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# The Designer in the Systemic Paradigm: Facilitator of Group Design

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## Abstract

A shift in paradigm, from a mechanist approach to a systemic approach, is redefining design methods. The design task changes from crafting objects to constructing systems and managing processes; and the design process from individual problem-solving process to design as a collaborative group process. Design becomes a meta-process, engaged in by "everyone who devises courses of action aimed at changing existing situations into preferred ones" (Simon, 1969, p.129). If everyone designs, what is the role of the designer in the systemic paradigm?

The emerging systemic paradigm redefines the designer's role as a guide that helps others design for themselves. If helping guide a group through processes is a description of the function of facilitation, then the role of the designer in the systemic paradigm is as a facilitator. Current facilitation methods are dominated by the mechanistic or neo-mechanist paradigm, both incompatible with systemic principles. The result is that there are currently no systemic facilitation methods. In addition, if facilitators help groups change states, and systemic design is the best description of the process of changing states, then it is suggested that systemic design should be recognized and adopted by the field of facilitation as its primary group process.

As this paper only establishes the concept and provide a brief overview of the possible characteristics of the designer as facilitator and not the methods themselves, complete methods and models still need to be developed.



Keywords: facilitation, group design process, design methods, systemic approach, complexity

# Résumé

Actuellement, un changement de paradigme réoriente les méthodes de design, favorisant une approche systémique plutôt que mécanique. La conception d'objets, c'est à dire la tâche première du design, est ainsi redéfinie en une construction de systèmes et une gestion de processus. Parallèlement, le processus de design se transforme, et devenant démocratique, abandonne le modèle de processus individuel de résolution de problème.

Le design devient donc un meta-processus entrepris par « everyone who devises courses of action aimed at changing existing situations into preferred ones» (Simon, 1969, p.129). Mais si chacun « design », quel est le rôle du designer dans paradigme systémique? Les chercheurs suggèrent que ce designer pourrait être un guide ayant comme rôle d'aider les autres à créer pour et par eux-même. De fait, si l'aide apportée à un groupe en l'accompagnant à travers son développement est la description de la mission de l'animation, alors le rôle du designer du nouveau paradigme systémique est celui d'un animateur. De façon réciproque, si le travail de l'animateur est d'aider un groupe à changer d'état et que la meilleure description de cette action de changement d'état est faite par le design systémique, alors les animateurs devraient considérer le design systémique comme un modèle de travail pertinent.

Cependant, les méthodes d'animation actuelles sont dominées par le paradigme mécanique et les rares modèles d'animation systèmiste existant sont basés sur l'approche de la première génération et donc catégorisables comme suivant le paradigme néo-mécanique. Ils sont ainsi incompatibles avec les principes systémiques tels que nous les concevons. Il en résulte donc une absence de méthodes d'animation systémique utilisables en état. Puisque ce mémoire ne fait que soulever l'idée de la fonction du designer en tant qu'animateur et ne vise pas à élaborer des méthodes qui y seraient adaptées, ce travail reste encore à être fait.

Mots clés : animateur de groupe (facilitator), processus de design en groupe,

méthodes de design, approche systémique, complexité.

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# Dedication

To my parents, Kalman and Daina

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# Introduction

# The Role of the Designer in the 21st Century

## 1 Paradigm Shift in Design Methods: from Mechanism to Complexity

From the beginning of the design methods movement in the 1960's design studies researchers have argued that design and design methods are in transition. The changes have been described as move from: old to new (Jones, 1980), modern to post-modern and material to immaterial (Diani, 1988), first generation to second generation (Rittel, 1972), domains of first, second, third to fourth order (Golsby-Smith, 1996), and rational to post-rational (Coyne and Snodgrass, 1995). Though the framework to explain the changes differ they all describe definitions of design that redefine the role of the design process, the object of design, and the role of the designer. The design process changes from an individual cognitive process to a social group process, the design object from an isolated object (product or structure) to a system, and the role of the designer changes from a computational problem solver and form giver to that of a go-between for the user and the manufacturer and a group process guide. The consequences of these proposed changes in design methods, particularly the role of the designer, have not yet been fully addressed by current design research.

The roots of design methods are found in the application of the scientific decision-making techniques of the 1940s and 1950s to the field of design in the 1960s (Cross, 1981). The application of these techniques to design led to the development of systematic design methods. The motivation for applying these techniques to design

was the perception that design projects were becoming so complex that more rational, systematic methods had to be developed in order to manage the complexity and improve the outcome of the design process (Jones, 1981). These 'new' methods were contrasted with 'traditional' craft-based methods. The effect of applying these techniques to design was an attempt to create a science of design. Soon, the 'new' methods designated as first generation, were the 'old' methods, and a new wave of second-generation design methods was created in response to the perceived inadequacies of the first generation (Cross, 1981).

As a third generation of design methods was developing, Cross proposed to end the 'generations game' by applying Kuhn's theory of paradigm shift. The concept of paradigm shift describes the developmental change from one way of thinking to another as experienced by science (Kuhn, 1970). It suggests that science advances by revolutionary shifts in paradigm rather than incremental advances as proposed by Popper (1968). Scientists work on problems developed within an existing paradigm until crisis forces a shift in paradigm that changes the entire outlook of the discipline and its underlying assumptions. Cross argues that the continued dissatisfaction with design methods and the subsequent development of new methods are representative of a discipline in a paradigm crisis, and suggests that, much as science experienced a paradigm shift from Newtonian physics to Einsteinian physics, design is in transition from a dominant paradigm to an emerging paradigm.

Cross defines methods to include "personality, product, and process" (Cross, 1981, p.5) as he feels that they can not be separated from design methods. The description of designers' personality seems to be wrongly classified. A similar, but more precise tri-partite model of design methods is outlined by Kees Dorst (1997). Design methods are described as comprising three dimensions: statements about the dynamics of the design process, a model of the designer, and a model of the structure of the design task, referring to the object of design (Dorst, 1997, p.13). The most important differences are that products become design tasks, or the result of design tasks, and the nebulous category of personality becomes the model of the designer. These three

dimensions will be used to describe design methods in this paper.

The theory of paradigm shift covers three periods: the dominant period, the transitory period, and the emerging period. The dominant period reflects the thinking of the existing paradigm, the transitory period shares characteristics of the dominant paradigm and also the emerging period, and the emerging period is typified by the new paradigm. As design transitions from a dominant paradigm to an emerging paradigm, new design methods will emerge to meet the requirements of this new paradigm:

> Just as the pioneers of the Modern Movement recognized the need for new design concepts to match the new technology of the 20th century, so the pioneers of the post-Modern movement recognize the need for new design to match the emergent technology of the 21st century (Cross, 1981, p.5).

When a transition of paradigm is complete, the profession changes its view of the field, its methods, and its goals (Kuhn, 1970).

Nearly 25 years have passed since design researcher Cross proposed applying Kuhn's theory of paradigm shift to design in order to end the "generations game" of design methods; and yet design methods still seem to be changing. While Cross proposed that the shift was from modernism to post-modernism and industrial to post-industrial (Cross, 1981), he did not make the underlying theories that inform the paradigms of each period explicit. And if the underlying philosophy is not explicit it is very difficult to attribute principles to each paradigm and then evaluate the methods by comparing them against those principles. The result is a paradigm unassociated with the principles of any theory or philosophy. Cross describes the current paradigm of design as "rationalistic, reductionistic, and mechanist" (Cross, 1981, p.4) and attributes it to modernism, but he does not describe what philosophy or approach informs modernism. This characterization of the dominant period can be considered as a description of the mechanist approach to classical science, first outlined by René

Déscartes. While preserving the paradigmatic framework, it is suggested that the shift in design methods can best be described as a shift from a mechanist paradigm to a complexity paradigm.

If mechanism is the theory informing the paradigm of the dominant period, what is the theory informing the emerging period? It is suggested that critical systems theory is the emerging paradigm for design in the 21st century (EAD, 2004). If an approach based on the evaluation of systems represents the emerging period, then the French School of critical-systems thinking (Levy, 1991), comprising Edgar Morin and Jean-Louis Le Moigne[1], is proposed as the underlying theory to inform the emerging paradigm. Morin is selected because of his work in developing Method[2], a collection of six volumes whose objective is to create a paradigmatic framework for systemic thought (Levy, 1991). Morin does not attempt to provide a unifying theory of everything to rival positivist (mechanist) science (Levy, 1991), but rather a break from the mutilating rational approach of Déscartes, aiming to create a "meta-methodology, which would help steer rationality and create understanding" (Levy, 1991, p. 91). The French school of complexity thinking is chosen as the underlying philosophy for the emerging paradigm because the work is a direct response to the method as outlined by Déscartes. The structural parallels between Morin's *Method* and Déscartes *Method* facilitates the comparison of methods based on different philosophical underpinnings.

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1 Levy refers only to Morin as the French School. However French researcher J-L Le Moigne, is included as he is instrumental in developing complexity theory as a director for *Programme européen "Modélisation de la Complexité, Association pour la Pensée Complexe* (MCX-APC), website [http://www.mcxapc.org], and co-author with Morin of recent works on complexity theory (Morin, Le Moigne, 1999).

2 *Method* is the English language translation of, *La méthode, tome 1: La Nature de la nature*, the first volume of six in the series *La Méthode*. The other five volumes are: *La méthode, tome 2: La Vie de la vie, La méthode, tome 3: La Connaissance de la connaissance. La méthode, tome 4: Les Idées. Leur habitat, leur vie, leurs moeurs, leur organisation, La Méthode, l'humanité de l'humanité, tome 5 : L'Identité humaine, Éthique : La méthode 6*. The other five volumes have not yet been translated into English. For an English summary of Morin's work based on the first four volumes (volumes five and six had not yet been published at the time of writing the article) read Ron Levy's article, "Critical Systems Thinking: Edgar Morin and the French School of Thought", in Systems Practice, Vol. 4, No. 2, 1991, pp. 87-99.

In the systemic paradigm, the design task shifts from objects to systems and the design process is described as a meta-process, engaged in by "everyone who devises courses of action aimed at changing existing situations into preferred ones" (Simon, 1969, p.129). Simon's description of design creates the possibility of design activity being recognized as a primary human process on par with problem-solving. As a primary human process it enlarges the domain of design activity from designers to the general population. It also allows for the recognition of design activity across different disciplines. However, **the redefinition of the process of design redefines the role of the designer and design process, the consequences of which have not yet been fully addressed by the design research community.**

The change in the definition of design raises two important questions. **Firstly, if everyone designs, what is the role of the designer?** Researchers suggest that the role of the designer "is that of a midwife or teacher rather than the role of one who plans for others. Instead, he shows others how to plan for themselves." (Rittel, 1972, p.9) However, the question remains; **what does it mean to be the midwife of group design and what are the methods? Secondly, if design is a group activity primarily concerned with changing states, what are the methods?** What does it mean for two or more people to devise "courses of action aimed at changing existing situations into preferred ones?"

The design researchers who first described the new models of design methods as a group process asked the same questions.

> Characteristically, designing is a social process. In every major building project, there are many different kinds of participants: architects, engineers, building contractors, representatives of clients and interest groups, regulators, developers, who must communicate with each other in order to bring a project to completion. These individuals in their different roles tend also to pursue different interests, see things in different ways, and even speak different languages, yet they do sometimes come to agree on some thing to

> be built. How shall we account for the ways in which they do so (Schön, 1988, p. 182)?

