COLLABORATIVE DESIGN IN A CONTEXT OF SUSTAINABILITY:
THE EPISTEMOLOGICAL AND PRACTICAL IMPLICATIONS
OF THE PRECAUTIONARY PRINCIPLE FOR DESIGN

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Abstract
Sustainable design is an approach that seeks to adopt an ethic of the future, where the vision of the solutions is based on a temporal and spatial perspective that is predominantly long-term and global. Design is characterized by its projective and ambivalent nature, and therefore a conscious effort to anticipate the outcomes of design intentions is crucial. Consequently, all design is inherently laden with uncertainty, doubt, and specifically in some technology-driven design projects - contradictions and controversies. Typically, such uncertainties and contradictions are not considered during the initial phase, since the main goal at this phase is to simplify the problem, and therefore these anomalies are often omitted, as they are seen to be outside the boundaries of the design problem. How can designers consider the uncertainties and contradictions during conceptualization, as well as consider the benefits resulting from their design proposals? Designers in their sustainable design practice must consider (1) the multiple objectives and criteria; (2) the multiple users and user preferences; (3) the multiple design alternatives; (4) the complex changing global situation; and (5) the knowledge from the various disciplines comprising the design project. A collective systems thinking approach to design addresses these concerns. Consequently, the theoretical basis of the precautionary principle is directly in line with this approach to design. This presentation will discuss the epistemological and practical implications of the precautionary principle for design in this context.
Keywords

collaborative design, sustainability, precautionary principle, integrated design process, fourth generation evaluation

1. Introduction

The main idea that motivated this paper and related research is that traditional methods of evaluation in a context of sustainable design present limits for innovation, on their own when designers seek transformational long-term solutions – in other words, those that transcend boundaries on various levels - therefore spanning various disciplines and professions.

The main reason for this is that traditional methods cannot adequately assess long-term visions as uncertainties and contradictions are far too great, and therefore the predictability of risks is unreliable. As much as these approaches are fundamental to help build the larger picture, ways in which to integrate the varying perspectives has become essential to enable a broader vision.

I am proposing that an approach to design conceptualization founded on the precautionary principle may enable this broader vision, because it is primarily concerned with revealing global and long-term repercussions for defining courses of action. However, because this principle focuses predominantly on long-term consequences where the uncertainties are great, where traditional evaluation methods fail, because value systems, visions and concerns are diverse, alternative methods of evaluation have become necessary. The precautionary principle may help expand the ways in which evaluation currently occurs is design by helping to reveal the divergences in design discourse engendered in understanding the long-term repercussions of a design project.

2. The Precautionary Principle (PP) for Sustainable Design

The precautionary principle originated from the initial German formulation Vorsorgeprinzip in the 1970’s within the environmental movement in Germany, which essentially translates more appropriately to ‘forward looking caution principle’. It has since been used in various declarations and conventions. One of the most often cited definitions is from the 1992 Rio Declaration on Environment and Development (Principle 15, UNCED, 1992):

“In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”
Scientific uncertainty may appear to be the focus, however, the precautionary principle does not valorize uncertainty instead assumes an infinite requirement for knowledge, both in *knowing what we know*, and in *knowing what we don’t know* when taking into account the long-term perspective for defining a course of action (Ewald, 1996). Precaution has been typically adopted for policy making. However, this research will focus on its relevance for sustainable design practice.

### 2.1 Modernity, Risk and the Preventive and Precautionary Principles

But what exactly does the precautionary principle represent. It essentially represents the basis for an alternative form for risk assessment. The idea of risk emerged in contemporary society with the development of probabilistic and statistical thinking. With this, the idea of individual responsibility was challenged towards a collective strategy for dealing with undesired events - the aim was the prevention of measurable collective risks (Werner, 2005, Ewald, 1996, among others). Precaution was a later development (in the 1970’s) for dealing with undesired events (Werner, 2005, Harremoës *et al.*, 2001, Ewald, 1996). Table 1 presents a comparative summary of preventive and precautionary inquiry.

