.
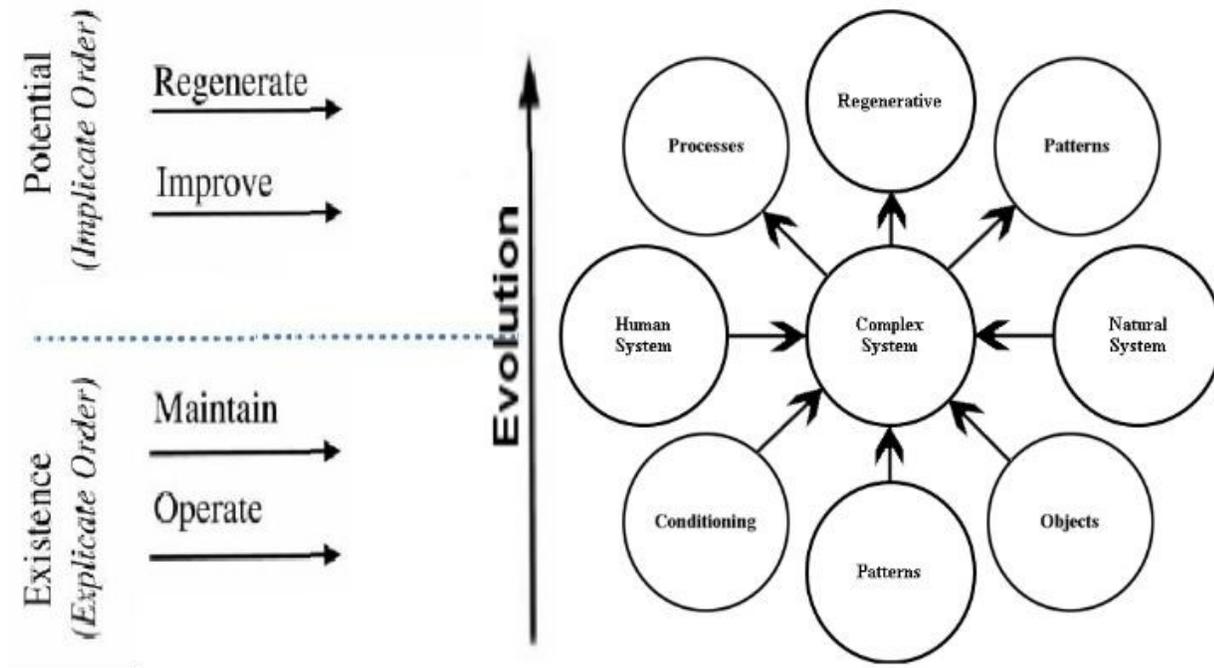
On the wheel of complex systems, this upward trend is located on the vertical axis. The first two levels, existence, are the mechanistic foundation in which potential can be built upon. Without the mechanistic, there is no system. But without potential, the existence cannot manifest regeneration. Both are important, but the trend should be an evolution towards regeneration, encompassing the four levels of existence.

On the vertical axis are located human and natural systems. Tarnas (1991) argues that the scientific revolution brought about a mechanistic view of nature, creating a clear distinction between humans and nature. This idea that humans are separate from nature lead to the idea that we can exploit nature, one of the root causes of current environmental problems. The arrows are pointing inwards, which means that human and natural systems should merge. In this way, designing complex systems should aim at fully integrated human and natural systems so they can co-evolve in symbiosis.

The two concepts located in the levels of existence are conditioning and objects. Conditioning is human induced while objects are naturally formed. There are two core concepts at the heart of conditioning. First is the idea that people can learn through observation. External or environmental/social reinforcement are factors that influence an individual's mode of relating to its environment, therefore conditioning his/her behaviour. Next is the idea that internal mental states are an essential part of this process – influencing an individual's mode of relating to his/her own thoughts, emotions and perceptions – conditioning his/her thinking process (Bandura, 1971). Conditioning can be best understood as a cognitive pattern that influences an individual's thinking process and by the same fact behaviour. Conditioning is part of the two lower levels of existence. This means that conditioning is a mechanistic state in which potential can be manifested from its existence. Objects are anything that is visible or tangible. Objects are located in the mechanistic part of the diagram because they are viewed as an entity as a whole.

Conditioning and objects can be transformed into their polarities: processes and patterns. In other words, when potential is properly manifested into conditioning and objects, it becomes a process and a pattern, which supports regeneration within the complex system. For example, it is when an object is not seen as a whole, but as a summation of patterns, that the synergies of these patterns can be transformed into potential. Once the conditioning process is broken down, it is possible to utilize social

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and environmental influences to produce processes that are beneficial to a system's growth. Process is on the human system's half of the diagram, which means that they are induced by humans. It's opposite, patterns, are induced by nature. It has been argued that patterns could be used to highlight the properties of human processes within a system. Since human and natural systems should converge towards unity, patterns and processes can be used to reinforce each-other. In this way, patterns and processes are the key to designing regenerative complex systems, as they allow manifesting potential into existence.

This new framework, building on Mang and Reed's foundation, could potentially become a useful framework for architects, engineers and designers working on regenerative project. Further research needs to be performed in the field of methodologies, in order to exploit the full potential of patterns and processes. Eventually, natural ecosystems patterns and human systems processes will merge in one symbiotic mutually reinforcing entity, which itself will manifest its own potential from its very own existence.

Summary

The regenerative paradigm is born of the realization that it is not enough, neither inspiring, to focus on mitigating the effects of human activity. This new framework is based on the desire to move towards a concept of maximizing activities that restore and regenerate ecological and human processes and enhance their capacity to co-evolve over time. Systems themselves do not evolve; this potential lies in the processes linking the systems. In this way, processes are the element supporting the mutually beneficial co-evolution of the system as a whole. Regenerative design should therefore focus on processes that are integrated to the inner working of living systems in order to generate new and healthier patterns which will promote the co-evolution of the whole system over time.

Within the design industry, process decision making is still implicit and therefore bound to practitioner's intuition. This becomes a significant barrier when seeking to design RDPs as each practitioner sees and interprets what it means to be regenerative in a different way. Methodologies on process decision making are the missing piece towards linking scattered systems and unleashing their capacity to adapt and co-evolve over time. Processes can be viewed as a systematic series of patterns directed towards the regenerative co-evolution of processes. In this way, patterns are a useful tool in revealing implicit processes and might be the way forward in framing process methodologies.

A complex systems framework has been proposed as a way forward. It has two main levels of work: existence and potential, which are both equally important towards the co-evolution and regeneration of the system as a whole. The framework suggests that natural systems and human systems should merge, and that design should evolve from mechanistic to regenerative, bringing about a shift from objects and conditioning to patterns and processes. In its own patterns and processes, regenerative sustainability should be thriving towards the merging of natural ecosystems and human systems into one symbiotic mutually reinforcing entity, which itself will manifest its own potential from its very own existence.

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