Other researchers state that the shift in paradigm "*brings to light new problems of practice. The emphasis is on design as a collaborative enterprise. What are the means of collaboration?*" (Coyne and Snodgrass, 1995, p.61). Schön states that a "*theory of designing worth its salt must somehow take account of these tensions. It must not ignore them*" (Schön, 1988, p. 182). Ironically, Schön proceeds to outline a theory based on an individual designer leaving the question unanswered.

Reviewing the design literature it would seem that little progress has been made to describe the methods of group design or the role of the designer in group design since the authors first mentioned it over twenty years ago. Little distinction is made between group design, participatory design, collaborative design, and team design in the literature. Initially, Rittel described participatory design to describe design that involves those affected by the design, such as users, allowing them to design for themselves. Often, it is now used to describe focus groups where researchers work with clients to help them express their attitude concerning various topics. For this paper, group or collaborative design, refers to two or more people engaged in the process of design, whereby each person has decision-making authority concerning the design. Decision-making authority refers to their ability to express preferences concerning the design that will be considered, though this does not guarantee an equal level of decision-making. They are also actively engaged with the other members of the group at the same time working on the same project. This last point is important to make a distinction between people working together on a design, and an executive with significant decision-making authority that comes in at the end of the design process and passes judgment. As the executive did not actively participate with other group members at the same *time*, he or she is not considered as a member of the group.

What is design as a collaborative enterprise? It is suggested that design done as a

group involves strategic conversations (Golsby-Smith, 1996), dialogue and choice-making (Rittel, 1972). The group involved in design dialogue together to determine what form or choices the design should represent. It is agreed, that group design involves dialogue and group choice-making – however it still does not address how this is done in a group and the role of the designer in acting as a guide of this process.

**It is suggested that the process of helping guide others through process is the function of facilitation, and that the methods for guiding groups through the process of design and collaborative group dialogue and choice-making can be found in the field of facilitation.**

Reviewing facilitation methods by the same paradigmatic framework used to categorize design methods reveals that the majority of the methods manifest characteristics of the mechanist approach: the observing subject (facilitator) is neutral in relationship to the observed phenomenon (the group), the primary group process is based on problem solving, and the facilitative approach is based on prediction and control.

There are two challenges to integrating mechanist facilitation methods with systemic design methods. The first, is that mechanist facilitation methods are philosophically incompatible with systemic design that is based on the complexity paradigm. The second barrier to integrating existing facilitation methods with design, a result of the mechanist paradigm, is that the current facilitation methods do not recognize design as a primary group process. Problem solving is recognized but not the process of design. At best, design is considered a sub-process to problem solving or a type of problem solving. The result is that systemic design cannot be integrated with existing facilitation methods and new methods need to be developed.

**It is suggested that existing facilitation methods and techniques can be adapted to facilitating design if the existing primary-process model based on problem solving is replaced with a model based on systemic design.**

Just as the redefinition of the process of design changed the role of the designer, integrating systemic design as the primary-group process model for facilitation redefines the role of the facilitator. The change can be considered a shift in paradigm for the discipline of facilitation from the mechanist to the complex because the key characteristics of facilitation are changed and in some cases inverted, echoing the contrast between the complexity approach and the mechanist approach. The key characteristics of current facilitation methods are negated: the facilitator is no longer neutral, the focus is no longer on control, and the process is no longer problem based.

The result of the integration of design and facilitation in the systemic paradigm is the development of new systemic design and facilitation methods. The role of the designer is defined as a facilitator, the methods of which are taken from the discipline of systemic facilitation. In turn, systemic facilitation incorporates systemic design as the primary group process. The result is an integration of the two disciplines: the designer as facilitator (facilitative designer), and the facilitator of design (design facilitator).

In order to explore the changes in design methods due to a shift in paradigm from the mechanism to complexity and the role of the designer as facilitator in the systemic paradigm, a comparison of paradigms is made. Following the theory of paradigm shift, design methods are categorized by paradigm and the philosophies that inform them are introduced. The **dominant period** is described as following the **mechanist approach** as outlined by Déscartes. The **emerging period** is described by the **complexity** paradigm of Edgar Morin. **Design methods** are then reviewed and categorized and described by **period**. Design methods that manifest characteristics that follow the principles of the mechanist approach are described as being **mechanist design methods**. In turn, those design methods that follow the characteristics of the complexity approach are described as **systemic design methods**. Systemic design methods are discussed, as is the question of the role of the designer in this paradigm. It is suggested that the role of the designer in the systemic paradigm be as a

facilitator. Current **facilitation methods** are reviewed by the same paradigmatic framework used for design methods revealing the incompatibility of existing facilitation methods with systemic design methods. The suggestion is made for the integration of the systemic design process into existing facilitation methods, creating systemic facilitation methods. The consequences of this integration for the discipline of design and facilitation are explored. In conclusion, the importance of advancing design facilitation methods and the next steps required to ensure those developments are described.

# Chapter 1

# The Paradigmatic Framework

## 2 The Dominant Period Paradigm: Mechanism

### 2.1 Mechanism, Déscartes and the Discourse on Methods

Since there is not only one expression of mechanist/positivist science but many (Le Moigne, 1995) mechanist thinking will be introduced by principles outlined by René Déscartes and restructured by Edgar Morin (1999). Déscartes is widely credited for developing the philosophical foundations for what is now referred to as the rational or mechanist approach of science. Philosophers such as Bacon and Kelvin built upon these principles to further the scientific method, but since Déscartes developed the founding principles, it is his work that serves as the foundation of the mechanist approach. The focus is on the general principles of mechanist thought as opposed to a critique of Cartesianism. It is acknowledged that the summary presented is not exhaustive and that different interpretations are possible. The dominant characteristics of the mechanist approach that are manifested by design and facilitation methods will be discussed.

A description of the mechanist paradigm can be found in three of Déscartes' four axioms in, *Method, Rules for the Directions of the Mind* (Le Moigne, 1990, 1977; De Coninck, 1993). The three axioms are *mechanist evidence*, *reductionism*, and *causality*.

**Mechanist Evidence.** Knowledge, which constitutes science, is the knowledge of reality, a reality postulated to be independent of the observers describing it. There exists a given pre-determined reality, substantial and immaterial, which presents some form of permanence, independent and outside of it being observed. This principle emphasizes the separation between the subject and the object (Le Moigne, 1977; De Coninck 1993; Coyne and Snodgrass, 1995). The relationship of the subject to the observed object can be modeled in the following way:

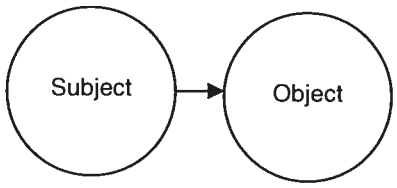


***Figure 1: The Relationship of the Observing Subject and the Observed Object in the Mechanist Paradigm***

The observing subject is separate and independent of the observed object. The object in turn, exists independent of the subject. All objects, including the entire world, are open to be perceived in all their detail, separate, unique, and independent of the observer.

As an independent entity the observer's work is to find the universal laws that govern it. The world is best compared to that of a machine or clock (Le Moigne, 1977; De Coninck, 1993). Every action is prescribed and works in a perfect equilibrium of cause and effect. Disorder is seen as a disruption, to be identified and eliminated. As a machine, the world is related to the concepts of determinism, time and linearity, means and ends, and final causality. Acts (motions) are caused by past events in the universe as they are for a clock. The parts function with order and regularity. By looking at the parts we can understand its function. Since they follow order and regularity, changes can be predicted that will occur from past and present characteristics.

The truth, being independent of the subject, is accessible if the subjects detach themselves from their personal concerns and prejudices (Coyne and Snodgrass, 1995). It is possible to achieve objectivity following the method outlined by Déscartes that was based on geometric analysis and algebra. The method is the following:

- To accept nothing as true that is not recognized by reason as clear and distinct; [reason]
- To analyze complex ideas by breaking them down into their simple constitutive elements, which reason can intuitively apprehend; [analysis]
- To reconstruct, beginning with simple ideas and working synthetically to the complex; [synthesis]
- To make an accurate and complete enumeration of the data of the problem, using both the methods of induction and deduction in this step. [evaluation] (Le Moigne, 1997).

The method begins with that which is beyond doubt; reduces problems to their most simplest constituent parts; through reasoning moves from the simplest to the more complex; and then finally validates and evaluates the results (Coyne and Snodgrass, 1995). The process can be summarized as analysis, synthesis, and evaluation (Coyne and Snodgrass, 1995). In order for the world to be understood as it is, it is necessary not only to perceive it as it is, but also to validate our understanding of it through reason. If underlying laws govern the world, then it is possible to deduce the effect of these laws on phenomena.

***Reductionism*** In order to understand the world, one reduces phenomena to their constituent parts, much as a clock is reduced to its components such as springs and wheels to understand its functioning and to be able to reduce it to a level where universal laws become valid. This method is applicable to all fields of sciences.

***Causality*** This logic establishes a linear cause-and-effect framework for thinking and does not support paradoxes. Paradoxes are interpreted as errors in logic and as the

expression of disorder. Cause and effect also reduce phenomena to a linear time frame. In general the classical scientific view is inherently stable, structured, and ordered. Time is linear; outcomes are predetermined as they are the result of cause and effect. Disorder is seen as an anomaly and is discounted.

## 2.2 Morin's Three Pillars of Classical Science

In summary, the emphasis of the mechanist paradigm is on the separation of the observing subject from the **object**, the **neutrality of the observer**, and **linearity**. The mechanist view regards the observed object as a representation of reality, and the observing subject is neutralized by the scientific method. Chapters two and three discuss how these characteristics are manifested in the methods of design and facilitation.

Morin's summary of mechanist principles is presented in order to better understand how the principles of complex thought relate to those of the mechanist paradigm and classical science. Although his summary of the key principles of this paradigm are renamed, they mirror those described by Déscartes. Edgar Morin begins *Method* by stating that it was developed as a response to his perceptions of the failings of the method of classical science. He defines three pillars that serve as the foundation for classical science to which his method would serve as a counterpoint. The three pillars on which classical science is built are identified by Morin as "order", "seperability", and "reason" (Morin, 1999, p.247). These principles can be generally paired in the following way; mechanist evidence (order), reductionism (seperability), and causality (reason).

**Order** relates to the general mechanist approach that is deterministic and linear. **Seperability** has two aspects: firstly, seperability or reductionism posits that a phenomenon, to be understood, must be reduced to its constituent parts (Reductionism, separation of subject-object, subject is neutral). Secondly,

**seperability** refers to the disconnect between the observer and the phenomenon being observed. This establishes the concept of the neutrality of the observing subject. **Reason** refers to the objective method outlined by Déscartes (Rationalism, Deductive-inductive reasoning, objective method of analysis-synthesis-validation/evaluation). These principles are important to keep in mind as the relationship between the three mechanist principles and their antithesis in the three principles of complex thought are described in the next section.

# 3 The Emerging Period Paradigm: Complexity

## 3.1 The French School of Complexity Theory

The epistemological stance of complexity is not yet established (Morin et al., 2003), so the focus will be on those characteristics shared by theories as interpreted by the proponents of the French school of complexity theory. The French school of complexity thinking is chosen for the emerging paradigm and not the Anglo-American approach to systems thinking because of its emphasis on the relationship of the subject/object/project. The French School is based on a constructivist approach that states that individuals subjectively construct their perception of the world around them and construct their perception of the object they are studying. This is in contrast to the determinist viewpoint represented in Déscartes' approach that asserts that reality exists independently of the subject observing it and that by employing the scientific method can be understood fully. It is felt that some Anglo-American approaches to systems thinking maintain the neutrality of the observing subject because they describe system that the subject observes as representing "reality," and the observing subject is not considered part of the system. The omission of the subject from the system parallels that of the neutrality of the Cartesian and mechanist approach and therefore is considered as a neo-mechanist approach to systems

thinking. This approach is less appropriate since what is of interest is the role of an observing subject (the designer) engaged in a system (a group) involved in the development of a design project. Therefore, a theory that includes the role of the observing subject within the system is more helpful in explaining the relationship of the subject and the system. It also seems to represent a more complete understanding of systemic thinking than that proposed by some Anglo-American approaches.