The principle of prevention states that if the probability of a threat and the types of consequences of an activity are known, then measures must be taken to prevent any further harm to the environment or society (Dupuy & Grinbaum, 2005, Godard, 2005, Harremoës, 2003, Callon, LasCOMes & Barthe, 2001, Kourilsky & Viney, 2000, Godard, 1997, Ewald, 1996, Lascoumes, 1996). This principle relies on traditional risk assessment methods. It valorizes universal knowledge and predictability - the aim is the prevention of measurable collective risks (Werner, 2005, Ewald, 1996), where the assessment is provided by experts. Therefore, risk is scientifically (or statistically) calculated and not socially constructed, and so the methods of evaluation are established and universal instead of context specific. Uncertainties are also statistically dealt with. This is considered an advantage as it seeks to remain objective. The types of uncertainty dealt with in this approach are those that stem from either data unavailability or methodological inadequacies. However, not all uncertainties could be statistically calculated, especially when dealing with long-term perspectives where the doubts and uncertainties are from a variety of sources. In particular, indeterminate or incommensurable uncertainties cannot be dealt with using preventive forms of risk assessment alone.

For example, a traditional risk assessment approach such as Life Cycle Analysis seeks to assess the environmental impacts of an artifact along all the phases of its life cycle, from raw material extraction and acquisition, through energy and material production and
manufacturing, to use and end of life treatment and final disposal (ISO, 2006). This represents a preventive approach for evaluating risks, since it seeks to identify the known potential impacts of the artifact using a quantitative assessment, where these are typically used for product optimization. However, even if such tools can provide an assessment of potential environmental risks, they are exactly that, potential risks, with unknown long-term repercussions.

Precaution, a later development for dealing with risks (Werner, 2005, Harremoës et al., 2001, Ewald, 1996), developed in response to the modern conditions of technology and uncertainty, which Ulrich Beck (2004) terms as “conditions of reflexive modernity”. Here reflexive refers to the recursive relationships between modern society and the process of modernization itself (Werner, 2005). In other words, society is increasingly threatened by potential risks that are a result of the modernization process itself (Werner, 2005, Beck, 2004, Giddens, 2004, Ewald, 1996, Jonas, 1985). In fact, Giddens (2004) has stated that the modern understanding of risk was supposed to help humans control their future, to normalize it. Yet according to Giddens (2004) and Beck (2004) things have not turned out that way, and that our attempts to control the future have in fact led to the realization that humans need different methods for relating with uncertainty. The emerging relevance of the precautionary principle rests on the failure of the traditional scientific approaches to deal with such uncertainty, but more importantly, on the myth of scientific progress which reduces the world to produced artifacts by technology (Latouche, 2006, Larceneux & Boutelet, 2005).

From a philosophical perspective, the precautionary principle is concerned with long-term risks and repercussions more than it is with uncertainty (Ewald, Gollier & Sadeleer, 2001). However, because long-term visions are laden with uncertainty, then this becomes a serious consideration for this principle. Design adopting the precautionary principle rests on the idea that innovation is as important as the assessment of the situation. Here the probabilities, as well as the consequence of the risks are not known and therefore the focus is on developing alternative scenarios and not only on the evaluation of the situation (Whiteside, 2006, Dupuy & Grinbaum, 2005, Tickner & Geiser, 2004, Harremoës, 2003, Kourilsky & Viney, 2000, O'Riordan & Jordan, 1995). One of the most important aspects of using this principle is its catalytic capacity for generating alternative solutions (Tickner & Geiser, 2004). So, the focus is on the ‘what can be’ and not only on the ‘what is’ (Simon, 1996, Schön, 1983), as is done using traditional methods of evaluation. What this implies is that a cautious approach must go hand in hand with a constructive one, where precaution becomes a catalyst for innovation (Bindé, 2000). Table 1 presents some of the main distinctions between design inquiry approaches that are founded on each of these principles (prevention and precaution).