Complexity theory has been selected to serve as the underlying theory for the emerging paradigm. The shift from mechanist thinking to complex thinking is a shift in epistemological frameworks, from a neutral subject observing a real object, to a non-neutral subject that constructs his or her understanding of the object through the mediation of a project. This is significant as it represents a move to research founded on the conception of a project and not on the analysis of an object (Le Moigne, 1990, p.43). The challenge is no longer to find the best methods to control the perceived reality, but to understand reality by constructing a conception of it through modeling. The paradigm of complexity is founded on the following premises: the world is inherently uncertain, the subject must be re-incorporated into knowledge, and the role of the knowing subject as constructor of knowledge. Subjects are aware that their knowledge is constructed and that it is they who are the constructor of that knowledge. The last being a reflection of its epistemological foundation in constructivism (Le Moigne, 1995, 1990). It is a move away from an *analytical* approach (concerned with objects, elements, wholes, analysis, structure, and evidence) to a *systemic* approach (concerned with project, action, systems, conception, organization, and pertinence) (De Coninck, 1993).

Complexity theory is founded primarily on three theories: **information theory**, **cybernetics**, and **systems thinking** (Morin and Le Moigne, 1999). **Information theory** brings the idea of order from disorder and the notion that information can organize systems while offering them autonomy. The concept of retroaction is introduced by **cybernetics,** interrupting the concept of linear causality and introducing the causal loop. A causes and effects B, and B in turn has an effect on A.

This retroactive loop is called feedback (Morin and Le Moigne, 1999). **Systems Thinking** is founded on the concept that "the whole is greater than the sum of the parts."[3] This implies that there exists an emergent quality that is co-created from the whole and which can react on the parts. Systems theory helps think in terms of systems, of hierarchy and of sub-systems.

Systems thinking is differentiated by **first generation** and **second generation** descriptions (Le Moigne; De Coninck, 1993). **First generation systems thinking** was primarily developed by L. von Bertalanffy, who defines system as an assembly of elements in interaction (De Coninck, 1993). To change one element of the system is to affect change in the whole system (De Coninck, 1993). His approach also emphasizes the importance of understanding the totality in order to understand an organism (De Coninck, 1993). First generation systems thinking describes the interaction of different elements as a system, however it does not mention the role of the subject. The system, separated from an observing object, is still then an isolated object, independent and separate from the subject observing it, and therefore can be described as neo-mechanist (De Coninck, 1993).

Morin ushered in a **second generation of systems thinking** by expanding the concept of systems analysis to include the observing subject in the system. This generation of systems analysis is differentiated from **systems** thinking by being called **systemic** thinking. The purpose of the systemic approach is to understand the complex without reducing it to its elements for the purpose of steering or managing it. Founded on a constructivist epistemology, the observed object cannot be separated from the observing subject that constructed it since the subject's understanding of the object is through his or her construction of the object by means of a project. The system

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3 Complexity theory expands this single principle to include eight others: the whole is less than the sum of the parts, the whole is more than the whole, the parts are sometimes more than and sometimes less than the parts, the parts are eventually more than the whole, the whole is less than the whole, the whole is insufficient, the whole is uncertain, the whole is conflictual (Levy, 1991, p.95).

therefore must include the observing subject in relationship with the observed object, mediated by the project. The purpose of complex thinking was to create a systems-based epistemology to counter Cartesianism.

Models based on first-generation systems thinking are considered transitory period models as they maintain attributes of the dominant mechanist paradigm as well as characteristics of the emerging complexity paradigm. First-generation systems thinking describes systems as interrelated elements with predictable behaviour. Complexity theory maintains that all constructions are fragmented and incomplete, and are therefore not predictable (Levy, 1991). The conjunction of the observing subject and the observed object in the system, is a significant differentiator of the second-generation systems approach.

In order to understand complexity theory, the word "complexity" needs to be distinguished from "complicated", with which it is often confused and used as a synonym. Complicated refers to phenomena that may have numerous and difficult inter-relationships but that ultimately can be predictably understood. Complexity implies that which is unpredictable or unforeseeable. This is linked to the concept of emergence in complex phenomena, that the whole is greater than the sum of the parts. An understanding of the parts cannot describe all the possible outcomes of the interactions and inter-relationships of the system. It is impossible to predict all the possibilities of baking based on an analysis of the baker's ingredients of flour, milk, egg, sugar, and yeast. It is possible that what is perceived by an observer as complex, may ultimately be complicated, but since it is seen as unpredictable by the observer, it is considered complex. The complex approach is less concerned with the phenomenon itself but rather with the multiple representations conceived by the observing actors. Therefore, complexity is, "une propriété attribuée, délibérément, par les acteurs aux modèles par lesquels ils se représentent les phénomènes qu'ils déclarent complexes" (Le Moigne, 1990, p.4). Complexity then is an attribute applied deliberately to models constructed by observing actors to represent the phenomena that they consider complex.

## 2.4 The Four Pillars of Complex Thinking

Morin describes the reductionist approach of mechanism as simple in contrast to the systemic approach that is complex (Morin, et al., 2003). To appreciate the paradigm shift in thinking between a complex view and a simplistic view one only needs to look at the four ideas that served Morin as the pillars for developing a complex method and that serve as a counterpoint to the three pillars of classical science:

1. The relinking of the object and the subject.
2. All knowledge is a physical/biological/anthropological/sociological loop.
3. Uncertainty is the only point of departure.
4. No simplification, no linearity – only spiral (Morin, 1992, pp. 10-21).

***Subject/Object*** The subject is relinked to the object since it was the separation of the subject from the object outlined by Déscartes that led to the reductionst paradigm. All objects are related to the subject that observes it since the object is a construction of the subject. The result is that "There is no longer an *object* totally independent of the *subject*" (Morin, 1992, p.140).

***All knowledge is physical/biological/anthropo-sociological.*** All knowledge is linked to the physical/biological/anthropo-sociological because knowledge is an object that is necessarily linked to a subject that is human and therefore is physical/biological and anthropo-sociological (Morin, 1992, p.11). Knowledge as a human construction is related to the subject, the anthropo-sociological dimensions. Humans are also physical and biological. Man cannot deny his social aspects nor his physical reality – the two are inter-connected, therefore physical/biological and anthropo-sociological.

***Uncertainty is the only point of departure*** Following the second law of thermodynamics that states that matter loses energy over time, the universe is not stable. If it is not stable, it is uncertain. This view recognizes that the world is in

constant change and transformation and therefore uncertain. Uncertainty is the only point of departure for elaborating a complex understanding of phenomena. If a non-mechanist view is adopted, as Morin does, then the future holds no predictability – therefore it is uncertain. In addition the inherent complexity of phenomena prevents one from determining all their possible interrelationships.

***No simplification, no linearity – only spiral*** Phenomena are not reduced in order to understand them – rather the understanding of phenomena is iterative and progressive. This means that our understanding of phenomena is linked to that of other phenomena, and this understanding increases and changes over time.

These ideas served as the starting points for the creation of complex thinking. The next section describes how they are expressed in the three principles of complex thinking.

## 2.5 The Three Principles for Complex Thinking

The four foundations of complex thinking are expressed by three principles: the **dialogical principle**, the **organizational recursion principle**, and the **hologrammatical principle** (Morin, 1990, p.98).

***1. The Dialogical Principle*** The dialogical principle refers to the paradoxal interrelationship of phenomena. It refers to the antagonistic but also complementary relationship between different phenomena such as: **order/disorder** and **subject/object**. **Order** does not exist without **disorder**. An **object** does not exist without a **subject** to perceive it. From this antagonism and complementarity comes organization and complexity. This principal allows the conjunction of opposing concepts to be maintained in a relationship of unity preventing the disjunction of these concepts as is done in classical science (Morin, 1990).

The epistemological foundation for complexity theory is constructivism. Constructivism holds that a phenomenon (the observed object) is the projected construction of the observing subject (Le Moigne, 1990). The relationship of the subject-object-project is represented in figure 1.

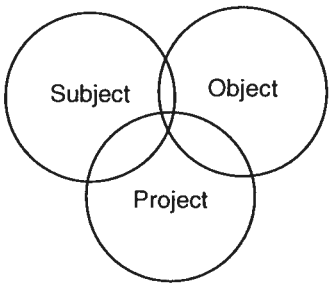


***Figure 2: The Relationship of the Observing Subject, Observed Object, and Project in the Complexity Paradigm***

Recognizing that our knowledge of the world is not a given, but a construction, all observed objects rely on a subject to construct them. The subject's perception of the object, being a construction, necessitates that it is mediated by a project. The project represents the subject's construction of the observed object, and not the object itself. Since an object can never be fully perceived, it remains complex.

***The Organizational Recursion Principle*** Organizational recursion (auto-eco-re-organization) refers to the ability of a system to regenerate itself, maintain itself, while at the same time be transformed by its environment. Following these principles, a complex system is self-regulating (auto), is open to its environment (eco), and is recursively regenerative (re). Living systems self-organize themselves and regenerate themselves by transferring energy to their environment. Due to this transfer of energy to the environment (eco), living systems maintain a relationship with the environment. Together these two aspects form the principle of auto-eco-organization. The result of this principle is that transforming oneself (auto) is to transform one's environment (eco). A part, as it transforms itself (auto), also transforms the whole (eco) in which it resides since it constitutes part of the whole.

Regeneration is a process where the product of organization in turn becomes the producer of the organization. Organization is at the same time producer and product. The cause produces the effect; the effect in turn produces the cause. This concept includes and goes beyond the cybernetic notion of retroaction. A feedback loop allows a system to regulate itself, creating homeostasis. A recursive loop allows for a system not only to regulate itself but also to regenerate itself. A system is able to re-auto-eco generate itself. A system, when open to its environment, can be transformed by interaction with its environment, it can also re-generate or re-organize itself through interaction with its environment. Having autonomy the system can self- or auto-transform itself.

Organization is the central core of *physis* for Morin (Morin, 1992, p. 91) It is organization that is the key concept for organizing *physis* and not element, or interaction. The universe of classical science was constituted of isolated objects independent of the observer/ conceiver. The principle of system and organization are complementary and interdependent. Organization is related to system and interrelations, "*Organization is the interiorized visage of system (interrelations, articulations, structure), system is the exteriorized visage of organization (form, globality, emergence).*" (Morin, 1992, 144) "*It is really a matter of morphogenesis: organization gives form, in space and time, to a new reality: complex unity or system*" (Morin, 1992, p.128). Organization,

> inter-relationally ties diverse elements, events, or individuals, which henceforth become the components of a whole. It assures relative solidarity and solidity to these ties, and thus assures the system a certain possibility of duration despite chance perturbations. Organization, [...] is the arrangement of relations between components or individuals, which produces a complex unity or system, endowed with qualities unknown at the level of components or individuals... (Morin, 1992, p. 101).

Organization, therefore: "*transforms, produces, binds, maintains*" (Morin, 1992, p.

101). The three concepts are three aspects of the same reality. The system is an expression of the relatively stable organization of the interrelations. Systems cannot be isolated from organization or interrelations. The closed and self-sufficient object in the complex view becomes a system. System is defined as:

some thing (no matter what, presumed identifiable)
which *in* something (environment)
*for* some thing (ends or project)
*does* some thing (activity = function)
*by* some thing (structure = stable form)
which *transforms* in time (evolution)

an object that is *active* and *stable* and *evolving* } { in and *environment*, and by relationship to some *ends*

***Figure 3: Definition of System (Le Moigne, 1977, p. 62, liberal translation)***

Instead of objects, the system comprises the smallest unit in the complex approach. In complex thinking, "*Objects give way to systems. Instead of essences and substances, organization: instead of simple and elementary units, complex units: instead of aggregate forming bodies, systems of systems of systems*" (Morin, 1992, 121). The system is "*conceived here as the basic complex concept concerning organization... in fact, there are no longer, there will be no longer any basic simple concepts for any physical object whatsoever, ergo for the universe*" (Morin, 1992, p.148). The system is the basic complex concept because "*it is not reducible to elementary units, simple concepts, general laws. System is the unity of complexity*" (Morin, 1992, p.148).

A system has four dimensions: subject, object, project, and environment.

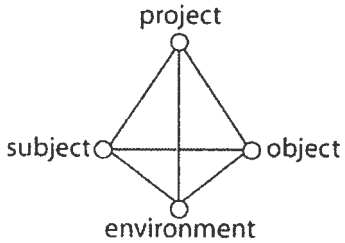


***Figure 4: The Four Dimensions of System: subject, object, project, environment. (Levy, 1992)***

Rather than an object or element each dimension consists of a system comprising a **subject system**, an **object system**, a **project system**, and an **environment system**.

The system/organization has paradoxal characteristics. The whole is more than the sum of its parts (emergence), the whole is less than the sum of the parts (constraints), and a system is a whole that is transformed at the same time as its elements are transformed. The result is a key systemic law: *everything that forms transforms* (Morin, 1992, p. 112). Systems are one/multiple and one/diverse. One of the fundamental traits of organization is its ability to transform diversity into unity, while preserving diversity in and by unity. All individual elements of the whole have a double identity, "*However different they may be, the elements or individuals constituting a system have at least a common identity of belonging to the global unity and of obedience to its organizational rules*" (Morin, 1992, p.114).

The system is an abstraction of the mind. The "*most physical system is also in some aspect mental and the most mental system is in some aspect physical*" (Morin, 1992, p. 140). This returns to the notion that all knowledge is physical/biological/anthropo-sociological. As Morin mentions:

> There is always, therefore, in the extraction, isolation, definition of a system, something uncertain or arbitrary: there is always decision and choice, which introduces into the concept of system the category of the *subject*. The subject intervenes in the definition of a system in and by his interests, selections, and finalities: this is to say that he brings into the concept of system, by his subjective over-determination, cultural, social, and anthropological over-determination. Thus, a system requires a subject, who isolates it in the poly-systemic swarm, cuts it up, qualifies it, and hierarchizes it. The system returns us, not only to physical reality in what it has of irreducible to the human mind, but also to the structures of this human mind, to the selective interests of the observer/subject, and to the cultural and social context of scientific knowledge (Morin, 1992, p. 138).

All systems are subjective constructions and therefore require a conceiving subject. Delineating the boundaries of a system is an act of choice making.

***The Hologrammatical Principle*** This principle states that the whole is expressed in the parts and the parts express the whole. The principle comes from the characteristics of a physical hologram where each point of the image of the hologram contains all the information represented by the whole.

***The Complex Subject/Object Relationship*** The hologrammatical principle states that each dimension contains within it all other dimensions. Each dimension of the complex facilitation model manifests the hologrammatical principle, whereby the whole is expressed in the parts and the parts express the whole. The **subject dimension** then contains within it the **object**, **project**, and **environment dimensions** of the system, and in turn, each dimension contains all the other dimensions as well. The subject dimension is then also found within the object dimension, meaning that the subject is included as an object. The facilitator and the client group, which are both found in the subject dimension, are then also found in the object dimension. This implies that the *subject* (facilitator/client group) is also an object for the subject. One of the tasks then for the facilitator and client group is to construct models of the facilitator/client group. This allows for a process of self-reflection that is often omitted by most facilitation models. A model that illustrates this relationship is shown in figure 4.

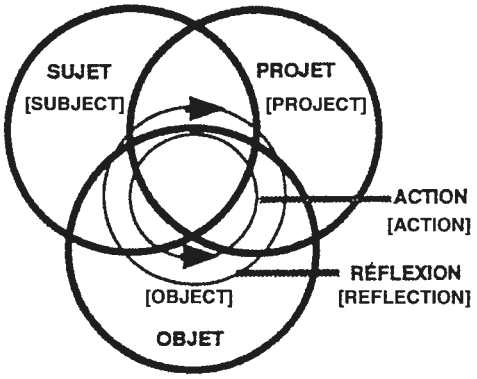


*Figure 4: Characteristic of Reflection* (Levy, 1988, p.14)

The subject and object is mediated by project. It is the projection that allows the subject to reflect upon the object.

This is in contrast to the mechanist approach where the subject is separated from the object, denying the possibility of self-reflection since the subject is neutralized. The world existing independently of the subject does not take it into account, or its relationship to the object. This principle is illustrated by Schön's "reflective practitioner" concept that describes the process of the designer reflecting on the process of design while designing (Schön, 1983).

The hologrammatical principle also applies to dimensions other than the object dimension, including the subject, project, and environment dimensions. As the complex approach emphasizes inter-relationships, the placing of the facilitator/group within the environment, allows the group/facilitator to develop models of their relationship within different environments including the facilitation project.

A person internalizes the values of society that in turn help create the values of society. Individuals rely on the general culture of the society in which the individual resides to provide resources for self-transformation. In turn, the individual may develop new resources that are given to the general culture. In the case of design, a design team determines the project, but in turn, the project requirements determine the composition of the design team. If the design team decides that the project is to bake a cake, the design team should then include a baker. This concept is significant because,

> L'idée récursive est donc une idée en rupture avec l'idée linéaire de cause effet, et produit producteur, de structure superstructure, puisque tout ce qui est produit revient sur ce qui le produit dans un cycle lui-même auto-constitutif, auto-organisateur et auto-producteur (Morin, 1990, p.100).

Linear cause and effect is ruptured. What remains is a cycle of mutual creation. The facilitator then no longer acts on an object, but acts as a system within a system. The facilitator is no longer neutral and the structure of the facilitation task cannot be pre-determined or structured.

***Modeling*** The concept of modeling is central in understanding the differences between the mechanist and complex approaches. Modeling here refers to the:

> Action d'élaboration et de construction intentionnelle, par composition de symboles, de modèles susceptibles de rendre intelligible un phénomène perçu complexe, et d'amplifier le raisonnement de l'acteur projetant une intervention délibérée au sein du phénomène; raisonnement visant notamment à anticiper les conséquences de ces projets d'actions possibles. (Le Moigne, 1990, p.5)

For Le Moigne, modeling is the intentional elaboration and construction of symbols to help an actor elucidate his or her understanding of a phenomenon by means of projection in order to act upon that phenomenon.

In the mechanist approach, since reality can be observed directly, the models created by the observing subject are representations of that reality. The work is analytic in nature because the observing subject works to describe what is. In the complex paradigm, the model represents the subject's projection of the observed phenomenon. In order to develop an understanding of the object, it is modeled.

Knowledge is not considered a reflection of reality but rather a relevant perception created during the act of modeling. The observer-subject-actor is a conjunction creating an observing system (De Coninck, 1993). The relationship project-subject-object reveals knowledge as a process of dynamic creation, in the continual dynamic process of creating and being created, and not as a state. (De Coninck, 1993). Complexity is marked mainly by its conjunctive nature – its ability to link the subject to the object, transformation, and project-environment. The move is from a

knowledge-state to a knowledge-project (Le Moigne, 1977). In a knowledge-state, knowledge is static, pursuing ends, a description of what is. In a knowledge-project, knowledge is in a constant state of becoming since all knowledge is seen as a projection. The model of the project then is a representation of the subject's knowledge at a moment in time. This allows the project to be adaptive through time.

Conceptual modeling is central to complex design. The attributes of modeling within the tradition of complex design can be best defined in contrast to the characteristics of modeling from the mechanist tradition, a shift from analytic thinking to systemic thinking.

*Table 1: Comparison of Modeling: From Analysis to Conception (Le Moigne, 1990, p. 27, liberal translation)*

| **Modeling: From analysis to design (conception)** | | |
|---|---|---|
| **Paradigm / Dimension** | **Dominant** | **Complex** |
| **Role** | From the computer analyst… | To designing (conceiving) engineer |
| **Task** | From the isolatable object… | To a conceivable project of knowledge |
| **Process** | From decomposition to simple and passive elements… | To the composition of implexe actions |

**Table 2** describes the change in role, task, and process of the subject involved in the process of modeling. The role of the modeler changes from that of a computer analyst to that of a design engineer. The design task changes from an isolatable object to that of a project of knowledge. Lastly, the process changes from being based on the decomposition of simple and passive elements to a process based on the composition of implexe actions. Implexe, from Latin, refers to the characteristic of a unity of action inseparable and irreducible to a single unique element, and is seen as being the opposite of simple, rather than complex.

Complex thinking is never complete thinking due to its multi-dimensional quality. Its goal is to reintegrate different disciplines isolated by reductionist thinking. It recognizes that total knowledge is an impossibility and therefore embraces the knowledge of incompleteness and incertitude. Complex thinking "*is animated by a*

*permanent tension between the aspiration for a non-separated, non-divisive, non-reductionist knowledge and the recognition of the unachievable and incomplete character of all knowledge*" (Morin et al., 2003, p. 68). It is a non-linear, iterative process, moving in a spiral movement.

Complex thinking is a conjunction of simplification and complexity, complementarity and antagonism (Morin, 1977). Complex thinking is not against that which is simple; rather it is a critique of simplification. It recognizes that all representations of reality are abstracted ideals, and to abstract is to simplify. Complex thinking offers an antidote to simplification by returning in a spiral from simple to complex thinking. The disjunction brought on by the process of abstraction is accompanied by conjunction and transjunction. Complex thinking then unifies that which is integrative and antagonistic.

Complex thinking thinks by means of macro-concepts. Macro-concepts "*associate concepts that exclude and contradict, but which, because they associate in a critical manner, produce a logical reality more interesting and comprehensive than if they were kept separate*" (Morin et al., 2003, pp. 77-78). It works towards gaining an understanding and recognizing by critical analysis, that which is lost in uni-dimensional, simplistic, and reductionist thinking.

Complex thinking then remains always in incertitude and obscurity. The world is in constant flux and movement as opposed to the simple view of the world as inherently stable. Rather than seeing this as being a negative uncomfortable state, it is more of a recognition and celebration of the fundamental dynamic changing nature of all phenomena. As change is considered the fundamental nature of all phenomena this is a declaration of truth and not of failure. Heraclites argued, "*all is flux*" and suggested "*the primacy of opposing forces or essential tensions in the generation and maintenance of dynamic stabilities*" (Mahoney, 1991, p. 9). The result is an approach whose objective is not to explain all knowledge, but rather "to know oneself in the act of knowing" (Morin et al., 2003, p. 74).