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<th>Preventive Approach for Sustainable Design Inquiry</th>
<th>Precautionary Approach for Sustainable Design Inquiry</th>
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<tr>
<td><strong>Purpose of evaluation process</strong></td>
<td>Collecting evidence for optimization (statistically constructed)</td>
<td>Exploratory - regarding the transformation of practice and structures (socially constructed)</td>
</tr>
<tr>
<td><strong>Type of knowledge that will nourish process of inquiry</strong></td>
<td>Known level of certainty of knowledge will be used to make decisions</td>
<td>Addressing uncertainty and contradictions nourish process</td>
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<tr>
<td><strong>Types of uncertainty that can be addressed</strong></td>
<td>Technical, methodological (data unavailability, method inadequacies)</td>
<td>Epistemological (indeterminate, incommensurable)</td>
</tr>
<tr>
<td><strong>Type of repercussions addressed</strong></td>
<td>Predictable, repeatable outcomes considered</td>
<td>Non-linear, non-substitutional, recursive, repercussions considered</td>
</tr>
<tr>
<td><strong>Elements of concern (risks)</strong></td>
<td>Resource and planet preservation, social-economic fairness, and cost-benefit analysis (normative and technical)</td>
<td>Ecological integrity, place identity and the individual, well-being, social cohesion, cultural and community life, transformative behaviour - (ethical, aesthetic and technical)</td>
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<td><strong>Type of inquiry</strong></td>
<td>Sequential inquiry</td>
<td>Recursive co-learning taking place within team</td>
</tr>
<tr>
<td><strong>Time frame/pace</strong></td>
<td>Matches corporate pace</td>
<td>Matches nature’s (civilization) pace</td>
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<tr>
<td><strong>Consideration of space</strong></td>
<td>Functional and flexible</td>
<td>Organic, fluid, context specific, tactile, sensory, pluralistic</td>
</tr>
<tr>
<td><strong>Type of innovation sought</strong></td>
<td>Technical innovation (efficiency – doing it right)</td>
<td>Technical, social, cultural, educational, and organizational innovation (ethical – doing the right thing)</td>
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<tr>
<td><strong>Design strategy</strong></td>
<td>Reduce energy, reduce social injustice, and reduce footprint, conservation of resources and environment and social structures</td>
<td>Express nature, contextual, living building/artefact, create identity, community and cultural revitalization, environmental regeneration</td>
</tr>
<tr>
<td><strong>World view</strong></td>
<td>Deterministic (causal effects) world view</td>
<td>Complex (dynamic and interconnected) world view</td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Systematic thinking (using tools such as, LCA, SLCA, EIA, SIA, LEED, Ecological Footprint)</td>
<td>Systemic thinking (using approaches such as Integrated Design, Collective Decision Making, and by drawing on (and not founded on) the more systematic tools)</td>
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Because modern conditions present long-term concerns that reveal fundamental forms of uncertainties, a precautionary form of risk assessment requires a deliberative participatory process, where participants ideally come to an inter-subjective understanding of the issues. So although in a general context, precaution may seem similar to prevention (because both seek to define actions that ultimately try to reduce potential future harm), they are inherently different in terms of how they perceive and address risk.

Consequently, the more the process of evaluation or problem-solving are disconnected from the complex real-world phenomena, and oriented by specialists and experts, the larger the extent of interrelationships within this complex problem which are ignored in developing alternatives (Voss & Kemp, 2005). This evasive approach to problem solving unlocks the possibility of unintended consequences (Voss & Kemp, 2005) – meaning that an understanding of the complexity of the phenomena has been ignored and therefore the proposed solutions become inconsistent with the real-world problem.

Evaluation methods that are committed to a positivist form of inquiry, are limiting in a context of sustainability and therefore, in this paper, my attention is drawn to a spectrum of non-reductive methods for assessment. Such an approach may help the design team, made up of technologists, designers, and community members to understand, contextualize, and possibly, challenge the given design problem (Busby, Perkins & Will, 2007a, Zimmerman, 2006, Larsson, 2004, Forester, 1993, Schön, 1983). Here the plurality of value systems and views can be considered during the evaluation process. However, this also represents the main difficulty because members must then comprehend and assimilate each other’s issues, claims and concerns into their own perspective of the design problem. Methods of evaluation then become a fundamental element for sustainable design, especially because evaluation is intrinsically linked to the process of conceptualization (Trochim, 2006). Therefore the need arises to consider a shift in paradigm for evaluation.

A precautionary approach to decision making would highlight diverging views in order to define an anticipatory course of action. A preventive approach to decision making would ignore these as anomalies to the problems (in the Kuhn sense, 1970) or hide them as assumptions to the design problem. Prevention is an approach that adopts instrumental models of rationality, whereas precaution must adopt both instrumental and critical-reconstructive models of rationality. Therefore, it seems that these two approaches can complement each other for sustainable design practice.
2.2 Evolution of Design Methods and Approaches

How do these risk assessment principles relate to design methods and approaches? In many ways, they have been congruent in their evolutions. Table 2 helps to elaborate the successive design approaches for dealing with environmental issues.

Design strategies have evolved from green, to eco and sustainable design. These strategies have evolved over time in parallel with the growing concerns of the environment and societies. Green design was an approach that sought to reduce pollution at the end of a production process – an approach that responded to the evolving laws. Eco-design is an approach that seeks to reduce impacts along the life cycle of the artifact to design, so it focuses on the eco-efficiency of both product and process - a primarily preventive perspective. Sustainable design seeks a broader perspective of the design problem by looking at the system within which the artifact to design is embedded - and where a sense of inter-dependence among the organization, those affected by the activities of the organization, and the environment becomes a serious consideration in the design process.

Table 2: Various approaches to design that consider one or more of: environmental, social, cultural, and ethical criteria (based on: Cucuzzella, 2007, p.35).

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<tr>
<th>Name of Design Approach</th>
<th>Type of Approach</th>
<th>Organizational Strategy</th>
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<tr>
<td><strong>Green Design</strong></td>
<td>Process Approach</td>
<td>An approach that comprises mostly of end-of-pipe solutions. Work is focused on reducing emissions of pollutants based on the process of fabrication. The motivation here is mostly abiding laws.</td>
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<tr>
<td>An approach that responds to evolving laws – pollution prevention.</td>
<td>Industrial vision with short term solutions</td>
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<tr>
<td><strong>Eco-Design</strong></td>
<td>Product and Process Approach</td>
<td>A strategic approach that considers all the life cycle phases of a product or process. All the potential environmental impacts of a product are taken into consideration and the actions taken are an integral part of the policies of the enterprise. The motivation here is for the enterprise to differentiate itself from other enterprises, as well as to follow expected laws and norms.</td>
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<tr>
<td>Approach to design that considers the environmental impacts based on the life cycle of a product – eco-efficiency.</td>
<td>Global vision with essentially short and medium term solutions</td>
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<tr>
<td><strong>Sustainable Design</strong></td>
<td>Product and Process -Global (temporal and spatial) Approach</td>
<td>A global approach that considers environmental, social, cultural, and ethical aspects. In this approach, the enterprise is no longer considered isolated in its environment, but is considered as a part of the system with the environment and society that surrounds it. The motivation here is a strong commitment to sustainable development.</td>
</tr>
<tr>
<td>Requires a sense of inter-dependence among the organization, those affected by the activities of the organization, and the environment.</td>
<td>More global vision with short, medium, long and very long-term solutions</td>
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Just as design approaches have evolved (from green to eco, and to sustainable design), so that the extent of the environmental and social issues are increasingly better reflected, design methods have evolved in parallel from the rigorous engineering approaches to those based on communication (inspired by the work of Schön, 1983).

2.3 Varying Levels of Innovation Approaches

What level of innovation will lead to greater sustainable gains? And how do these levels relate to design approaches and methods of risk assessment? In Figure 1, the various scales of approaches for conceptualizing and evaluating design problems are presented. This figure shows that on the one hand, there are greater eco-efficiency improvements, as we move from a product focus to a system focus innovation, while on the other, the difficulty of implementation increases.

Brezet (1997) claims that re-thinking lifestyles will lead to greater sustainability when compared to product improvement through eco-efficiency optimizations alone. Levels 1, 2, and 3 represent approaches that are embedded within eco-design. Here the designer seeks to redesign the artifact or its functionality in order to reduce environmental (or social) impacts. The approach remains within a product vision of understanding the impacts and though is fundamental for optimization; it also presents a handicapping myopic vision, and is a major problem for sustainable design, where a more global point of view is needed. In fact, Van Der Ryn & Cowan (2007) question the benefit of technological sustainability alone. They challenge the idea that this approach for sustainability may actually be “simply a kinder, gentler form of reductionism in which we do a more efficient job of using up, accounting for and managing nature” (p.21).

On the other hand, system level innovations (level 4) represent solutions where the artifact to design is only one element of a larger system of changes. Here, the integration of ideas from varying stakeholders is necessary since designers cannot impose system level changes; instead these solutions must come from a collaboration of both, bottom up and top-down approaches (relativist, inter-subjective approach to acquiring knowledge – a co-learning process). Consequently, a difficulty with innovations at this level is that epistemic uncertainties are prevalent and that traditional scientific forms of inquiry cannot handle long-term predictions.
Figure 1: Various scales of problem perspective (based on: Fletcher, Drewberry & Goggin, 2001, Janin, 2000, Brezet, 1997, Dewberry, 1995)

Figure 1 draws a parallel between the temporal scale, the level of innovation and the potential sustainable benefits. This schema seeks to show that as the vision moves beyond the artifact, towards system level innovation, the main issues and concerns move to the relationship between the artifact and the larger system of changes within which the artifact is embedded (and do not stay focused on the artifact).