# Chapter 2
# Design Methods

## 3 The Dominant Period: Mechanist Design Methods

### 3.1 The Design Process: Problem-Solving

Mechanist design methods are historically situated within a larger movement to create a rational theory of design. The focus is on a systematic, linear, rational approach to design with the model of the designer based on the analogy of a computer (Gregory, 1966; Jones, 1981).

In the quest to rationalize design, the three-stage model of analysis-synthesis-evaluation is applied to design (Jones, 1981; Quarante, 1984; Roozenburg and Eekels, 1995; Coyne and Snodgrass, 1995). An example of a problem-based design process model is shown below:

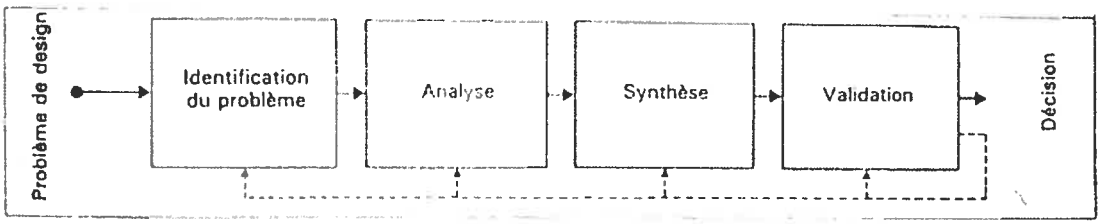


*Figure 5: Model of the Mechanist Design Process (Quarante, 1984, p.291)*

Analysis concerns itself with analyzing and defining the problem, synthesis with

concept studies, and lastly validation/evaluation with the creation of prototypes. This same model has been generalized to apply to that of divergence-transformation-convergence (Jones, 1981, p.64). The process structure for mechanist design is so close to that of problem-solving (analysis/synthesis/evaluation) outlined by Déscartes that they can be considered one and the same. The three stages of the problem solving model

> Can be described in simple words as 'breaking the problem into pieces', 'putting the pieces together in a new way' and 'testing to discover the consequences of putting the new arrangement into practice' (Jones, 1981, p.63).

The goal of the designer is to identify all possible variables in the analysis stage in order to reduce the number of variables needed to synthesize the variables and to avoid having to recycle through the stages. Pre-structuring all the variables is an attempt to accelerate and systematize the process of creation. This approach is primarily concerned with control (Jones, 1981) and the end goal is *effectiveness* (Roozenburg and Eeckels, 1995).

Design is a "process of goal-directed reasoning" (Roozenburg and Eeckels, 1995, p.54). The designer begins with the client's goals and then works backwards to develop a form that satisfies the functions of those goals. The process is linear and expresses the logic of cause and effect. The functions that satisfy the needs and values of the end user are determined. There is a direct relationship between the function and the satisfaction of needs and values if the user 'correctly' uses the product. In addition,

> There is a one-to-one relationship between functions and physical components. The whole assembly of inputs and outputs can be specified at the start and each of the components can be designed afterwards on the assumption that if it fits the inputs and outputs it fits the system (Jones, 1981, pp. 50-51).

There is little possibility of emergence as every physical component is accounted for, manifesting the principle of cause and effect.

## 3.2 The Design Task: Product/ Problem

The task for the designer is "*the initiation of change in man-made things*" (Jones, 1981, p. 6). The design task is primarily focused on the industrial object (product) and the manipulation of its properties.

## 3.3 Model of the Designer: Computer

In the mechanist paradigm, the designer is rational, expert, and individual. The design process describes what is done by designers – those in the design fields; architects and industrial, interior, graphic, landscape and urban designers. The designer follows a rational design process by attempting to maintain objectivity and the employment of reason. Design methods are "*a rational procedure; following the prescribed steps increases the chance of solving the problem*" (Roozenburg and Eeckels, 1995, p. 39). The problem tasks are reduced to sub-problems and then calculated to achieve the optimum solution. The design process is seen as a type of information-processing in which "*the designer is regarded as in the same class of machines as the digital computer, and, given this similarity, there should be no reason why a computer should not carry through a design of the type which this model represents*" (Gregory, 1996, p. 327). Another example:

> The picture of the rational, or systematic designer is very much that of a human computer, a person who operates only on the information that is fed to him, and who follows through a planned sequence of analytical, synthetic and evaluative steps and cycles until he recognizes the best of all possible solutions (Jones, 1981, p.50).

The designer is a computer, an expert in the rational process of problem-solving.

## 3.4 Manifestation of Mechanist Principles in Design

Current design methods were evaluated to see how they manifested mechanist or complexity principles. Those that manifest mechanist principles are considered as following that paradigm and presented as "mechanist design." Methods that manifest complexity principles are described as "systemic design."

The characteristics of the mechanist approach to design are summarized as (Jones, 1981, p.50):

> Objectives, variables and criteria are fixed in advance.
> Analysis is complete, or at least attempted, before solutions are sought.
> Evaluation is largely linguistic and logical (as opposed to experimental).
> Strategies are fixed in advance; these are usually sequential but may include parallel operations, conditional operations and recycling.

This summary describes how the principles of mechanist thought are clearly manifested in design methods. The objectives, and variables are *pre-determined* before the synthesis part of the design process begins. The process is *linear* beginning at one stage and preceding in order to the following stage. The evaluation is logical employing *reason* to determine solutions. The role of the designer is to analyze the problem by breaking it down into pieces, and then to reassemble them. The strategies, or ways to proceed, are *pre-structured.* In addition the emphasis is placed on the object that is conceived of as a problem. There is a clear separation of the designer from the design object.

Design methods remains rooted in the mechanist paradigm and its principles of separation of subject and object, the neutrality of the observing system, pre-

determination of outcomes, and emphasis on control. As problem-solving approaches to design seem to be the dominant current practice, it is reasonable to describe current design practice methods mechanist methods.

# 5 The Emerging Period: Systemic Design Methods

## 5.1 Systemic Design Methods

The application of complex thinking to the field of design is a shift in thinking from the current mechanist analytic approach to a complex systemic approach. The approach adapted by the emerging paradigm is best described as integrative. Complex design methods focus the process on collaborative systemic modeling, the design task on complex systems (all phenomena; all objects, mechanisms, and procedures), and the role of the designer as a facilitator. The design **process structure** is concerned primarily with changing states. The **role of the designer** is to set the boundaries for the system through modeling and to reflect on the process of construction. In this approach design is described as being:

> Design is *anticipative* (looking ahead, in different directions and time scales).
> Design is *generative* (aiming at the synthesis of material or immaterial artefacts and patterns of behaviour).
> Design is *use-oriented* (taking quality of life as its criterion, without claiming to know what this is).
> Design *is illustrative* (creating wholes, contexts, narratives, aiming at agency and dissemination).
> Design is *integrative* (neglecting disciplinary boundaries, moderating perspectives, and including its own).
> Design is *context sensitive* (being aware of and using social, cultural, technological interdependencies) (Jonas, 2001, p.56).

It is the anticipative nature of design that also allows for its projective nature. The generative nature refers to the creative or transformative aspect of design. Design is about creating something new, or transforming something already in existence. The integrative quality refers to designs' systemic qualities. As outlined earlier, a systemic perspective allows for the integration of different perspectives of the same phenomena, without reducing it to basic elements.

These qualities help design to be an excellent approach for dealing with ambiguity and complexity as it provides a means for discovering and integrating phenomena into models that develop new understandings. The new understandings can then help individuals make choices about creating and transforming products, services, systems, and ideas.

Within this framework, design is defined as:

> ...la manipulation (par les êtres humains) de tout être; c'est à-dire de tout phénomène (vivant et non-vivant), de tout objet, tout mécanisme, tout système et toute procédure. La finalité de la manipulation de ces êtres est la création de concepts nouveaux et d'expériences nouvelles dont la totalité change le monde de manière récursive (Levy, 1992, in De Coninck, 2004).

Design is no longer limited to making change in man-made things but includes all phenomena, living and non-living, including systems, procedures, and culture (Golsby-Smith, 1996). Instead of manipulating objects, designers interact with the world by means of the creation of concepts (projects) that guide actions that change the world in a recursive manner.

## 4.2 The Design Process: Recursively Changing States

Systemic design does not focus on problem-solving but rather on recursively

changing states. Design concerns everyone "*who devises courses of action aimed at changing existing situations into preferred ones*" (Simon, 1969, p. 129). By this definition design concerns itself with the transformation of states, from **state A (existing situation)** to **state B (preferred situation)** (Findeli, 2001).

The structure of the process of design changes from analysis-syntheses-evaluation or problem-solution to that of changing states, state A to state B:

> Instead of a problem, we have: state A of a system;
> Instead of a solution, we have: state B of a system; and
> The designer and the user are part of the system (Findeli, 2001, p. 10).

Changing states is not a linear, or retro-active process, rather it is a recursive process mediated by the concept of the project.

The focus of the process is not the creation of products or services, but the continual process of moving from state A to state B, and then back to state A. The continuous, recursive, and dynamic process of changing states with the role of the project is modeled in figure 6.

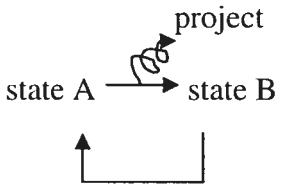


***Figure 6: The Complex Structure of the Design Process (after Levy, 1992 )***

The output of the continuous changing states is the project, "*the production of a material object is not the only way to transform state A into state B*" (Findeli, 2001, p.10). The production of a material object is just a result of the process of changing states.

If changing states were linear, then it would begin at state A, and move to state B, and end, much like linear problem-solving models. If it were only a retro-active process, it would begin at state A, move to state B, and then return again to state A. Systemic design is recursive; it moves from state A, to state B, however, "*state B is only a transitory, more or less stable, state within a dynamic process, never a solution*" (Findeli, 2001, p. 10). In turn the process returns recursively to state A, which too, is only a transitory, more or less stable state. Again, one cannot step into the same river twice. State A, like the river, is identified as state A, but it is not the same river twice that is returned to. The understanding of state B changes state A, which in turn changes the understanding of state B. States are place holders for existing situations and preferred situations. The understanding of the existing situation changes as the understanding of the preferred situation is developed. The inverse also holds true. The understanding of the preferred situation changes as an understanding of the existing situation changes. The design task (the object of design) can only be initially described as a state because all design tasks are projected constructions, and as a project they are in a recursive process of change.

The object of design is not conceived of as a product or service but as systems with the designer embedded within the system, since the observing subject cannot be separated from the observed object. A designer looks at an existing situation (state A) and devises courses of action to change it into a preferred situation (state B). **State A** is an object perceived by a subject (the designer). **State A** is also a system. Since the **object** (design object) cannot be separated from the **subject** that observes it (the designer), the object and subject are recognized as being part of the same system. The result is that, "*One cannot act **upon** a system, only **within** a system*" (Findeli, 2001, p. 10). In addition, if **state A** (a system that includes the designer) is transformed, then the designer that is part of the **state A system** is also transformed (Findeli, 2001). To design is to change the world. To change the world is to change oneself.

Design action is differentiated from other types of action by its intentional, projective, and transformational nature concerned with the process of changing states. Design is

a specific type of action in that it is intentional (Nelson and Stolterman, 2003), projective (Jonas, 2001) and transformational in nature. The creative and transformational nature of design is unique since it concerns itself not only with changing states but with the intentional and projective action of changing states towards achieving an end. It is this projective nature of design that separates the designer from the intended result of the action by time and space. It is this separation of the individual and the action in time and space that is the distinguishing characteristic of design action from other actions. It is also why design is so difficult to describe and to practice, as the *object* of design, the results of the action are separated by time and space.