Van Der Ryn and Cowan (2007) claim that current design epistemologies are incompatible with nature and therefore they are flawed when seeking to find methods for moving towards sustainability. These authors offer three visions for addressing the natural capital depletion: conservation, regeneration and stewardship. The conservation strategy is incomplete on its own because it is not radical enough – it encourages a deceleration of the rate at which resources are depleted (Van Der Ryn & Cowan, 2007). This is a preventive approach. Regeneration is “an expansion of natural capital through the active restoration of degraded ecosystems and communities” (Van Der Ryn & Cowan, 2007, p.37). Regeneration preserves, protects, and restores, therefore adopts a long-term perspective – so represents a precautionary attitude. This strategy seeks to understand the integration of society and the environment. Stewardship “maintains natural capital by spending frugally and investing wisely” (Van Der Ryn & Cowan, 2007, p.38).

These strategies are a reminder that sustainability is not only about technical solutions (conservation), but also that the human dimension is prevalent in both the decision process
of solutions (stewardship) and the solutions themselves (regeneration) (Cucuzzella, 2009b). This is because the more you tend towards systems solutions, the more it involves various actors, changes in the way things are done, reorganization and, modifications of potentially sensitive social and cultural practices and structures (Cucuzzella, 2009a, Cucuzzella & De Coninck, 2007). In other words, the difficulty lies not only in the implementation of the solution, but maybe more importantly on the acceptability of the proposed solutions and the decision making process to get there, as well. This is why this research will seek to move beyond traditional evaluation approaches for sustainable design practice.

3. Theories Supporting an Implementation of the Precautionary Principle for Design
If the precautionary principle is to be integrated within the evaluation and innovation frameworks of sustainable design projects, it is important to understand which theories are congruent with and can support this principle. I present several concepts and theories. The suggestion is that each of these has a particular significance for its introduction into the design process. In addition, an understanding of their compatibilities can provide a coherent view of this envisioned implementation. I will begin with describing the varying forms of interaction.

3.1 Forms of Interaction and the Construction of Collective Knowledge
Why is an understanding of levels of interaction interesting for this research? Decisions that adopt the precautionary principle rest on the participation of stakeholders in order to define an anticipatory course of action, mainly, because participation may open up dialogue and facilitate co-learning, by bringing about critical awareness and self-confidence among the participants (Cornwall, 1996). So, it is important to start from an understanding of the varying forms of interaction.

There exist many models representing the levels of interaction within groups. Figure 2 is one of several examples. There are varying levels of participation, and it is important to emphasize that co-learning does not occur at all levels. In general, there are three main categories.

First, there are methods where the participants are simply given information (one-sided communication and the decision is unequivocal). Second, there are methods where the participants are asked their views, but there are no guarantees that these views are considered in final decisions (two-sided communication but no collective knowledge construction). Finally, there are methods where the participants exchange knowledge in an effort to build a common view of the issue (two-sided communication with collective
knowledge construction). Here both horizontal and vertical forms of communication are necessary in order that collective knowledge construction can occur.

For sustainable design practice, where the issues, claims and concerns are often global and long-term, and where uncertainties are of an epistemic nature, the type of interaction needed would be where a co-construction of knowledge can occur in order that some kind of synergy among the diverging ideas can take place. In these varying forms of interaction, the participants can be the members of the design team, the local public of the project, the larger public (neighboring or city), the provincial context or national context. So, consultation can occur with individuals, bureaucrats, politicians, or children that represent our future.

Struggles of power or coercion may affect the quality of knowledge exchange among participants in design projects, so it is infinitely important that the situation within which the communication occurs is fair and just, in order that the issues are resolved based on the strongest argument and not on the level of power of stakeholders.

3.2 Integrated Design process (IDP)

However, in order that such a co-learning and co-creation process may be adopted in design, the structure and dynamics of members within design teams must be more integrated when compared to traditional teams. Figure 3 tries to compare the different levels of involvement of the various stakeholders for the two types of design processes.
Figure 3: Comparison between the level of involvement of stakeholders in traditional and integrated design processes (based on: Busby, Perkins & Will, 2007a, b, Zimmerman, 2006, Sylvester-Bradley, 2003).

The integrated design process (IDP) represents a departure from the traditional process in this respect. In an IDP, the stakeholders are ideally involved throughout the design process. An IDP is based on the facilitation of dialogue among stakeholders who bring different insights to bear on complex issues and where the members of the design team are confronted with the same problem, but where the perspective of the problem is different for each member of the team (Zimmerman, 2006). Because an IDP adopts design methods based on communication and dialogue, the quality of communication in an IDP is very important since (1) the diverging value systems must be made explicit in order that they are addressed; and (2) that the synergy amongst participants may be captured.