It is important to make a distinction between the characteristics of design action and other types of action in order to properly understand the nature of design and to differentiate it from other types of action with which it is confused, such as reflex. It is argued that if design is defined as a type of transformative action then the definition is so broad that it applies to all transformative action, such as scratching an itch. The result is a lack of differentiation between design action and action. However, the projective and intentional nature of design distinguishes it from direct action or reflexive action. The projective and intentional nature of design is alluded to in the Simon definition by the use of the word 'aimed at.' Designers are not described as everyone who "devises courses of action changing existing situations into preferred ones"; it is everyone who "devises courses of action *aimed at* changing existing situations into preferred ones". 'Aimed at' can be substituted for the words 'with the intention to', creating the sentence, design concerns everyone "who devises courses of action *with the intention to* change existing situations into preferred ones." The word 'to' communicates the projective nature of design. The projective nature of design separates the individual from the action in time and space. As stated by Heraclites, one cannot step into the same river twice, as the river is constantly changing. One cannot step into the same river twice, because the action of stepping into the river the second time is separated by time. Time changes the nature of the space (the river). As the individual is separated in time, he/she is also separated in

space. Designers devise courses of action *to* change an existing situation into a preferred one.

If one has an itch, and scratches the itch, it can be claimed that the individual devised a course of action changing the situation of 'itchiness' to a preferred situation of 'non-itchiness'. No claim of a projective nature can be attributed to the action. The action occurred without projection. There were no actions that were devised in order *to* alleviate the itch, there was only action. Without the projective quality there is no design action. But, if the itch was on the individual's back, and he or she was unable to reach it with his or her hand, and the individual decided to employ a ruler as a back scratcher in order to scratch the itch, then it can be argued that it was an example of design action as it was necessary to devise a course of action (find ruler and generate the idea that it could be used as an extension of the arm) aimed at changing the existing situation (itchy back out of reach of hand) into a preferred one (longer arm that can reach itch and therefore a scratched itch). The design action is in the devising of actions in the creation of the back scratcher to scratch the itch.

The word 'preferred' in the definition of design infers the intentional nature of design. Intention means to have an anticipated outcome or purpose in mind. One devises courses of action with the purpose of achieving a preferred state. Action without intention makes for accidents. Design refers to intentional action, not accidental action. If an individual were to devise "courses of action to change existing situations into *other* ones", then there would be no intentionality and a random or accidental outcome of an action could be counted as design. Design action refers to intentional outcomes and not random outcomes though it is acknowledged that preferred outcomes are not deterministic. Preferred also infers a positive characteristic to the action.

The process of systemic design is explained by comparing it to mechanist design using the example of building a hospital to be built in ten years time. The mechanist approach is described first and then the systemic approach. In the mechanist design

approach, the hospital is seen as a problem that needs to be solved. The first stage is identifying the problem: the need for a hospital in ten years. What kind of hospital? The "problem" of the hospital is broken down to sub-problems until all the problems are identified; size, number of rooms, heating system, layout etc. The solutions to the problems are determined by rationally analyzing the best solutions. This may be done using performance matrices, cost-benefit analysis etc. The "solution" is manifested by the creation of blueprints that represent the "end state", goal, or solution. With the solution in hand, it is time to develop a work breakdown structure, of what activities need to occur first (dig foundation) all the way to the last (ribbon cutting ceremony).

Systemic design does not focus on problems, but rather states. **State A** represents the existing situation, and **state B** represents the preferred situation. The first task is to determine, with the aid of models, the existing situation. The existing situation includes the designer. As this is a systemic approach, those actors that may represent the designer are not a given; it is a question for the design team to determine. Does it include doctors, nurses, patients, politicians, architects, and contractors? All of these questions are part of the process of determining state A, the existing situation. The process may not begin with state A, it may begin with state B. What is the preferred situation? The preferred situation is not an object such as a building, but a system (subject-object-project-environment), and therefore could include the local neighborhood where it is constructed or the city in which it resides.

Constructing models of the existing situation changes the understanding of the preferred situation. In turn, an understanding of the preferred situation can change the understanding of the existing situation, manifesting the recursive nature of the process. For example, if in the existing situation it is determined that patients are included in the design team, this could impact the preferred situation to include their preferences, such as having more private rooms with windows. If part of the preferred situation is to integrate with other regional hospitals, that will change the understanding of the existing situation through the need, first to understand how the hospital currently relates to the other centres, and second, to have representatives join

the design team. The preferred situation changes the understanding of the existing situation. The decision of having a patient-centred design as a preferred state, can lead to the inclusion of patients in the design team in the existing situation. The future state B, recursively changes the existing situation of state A. In the case of the last example, the construction of a hospital building does not represent the end of the design process but rather a milestone or result of the design process. The building does not represent the preferred state but only one aspect of the preferred state. The building creates a place for ambulances from other hospitals to arrive, but does not coordinate their activities, or determine what cases each hospital should receive. These questions are considered as part of the systemic design task.

The problem with problems is that they are deterministic, reductionist, simplistic, and negative. If design is primarily "devising courses of actions with the aim to change existing situations into preferred ones," then problem-solving is not very helpful since it pre-structures the existing situation as a problem, "a difficult situation that needs a solution" (Roozenburg and Eeckels, 1995). All design tasks are not "a difficult situation that needs a solution". In the case of the hospital, how is the desire for a new hospital a problem? If an architect would like to build a home for himself what is the problem? The lack of shelter? A hotel room or a tent can meet that need, but they don't describe the rich complexity of the design task. Design situations are a mixture of needs, desires, wants, visions, and yes, problems (Levy, 1988). Human motivation for designing, changing states cannot be reduced to problems. Framing design tasks with this approach reduces the complexity of the task to one perspective, that of problems, making it simplistic. The systemic design process is "open" in the sense that it allows the designer to construct all aspects of the existing situation and the preferred situation, including questions such as, "what is a home?" and "who is asking, what is a home?"

Having to modify a design task to fit within the problem-solving framework distorts the design task, reduces the complexity of the design task, and pre-structures the designer's understanding of the situation. The systemic approach removes the

conceptual framework of problem-solving and replaces it with undefined states. The necessity of having a non-predetermined framework is important in order to allow the participants full freedom to determine all aspects of the states. Jones describes this feature of design when he describes 'new' design methods:

> The essential point is that the new methods permit collaboration *before* 'the concept', the organizing idea, and the back-of-the-envelope-sketch, 'the design' has emerged (provided the leading designer knows how to switch from being the person responsible for the result to being the one who ensures that 'the process is right'). The new methods, properly used, release everyone from the tyranny of imposed ideas and enable each to contribute to, and to act upon, the best that everyone is capable of imagining and doing. This is not easy. It requires not only new methods but also a new conception of the self (Jones, 1981, p. xxvii, emphasis by author).

Jones highlights the idea of design methods that are structured to permit collaboration before any 'organizing idea' or 'concept.' Problem-solving is 'the concept' and 'organizing idea' that inhibits the imagination of the designer as it pre-structures the understanding of the situation. The new methods exclude problem-solving as the structuring concept of design because problem-solving pre-identifies the method of design. A 'problem' is a concept imposed on state A, and a solution to state B. Lastly, the problem-solving approach is negative, as it focuses on what is currently problematic, inadequate and not working well, rather than focusing on preferred situations that are positive, of what could be. Systemic design can reverse the order of problem-solving, from problem solution to starting at the preferred situations and then moving back to existing situations, allowing the designer to begin with what is desired and preferred.

A similar recognition of the inadequacies of problem-solving as a strategy has occurred within the field of psychology. Faced with the limitations of problem focused methods for guiding therapeutic sessions, solution-focused methods have been developed wherein the therapist spends time:

- Focusing on change and possibilities;
- Creating goals and preferred futures;
- Building on strengths, skills and resources;
- Looking for 'what's right' and 'what's working';
- Being respectfully curious;
- Creating cooperation and collaboration;
- Using humour and creativity (Sharry, 2001, p. 17).

It is solution-focused approaches emphasis on change and discovering possibilities, creating goals and preferred futures, which makes it well suited to design that is concerned with creating that which is not yet, or ought to be (Nelson and Stolterman, 2003). The focus on building on existing strengths compared to ideal strengths and skills, is a realistic and adaptive model rather than problem-solving based design methods focused on optimization. The shift from problem-focused to solution-focused therapy has been described as a "paradigm shift" for therapy (Sharry, 2001, p. 6).

## 4.3 The Design Task: Modeling Systems

Systems thinking, to conceive of phenomena as systems, is not an emerging concept but one that has always been the foundation for design thinking, "*The systems approach is the logic of design*" (Nelson and Stolterman, 2003, p. 74). The process of complex design is to, "*create distinct complex images and then conceptually model them in relationship to each other, as a whole; this is the function – and ultimately the value – of systems thinking in the design tradition.*" (Nelson and Stolterman, 2003, p. 91). The design task is no longer an object but a system. More importantly, the system is only a conceptual projective representation of knowledge and not representative of the phenomenon itself. This is a significant and crucial distinction between mechanist and complex thinking.

***Project as Mediator*** Projects mediate between the subject and object, time and space, individual and collective (Bouthinet, 1999). The observing subject is linked to the observed object mediated by the concept of a project. It is recognized that the observing subject constructs his or her understanding of the object mediated by the project. A project has two functions: first, it materializes thought allowing the author to have a better understanding of what he or she wants; and second, it communicates thought, so that others can no longer remain indifferent to the intention presented by the author (Bouthinet, 1999). It is the project that allows different individuals to work collaboratively together. Without the concept of the project it is not possible for an individual to communicate their thoughts with others.

The project also mediates between time and space (Bouthinet, 1999). This allows for the group to discuss their design intentions for a situation that is separated in time and space. It is the separation in time that allows them to anticipate future actions, as the project allows for the discussion of what could be. The project mediates space because it allows for the discussion of a situation that may not be physically present. A project can include a model or plans that represent a separate situation. For example, a discussion using a prototype concerns the creation of an object that is not the prototype itself but of an object not yet created, and is separated in time and space. The prototype represents what the object *will be*, or *could be*, and not *what is*.

***Project Development*** The move from object to project is a crucial distinction as it changes the task of the designer from the problem-object to that of the project-system. If mechanist design is described as problem-solving, complex design can be described as project development.

Since a project is never complete and in a continual process of becoming, development is the best description of this activity. Develop has many different meanings:

- Make something new, such as a product or a mental or artistic creation;
- Work out;
- Come into existence; take on form or shape;
- Change the use of and make available or usable;
- Elaborate, as of theories and hypotheses;
- Be gradually disclosed or unfolded; become manifest;
- Grow, progress, unfold, or evolve through a process of evolution, natural growth, differentiation, or a conducive environment;
- Generate gradually;
- Make visible by means of chemical solutions (WordNet, 2003).

Project development is then to gradually disclose or make visible the project. The project is the structure for the group's ongoing complex understanding of a situation that is manifested by models. Through the process of modeling, the design group develops, works out, gradually discloses or manifests their understanding of the situation. Project development differs from project management. Project development focuses on managing time and space, project management on time and costs. Project management is concerned with administering a project's schedule, roles, responsibilities, and costs but not with determining what it should be and therefore can be equally described as project administration.

***The design task comes into being only when the designer constructs it*** For design, this means that the design task (the object of design) is not a given, and comes in to being only when it is constructed and designated as such by the designer. In addition, the design task is not limited to the *object* in as in the mechanist approach; rather *object* refers to the object system (object/subject/project/environment). An object such as a commercial product may be created, but that is only an *outcome* of the process of design, and not the *object* of design.

***Designing the designer*** Design concerns itself with all phenomena, including most importantly, the designer himself or herself.

> Not only are the artifacts of systems related, but the agents of change – the designers and the design teams – are social systems as well. Design roles and relationships are systemic. Design processes are both systemic (integrative and interconnected), and systematic (methodical) (Nelson and Stolterman, 2003, p. 77).

The designer is a system and part of a system and therefore also an object of transformation. All understandings of the situation need to be modeled and understood. This includes the designer (or design team). Who are the individual members of the group? What is the relationship to the situation and with each other? What is the environment in which the design team is working (physical, social, economic)? What is the project and how would they like to develop it? The modeling of the situation includes within the subject dimension the role of the designer. What is the role of the designer in the system?

***Trans-disciplinarity*** The complex approach, following the organizational principle and the hologrammatical principle, is trans-disciplinary. Of necessity, the complex approach first provides a way of looking at the world that transcends discipline. It is not a grand-theory-of-everything, but a way to construct models of the world. All disciplines can participate as it transcends disciplinary approaches. The complex approach, being self-reflective, provides individuals with different disciplinary perspectives and a means to collectively construct understanding. The models constructed can be antagonistic since it is recognized that the models do not represent reality, but rather a subjective construction of reality. This allows participants to construct an understanding that integrates different viewpoints.

***Design as Meta-Concept*** Systems thinking is founded on meta-concepts (Morin, 2003). Design can be considered as a meta-concept that provides a structure for: 1) all activities concerned with intentional change and transformation of states; 2) sub-processes engaged in these activities. There are an increasing number of names to describe the process of intentional change and transformation of states. The different

names to describe this process are: decision-making (Justice and Jamieson, 1999; Bens, 2000), communication, negotiation, choice-creating (Rough, 2004), establishing vision and common ground (Weisbord and Janoff, 2000; Jones, 1998), search conferencing (Rehm et al., 2002), and problem-solving (Webne-Behrman, 1998; McFadzean and Nelson, 1998; Strauss, 2002; Schwarz, 2002). Design as a meta-process provides a general structure for these activities as they are seen as different names for the same process of change and transformation. The different processes are not distinct from design, but represent different design strategies. The reason for the proliferation of these multiple descriptions of design is due to ignorance concerning design. The benefit of unifying these different activities under the common name of design is the creation of a common vocabulary and understanding of this activity.

Design is a meta-process that unifies and provides coherence to the disparate activities described in the old paradigm of facilitation. These activities, including problem-solving, decision-making, choice-making, creativity, innovation, negotiation, communication, and learning are all complementary sub-processes of design. They are complementary because they are all tasks used to assist humans with the achievement of project development, the intentional change and transformation of states. These processes are integrated with design since they all occur during the process of design.

## 4.4 The Model of the Designer: The Role of the Designer

In the systemic paradigm design is described as being participatory, anonymous, and democratic. The process is collaborative since it engages individuals from different disciplines in the process. It is democratic by giving those affected by the design the right to participate in making decisions concerning the design. Participatory refers to the relationship between the designer and others involved in the design process. The designer's role is now not to design for others, but rather to help others design for

themselves (Cross, 1981). Determining and constructing models of each state is the task of the designer. Constructing and determining the project, is the project. As this is a process of construction separated by time and space, it is considered design. The result of this development is that design becomes a meta-process, engaged in by "everyone who devises courses of action aimed at changing existing situations into preferred ones" (Simon, 1969, p.129) redefining the designer from that of an expert and extending it to almost everyone while placing an emphasis on it's nature as a group process. Design as a group process redefines the role of the designer and it is agreed that this process needs to be assisted and mediated, a function now attributed to the role of the designer (Rittel, 1972; Golsby Smith, 1996; Schon, 1988). The role of the designer "in this model is that of a midwife or teacher rather than the role of one who plans for others. Instead, he shows others how to plan for themselves" (Grant, 1979, p. 326). As design shifts from "*design as information processing* we may, for example, characterize design as *a process of enablement within a community of expertise*. The problem of accurate information-transfer then becomes a problem of facilitation" (Coyne and Snodgrass, 1995, p.33). What is the role of the facilitator? What are the ground rules for the group? The characteristics of the facilitator are elaborated in the next chapter (facilitation methods).

# Chapter 3
# Facilitation Methods

## 5 Introduction to Facilitation: Guiding Group Process

The discipline of facilitation is inter-disciplinary, integrating theories from many different disciplines, such as psychology (and several of its sub-disciplines: social psychology, group psychology, industrial psychology), education (learning theory, human performance technology), and management (organizational behaviour, organizational development). The result is that facilitation itself is not a discipline with it's own theoretical foundations but developed within other disciplines.

As an emerging field there is no one definition of facilitation. Some recent definitions and descriptions of facilitation appear below:

> Group facilitation is a process in which a person whose selection is acceptable to all members of the group, who is substantively neutral, and who has no substantive decision-making authority, diagnoses and intervenes to help a group improve how it identifies and solves problems and makes decisions, to increase the group's effectiveness (Schwarz, 2002, p. 5).

> A facilitator ... is a process guide; he or she does not evaluate or contribute substantive ideas to a discussion. The facilitator is the servant of the group, not its leader, and works to ensure that the group accomplishes its goals. (Strauss, 2002, page 118.)

> Facilitation is the design and management of structures and processes that help a group do its work and minimize the common problems people have working together (Justice and Jamieson, 1999, p. 5).

> Facilitation is about process – *how you do something* rather than the content of what you do. A facilitator is a *process guide*, someone who makes a process easier or more convenient. Facilitation is about *movement* – moving something from A to B. The facilitator guides the group toward a *destination*. Facilitation makes it easier to get to an agreed destination (Hunter, Bailey, and Taylor, 1995, p. 1).

Despite the differences in description, several common themes recur concerning the function of facilitation. The facilitator, is someone who helps a group with process to achieve some end that may be a destination, goal, or solution by intervening in group process and structure that may not be working well in a group situation and try to improve them in order to increase the groups effectiveness (Schwarz, 2002). These processes are primarily problem-solving, decision-making, and communication (Schwarz, 2002). Structure is referred to as different things by different authors. This paper refers to structure as the organization, with all its associated dimensions (schedule, physical resources, participants), that allows the participants to engage in the process. A facilitation session is an example of structure that creates the organization so that a group can develop a project.

There are several facilitative dimensions that describe the facilitation situation. The dimensions are the **group**, the **facilitator**, the **primary group process**, the **facilitation process**, the **group task**, and the **facilitation task**. The **group** consists of those individuals who will take part in the primary group process. The **facilitator**, as described above, is the individual (or team) responsible for assisting the group with their process. The **primary group process** is the main activity engaged in by the group and that structures their activities. Problem-solving, decision-making, and learning are common primary group processes. With the suggestion of the designer as facilitator, the primary group process now includes design. It is this process that the

facilitator would help guide the group through. The **facilitation processes** are those procedures that structure, inform, and guide the interventions of the facilitator. Much as the group process describes their activity, the facilitation process outlines the facilitator's methods for intervening with the participants. The **group task** is the object of the group. It is the thing that the group is working on. In problem-solving the task is a problem situation. For learning it may be the curriculum. The **facilitation task** is the object for the facilitator and comprises the relationships within the group, their task, and the process used to develop the task. If the emerging role of the designer is as a facilitator, the primary group process would be systemic design. If the new function of the designer is as a facilitator, what are systemic facilitation methods?

Facilitation methods from each period are described below. First the dominant period, followed by the transitory period. The summary of the methods based on a paradigmatic framework identifies each period with a paradigm. The authors of the facilitation methods of the mechanist paradigm do not describe their models as "mechanist" models, nor do they identify any philosophical foundations. This is an artifact of the mechanist paradigm that believes that it is presenting the world as it is, and therefore a description of the approach is seen as unnecessary.

The theory of paradigm shift describes an intermediate transitory period between the dominant period and the emerging period. Until the emerging period establishes itself and becomes the dominant period, there is a transitory period where the theories and beliefs of the dominant period paradigm are questioned, yet the new emerging theories and beliefs of the emerging period paradigm have not yet been fully established. Methods of this period share characteristics of both the emerging period paradigm and the dominant period paradigm. As this paper is interested in the emerging systemic paradigm, the review focuses on those facilitation methods that claim to be founded on an analysis of systems (systems thinking or systemic thinking). The methods are categorized as transitory because, though they claim to take an approach based on the analysis of systems, the methods manifest

characteristics of first-generations systems thinking (neo-mechanist paradigm) and not second-generation systems thinking or systemic thinking (complexity paradigm).

Examples of transitory period facilitation methods are selected from two sources: the first source is current literature describing facilitation methods, the second source is a summary of a research project into the design-facilitation methods field. The first model is based on complexity science, the second on the MG Taylor *Scan, Focus, Act (SFA)* model. This model is selected because it is one of the only attempts at developing a group-design facilitation model. The model will be reviewed in order to see how it represents the transitory period, manifesting characteristics of both the mechanist and complexity paradigm.

# 6 The Dominant Period: Mechanist Facilitation

***Group Process: Problem-Solving.*** The primary group process for facilitation groups is problem-solving (IAF, 2004). The model is based on the classic three-stage model of problem-solving: identify the problem, decide on a solution to the problem, and then act (implement the solution). The problem-solving model has already been sufficiently outlined by mechanist design methods that are a form of problem-solving and therefore do not need to be discussed further.

***Facilitation Process: Managing Problem-Solving Groups*** The mechanist facilitation process is based on problem-solving and focuses on managing the group process and structure in order to improve group effectiveness (Schwarz, 2001).

The model organizes a facilitated session into four distinct phases: pre-planning session, group session, post-session report, and post-session review. The model is presented in figure 7:

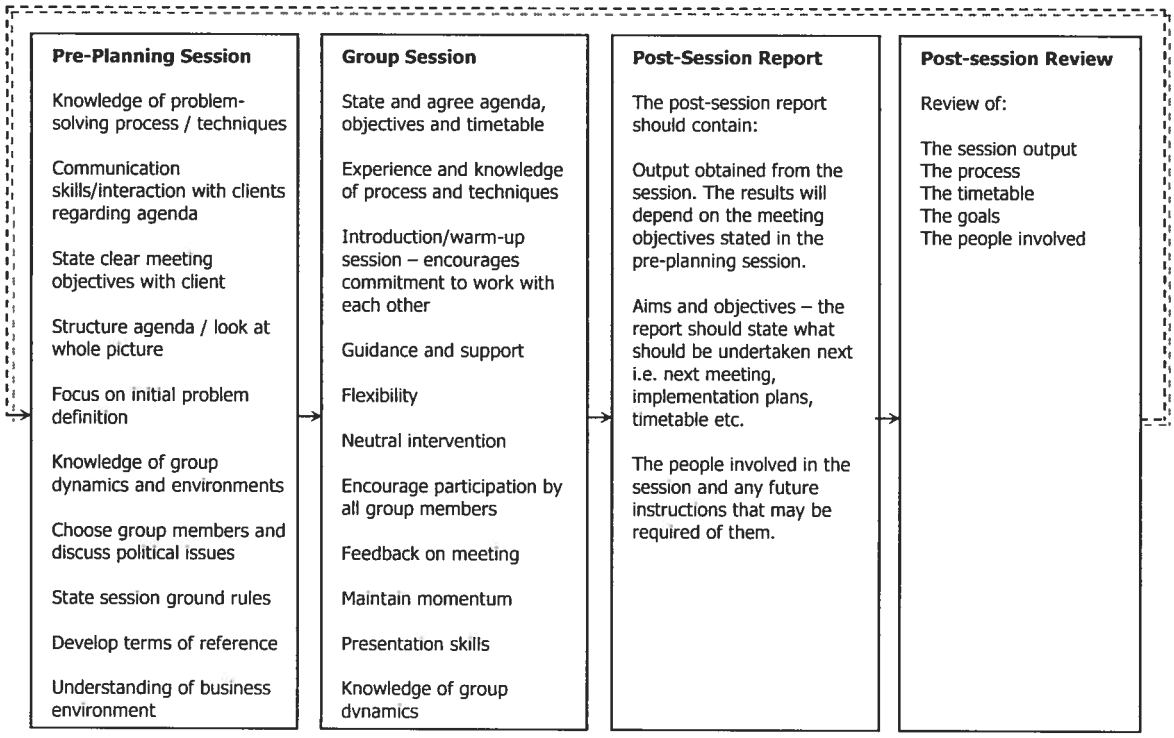


***Figure 7: A Conceptual Model for Facilitating a Group Problem- Solving Session*** *(McFadzean and Nelson, 1998, p.8)*

This model is described in detail in the following paragraphs.