3.3 Fourth Generation Evaluation (FGE)

Consequently, if an IDP is adopted, then the form of the evaluation must be able to accommodate the plurality of the values and visions of the various stakeholders of the design project. This is why this research must also consider the fourth generation evaluation (FGE) approach as defined by Guba and Lincoln (1989) – in order that the evaluation process can move beyond an evaluation of mere facts to include a multitude of elements such as social, cultural, political, contextual and human (Guba & Lincoln, 1989).
FGE is both educational and empowering, where the results of the evaluations are more socially and politically sensitive (Guba & Lincoln, 1989) – especially when compared to the first three generations of evaluation approaches. The first three rely on measurement, objectives or judgement where an over-commitment to the positivist form of inquiry results in an inability to accommodate value pluralism and therefore may be disempowering to those involved in the evaluation. Fourth generation evaluation is negotiation oriented and is meant to address the limitations of the first three. So, fourth generation evaluation represents a shift in epistemological positions, from a predominantly positivist to a constructivist paradigm (Morse, 1994, Guba & Lincoln, 1989). Fourth generation evaluation can be defined as the (Guba & Lincoln, 1989, p.184):

“marriage of responsive focusing – using the claims, concerns and issues of stakeholders as the organizing elements – and constructivist methodology – aiming to develop judgement consensus among stakeholders who earlier held different, perhaps conflicting, emic constructions.”

The claims, concerns and issues represent the core of the constructions for the common view. Therefore, the involvement of stakeholders requires more than just an identification of the claims, concerns and issues of each stakeholder group. The most important part of FGE is that each group is required to confront and take account of the inputs from other groups. This is where the co-learning and co-creation takes place.

So, when adopting the precautionary principle for defining a course of action in a design project, FGE characterizes a relevant evaluation method because it allows a negotiated common view of the problem through an understanding of the collective claims, issues and concerns – a hermeneutic/dialectic methodology for evaluation. All these theories lead to the
question: how then does one evaluate the quality of the communication process to ensure that a fair and just decision is taken? And particularly, how were the diverging views and visions revealed and addressed? And were the ways in which they were addressed best suited for the type of issue in question? Here, both technical and emancipatory forms of knowledge will be included in the design discourse and therefore the theory of communicative action as defined by Habermas (1984) can help the team understand and adjust the quality of the communication.

3.4 Habermas' Theory of Communicative Action (TCA)

The theory of communicative action as developed by Habermas (1984) represents a method that may help understand how participants can come to a shared understanding of the design problem through communication. Habermas (1984, p. 286) states that:

“participants are not primarily oriented to their own individual successes; they pursue their individual goals under the condition that they can harmonize their plans of action on the basis of common situation definitions (...) the negotiation of definitions of the situation is an essential element of the interpretive accomplishments required for communicative action”

So it is emancipatory, teleological, based on a fair and just deliberation process, the findings are co-created through a process of co-learning and are founded on the values and visions of the various participants. Habermas (1984, pp. 285-286) defines communicative action as a form of communication where: “the actions of the agents involved are coordinated not through egocentric calculations of success but through acts of reaching understanding.” In this perspective, communicative action is a two-sided communication amongst participants, rather than a one-sided coercive form of communication. Here, participants are free to express their views. This is what Habermas (1984) refers to as the “ideal speech situation” – where the strongest argument has the most influence and not the most powerful actor. So an ideal speech situation is essential when a design team must share, exchange and assimilate others' knowledge to construct a common view of the design problem together. It is important to highlight that design projects are rarely free of coercion, power struggles, hidden agendas, diverging views, visions, value systems or concerns, errors in calculations or judgements. Therefore, there will be controversies within non-ideal speech situations. So why am I selecting such an ideal model of communication? Even if a Habermasian perspective for communicative action may appear too ideological, this actually represents its strength.
because it provides a benchmark from which to assess the quality of communicative action. More specifically, it provides a lens from which I can analyse and assess the deliberative process of the design discourse.

3.5 Benefits of a Habermasian Analysis

What is the main benefit of adopting a Habermasian analysis? This theory pushes the notion of instrumental rationality as defined by Weber. He critiques Weber’s idea that rationalization in modern society has enabled the emergence of society as the ‘iron cage’ [sic]. Weber claims that the tension between modern culture and the individual, based in a formal rational of bureaucracies represents the elimination of individuality, where formal rules, procedures and norms replace individual connections (Fleury, 2001).

However, Habermas claims that communicative rationality can address this. The idea of empowerment is inherent in his theory since the participants engage in processes of reaching common situation definitions through a reflection of their own intentions and worldviews.

“This concept of communicative rationality carries with it connotations based ultimately on the central experience of the unconstrained, unifying, consensus-bringing force of argumentative speech, in which different participants overcome their merely subjective views and owing to the mutuality of rationally motivated conviction, assure themselves of both the unity of the objective world and the intersubjectivity of their lifeworld.” (Habermas, 1984, p.10)

Therefore, the theory of communicative action addresses the gap between the models of critical-reconstructive rationality (based in communication) and instrumental rationality. This research is subscribing within this gap - seeking to address the limits of traditional assessment methods (that are more instrumental) with the deliberative approach for fostering innovation (more communicational). The main benefit for combining the various theories is that both rigour and relevance are reconciled in the evaluation and innovation process of design projects.

3.6 Compatibilities among Theories Proposed (IDP, FGE, TCA and the Precautionary Principle)

How do these various theories and concepts benefit a precautionary approach for conceptualization? What are the compatibilities among them, and more importantly those with an implementation of the precautionary principle?
All require some kind of consensus to be reached or at least diverging views are exposed;
All are teleological - reaching some common goal;
All are educational, since stakeholders assimilate others’ views into their own;
All are empowering, because the process is based on the negotiated stakeholder’s views;
Co-learning and co-construction are at the core of these approaches;
All include both, instrumental and dialectic rationality in the design discourse;
All require a critical analysis of the boundaries of the problem (who is involved and what issues to include); and
All require a constructivist mode of generating the knowledge, as well as a responsive (adaptive) mode of focusing on the issues.

This research began with an interest to operationalize the precautionary principle for sustainable design practice, because sustainable design practice has at its heart, uncertainty and doubt. When looking at the design problem through a precautionary approach, the complexity of the problem is revealed, and therefore a more global perspective may be obtained when compared to traditional problem-solving approaches for design. In a precautionary approach, the design problem is set at the same time as it is solved. According to Schön (1983), when designers set the problem, they select what they will treat, they select the boundaries, and construct a coherence which allows to judge which direction is most appropriate to follow (or if the situation must be changed). Rendering explicit the value systems of the stakeholders is necessary for this judgment to occur in a collaborative environment. However, the traditional approaches for evaluation are equally fundamental as the results of such approaches may nourish the communicative nature of the collaborative design process needed for a precautionary approach. According to Seager (2008, p.449),

“Although research in the analytic fields (such as risk analysis, benefit–cost analysis and life cycle assessment) and research in the deliberative fields (such as public participation, value elicitation and facilitation) have progressed individually, synthesis of these diverse areas has lagged.”

This research is subscribing within this gap, seeking to address the limits of traditional assessment methods, and the deliberative approach for fostering innovation, where these
approaches can complement one another. The benefits of combining the various concepts are numerous for an operationalization of the precautionary principle for sustainable design practice. And consequently, each of these is interrelated, in that they have inherent compatibilities amongst them.

4. Field Work
The field work for this research will focus on an architectural community design project: the McGill University Health Center (MUHC) in Montreal. This is an ongoing project. The preliminary design phase had just been completed. This hospital project will consolidate its activities on three sites. Currently these activities are spread across more than five sites, where the facilities are out-dated and are difficult to keep up with modern medicine and science. The MUHC project is being developed with careful consideration of the concerns of the community. In November 2004, the MUHC signed a commitment with the community called the Inter-Neighbourhood Coalition agreement. The purpose of this agreement is to ensure that an open dialogue with the community is maintained by addressing issues related to (but not limited to) potential employability, environmental protection, economic development and accessibility. A silver LEED certification is being sought for two of the three sites. LEED certification is the main tool that will be used to assess the recognized sustainable development, operations and maintenance standards.1

In order to address the concerns of the community regarding the construction of this mega-hospital and the simultaneous closure of the downtown hospital, a coalition of citizens was created. This group represents the community perspective. The concerns of this group were communicated to the planning committee of the MUHC, where some of these concerns made it to the Request for Proposal. This committee was only one of several involved in the planning of the hospital. Other committees included the clinical, architecture and transition committees.

The main reason for selecting this hospital community project as the focus for my observations is that it adopts an IDP. The methods of interaction among members of the design team in an IDP should ideally be negotiation (as in FGE) or better, co-learning and co-construction of the design problem and possible solutions. However, it will be interesting

1 Further information about this project can be found at http://muhc.ca/new-muhc
to see if the IDP is realized given the complexity of the project, the multitude of actors involved, and the various concerns which may at times be contradictory and diverging. In addition, another important criterion is that this project seeks to include the community’s concerns in the development of the project and is therefore, in many ways a social project affecting many actors in a variety of ways.

The Habermasian notion of an ideal speech situation would ideally characterise the communication milieu of the planning. However, the hierarchical positions of the members of the planning team cannot be ignored within a hospital project since the members of the planning committee range from clinical experts to architectural design teams and to community members. So even if the MUHC claims to adopt an IDP, where the methodology for evaluation is ideally hermeneutic/dialectic, whether or not that promise is realized is unclear. The specific areas of inquiry in this project will be: the design and development process; the input by neighborhood residents; the community representation on the design committee inside the planning process; and the iterative and consultative integrated design process. It will be interesting to see if the ways in which the issues were dealt affect the ability for the planning and design team to innovate and move innovation beyond the idea of performance optimization for the sustainable axe of the project.

5. Conclusion and Preliminary Recommendations

In conclusion, the precautionary principle in its very basic form is an alternative to risk assessment for defining a course of action. As design projects are characterised by their ambiguity and their uncertainties, a precautionary approach can enrich the risk assessment through a heuristic and holistic approach for understanding the design problem. A precautionary approach is a learning process rather than a process to help identify areas of optimization. An interactive planning approach provides an excellent framework for a precautionary approach for evaluation. Consequently, IDP is based on many of the basic principles as interactive planning. The IDP allows a collaborative process of design that seeks a holistic vision of the project. In addition, an IDP seeks to address the common-good, seeks to assimilate the plural visions, is based on understanding the long-term visions of the project, and the proposed solutions seek to satisfy multiple needs and therefore provide multiple benefits. These are all core concerns of sustainable development, as well as the precautionary principle. Therefore, the foundations of the IDP lie in a similar philosophical space as the precautionary principle.

IDP is therefore a fertile process for integrating the precautionary approach for evaluation since, the precautionary principle requires as a basis for its operationalization, a collective
process. Also, according to Whiteside (2006), at the heart, a precautionary approach requires a transdisciplinary attitude for seeking a global vision. It is fundamental to obtain a perspective of the various participants with non-traditional backgrounds with regards to a design project. This whole system view can be constructed based on their collective discourse and deliberation. It will however be interesting to understand where the MUHC, which adopts an IDP, lies within the social ladder of participatory methods.

The proposed evaluation process is suggested to be modelled on the FGE approach, as this is based on a hermeneutic/dialectical methodology and where transactional subjectivity presents the key epistemological characteristic for this approach. Systemic modeling can be very useful to help construct the global perspective of the claims, issues and concerns of the stakeholders. This process of modeling will, in addition, give ownership to each of the participants involved in the design project.

A new evaluation and innovation framework for sustainable design based on the notion of precaution (and not only prevention) is therefore proposed to address some of the limits that design practice is faced with respect to current risk assessment methods. In particular, when regarding the complexities of design projects, their uncertainties, the controversies that emerge associated with potential environmental or social risks, the irreversibility of actions taken, the unpredictability of long-term consequences, the incommensurability of the plural visions - are all important for the long-term perspective that sustainable development seeks.

A precautionary approach to evaluation may consider each of these.

This research is inspired by the Habermasian theory of communicative action as well as by design methods based on communication and conversation. A particular emphasis is dedicated to the evaluation of long-term sustainable design goals, where divergent value systems, visions, claims and concerns emerge during design discourse, and where these must be comprehended, analysed, assimilated and communicated until such point as consensus is reached or that the conflicting ideas are exposed.

As this may seem an impractical focus, since it complicates the evaluation process, it represents the greatest strength of the precautionary principle, since it will allow designers to address uncertainties and doubts regarding long-term views and visions, which arise during design discourse. I see this principle as a way to situate the evaluation process with the innovation process for design projects that seek sustainable objectives.
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Acknowledgements

This research has been possible through a bursary provided to the author by the Social Sciences and Humanities Research Council of Canada and through the support of the research laboratory L.E.A.P (Laboratoire d'étude de l'architecture potentielle).