***Pre-Planning Session.*** Pre-planning is essential for the success of a problem-solving session. The pre-planning session provides the opportunity for the facilitator to meet with key stakeholders to identify problem issues and pre-structure the session. The entire session is structured during the pre-planning session including the problem, group membership, the problem situations to resolve, the environment, the agenda, and timing. The facilitator must have a very good understanding of where the client is currently, "the current situation", and "*also needs to understand precisely why this situation is so*" (McFadzean and Nelson, 1998, p.8). This is to ensure that the facilitator and the problem champion understand why the group problem-solving session is being undertaken. One of the first outcomes of the pre-planning sessions is determining clear objectives for the session – whether the group will identify issues concerning the problem or whether attempts at providing solutions will also be included. The environment and resources for the session are also determined at this

time.

***Group Session*** During the session there are three dimensions in which the facilitator will intervene in an attempt to influence the group's effectiveness: the meeting process, content or the task of the session, and the group dynamics and relationships (McFadzean and Nelson, 1998, p. 9).

The facilitator's main objective during the session is to maintain positive relationships between group members and to help the group accomplish their tasks while stimulating and managing group conflict. These objectives are attained in part by the facilitator performing the following actions: introducing the group members to one another, facilitating the task ahead, and reiterating all conclusions.

***Post-Session Report*** After the completion of a session the facilitator writes a post-session report summarizing the session. The report includes a summary of the session stating the objectives, goals, comments, ideas, discussions, output and decisions, and finally next steps and those responsible for them.

***Post-Session Review.*** The post-session review is an opportunity for the facilitator to review members' performance in relationship to the needs of the group, maintain the energy of the group, reinforce the importance of implementing changes, agreeing on short-term actions, communicating actions already achieved, and managing the process of review and control (McFadzean and Nelson, 1998).

One of the most significant characteristics of the dominant model in contrast to the emergent model is the active role of the facilitator in pre-identifying and structuring the group problem, "*Possibly the most important general guideline for facilitators is that they must start from where their client is, the "current situation", and they also need to understand precisely why this situation is so*" (McFadzean and Nelson, 1998, p. 8). What is important to note is that the investigation of the "current situation" is done *independently* of the group. The "client", the person who is paying for the

facilitator or the lead sponsor, is invited to help determine the "current situation", but the group is not. The role of the facilitator is to pre-structure the problem in order to accelerate the efficacy of the group and understand why the group session is to be undertaken. The result of the facilitator pre-structuring the session is that he or she is robbing the group the opportunity to do so. It is not clear how this can be considered a neutral position.

***Facilitation Structure: The Group*** The facilitator's activities are primarily structured around the concept of the group and it is the group on which most facilitation tasks are aligned. Group theory provides much of the organizing theories that are used by the facilitator to help him or her successfully in group work. The theories include group process, membership, and goals. Following the mechanist principles, the facilitator sees himself or herself outside the group, a substantially neutral observer. Due to the emphasis on the group and group process, most facilitation models do not represent the group – only the group processes.

The facilitator's task is to manage the group's focus on problem-solving.

> It is the facilitator's job, therefore, to ensure that the group's attention is focused on the appropriate tasks and to reduce or negate both internal and external distractions. In addition, the facilitator must encourage the group to ascertain and maintain goal congruence and enthusiasm for completing the task ( McFadzean and Nelson, 1998, p. 7).

Every aspect of the session is identified and controlled by the facilitator including: schedule (start and end time, break durations, number of days), environment (furniture type, room temperature, lighting, ventilation, number of windows, food served) to processes (communication, vocabulary) to behaviour (cell phone use, language). Facilitators prefer to isolate participants from their everyday work environment in order to manage all the environmental aspects to increase efficacy and reduce distractions. Group performance is measured by the speed and quality of the outcome of the group. Speed is measured quantitatively, the time it takes for a group

to develop a solution, but the increase in quality is not elaborated upon. The group process and structure are accelerated by controlling group process and structure. In order to accelerate the development of a solution the facilitator pre-identifies the group problem and pre-structures the facilitation session.

Facilitators identify group processes that may not be working well and try to improve them in order to increase the group's effectiveness (Schwarz, 2002). These processes are primarily problem-solving, decision-making, and communication (Schwarz, 2002).

The mechanist principles are manifested in the facilitation methods in two ways: the separation of the subject (facilitator) from the observed object (group, group task, group process) is expressed by the fact that the facilitator is described as being substantively neutral (MacFadzean and Nelson, 1998; Schwarz, 2002); and the fact that the facilitation process (figure 9) shows only the process of design.

# 8 The Transitory Period: Neo-Mechanist Facilitation Methods

In this model the characteristics of complex adaptive systems are applied to teams and organizations and the work of facilitators (Kimball, et al., 2004). The characteristics of complex adaptive systems are seen as manifestations of the principles of "complexity science". The definition of complexity sciences is not elaborated upon or referenced. The authors define a system as,

> complex systems, multiple agents interact with each other, each agent being unique and different from the next, such that no agent's behavior will be the same in all conditions. Each of these agents changes and adapts over time and has an impact on the other agents because of the mutual context of the system they share (Kimball et al., 2004, p. 1).

The system description is first-generation systems thinking, as it defines elements in interaction.

Complex adaptive systems are described as having four characteristics:

> **1. Order is emergent and self-organizing.** One characteristic of a complex system is that order emerges as it flows from the interactions among the individuals. This process is called self-organization because there is no central control over the behavior of the individual agents.
>
> **2. A small set of simple rules generates purposeful, complex, and dynamic behavior.** Flocking birds are exquisite examples of another essential characteristic of complex adaptive systems because they exhibit a kind of self-organization where a small set of rules generates complex behavior.
>
> **3. The whole is greater than the sum of its parts, with its own distinct identity**. As each unique individual takes independent action, changes, and interacts with other individuals, a complex system emerges as a whole greater than the sum of its parts. [...] At the edge of chaos is where systems are most adaptable and creative. Complexity scientists describe complex adaptive systems as moving among three states: stability at one end of a continuum, chaos at the other, and a state called the edge of chaos in between. When systems are in this zone between stability and chaos, they are most adaptable and creative. The elements of the system do not lock into place but do not dissolve into anarchy.

> **4. Small changes can generate big effects.** The relationships and connections between the parts of a complex system can be the underlying cause for changes and new ideas to accelerate and multiply throughout the system. This produces another key characteristic of complex adaptive systems: small changes or ideas might create big effects (Kimball et al., 2004, pp. 1-2).

From these four characteristics of complex adaptive systems a general framework for facilitation is created and a set of design principles to inform specific design choices are defined. Three such design principles are the following: engaging the whole system first, using simple rules, and creating an edge.

***Engaging the whole system first*** This principle asks the participants to keep the system perspective in mind rather than only their individual perspectives. They should see "*how their particular perspective both contributes to the overall result and is affected by the interplay between the various groups and stakeholders within the system*" (Kimball et al., 2004, p. 3). In order to present the system perspective to participants it is suggested to begin a session with a system perspective of the issue at hand. This would necessitate the pre-structuring of the system. Another strategy is to create smaller groups from the larger group that represent different agents and perspectives of the system. These smaller groups are called "*mini-systems*" (complexity science terms, fractals) in that they "contain the diversity of views, opinions, hopes, and concerns that are inherent in the larger system" (Kimball et al., 2004, p. 3). This concept parallels the notion of the hologrammatical principal, whereby the part contains all the information of the whole. The participants are helped with "*putting the system first*" by having a graphical recording of their ideas "*resulting in a systemic view of the issue at hand*" (Kimball et al., 2004, p. 4).

***Using simple rules*** Simple rules are employed to govern group behaviour. A completely unstructured process would be chaos, and too many "rules stifle as a group" (Kimball et al., 2004, p. 4). The rules "*refer to how individuals should interact with each other*" and the "*implementation of the rules should be tightly managed*"

(Kimball et al., 2004, p. 4). Simple rules will allow a minimum of guidance so that the group is prevented from descending into chaos, but not too many so that the participants do not lose the ability to behave in "adaptive, creative, surprising ways, which create complexity" (Kimball et al., 2004, p. 4).

***Creating an edge*** In nature, the edge of chaos is called a verge, "*a mixture of ecosystems that happens when two distinct regions border each other and begin to overlap and interact. All living things in these regions are forced to engage in adaptation, cooperation, and competition that cause them to differentiate and create new forms*" (Kimball et al., 2004, p. 5). It is suggested that facilitators create verges for participants through the management of the physical environment such as creating informal meeting places between different groups during facilitation sessions, or introduce disruptive agents to the process such as inviting an expert from another field to participate in a session, whereby their outside viewpoints and questions create tension and "*just enough discomfort to generate new ideas*" (Kimball et al., 2004, p. 6).

The presentation of the system to the participants by the facilitator at the beginning of the session pre-structures the system. How can the facilitator be considered neutral if he or she is constructing a representation of the situation? There is no mention of the facilitator's relationship to the group.

***Contradiction within this approach*** Though this approach shares some characteristics with complexity theory, such as the notion of "fractals" that can be seen as being similar to the hologrammatical principle, the approach presents a neo-mechanist approach by maintaining the separation of the subject (the facilitator) from the object (the group). The facilitator is maintained outside the system, and the system is defined as comprising inter-relational elements, a first-generation systems thinking perspective.

The authors state that in a system each agent is "*unique and different from the next,*

*such that no agent's behavior will be the same in all conditions."* They then state that a "*small set of simple rules generates purposeful, complex, and dynamic behavior."* If agents' behaviour is unique and un-predictable how then can simple rules explain their behaviour? The examples given for the behaviour of birds flying in a flock are offered as an example of complex behaviour. The behaviour is predictable and therefore deterministic. Given certain rules, birds will fly in certain formations. Where is the unique behaviour of the birds? Why is flocking behaviour considered complex?

There seem to be two contradictions that become evident when this application of the rules are applied to groups. The first concerns the implementation of rules and the definition of complex adaptive systems. The second regards organizing self-organizing agents. If order "flows from the interactions among the individuals" and this "*process is called self-organization because there is no central control over the behavior of the individual agents*" (Kimball et al., 2004, p. 1), then how can the rules established by the facilitator not be considered as central control? Is the facilitator not the central control creating rules to govern individuals' behaviour? And the fact that the rules need to be tightly managed? It is stated that the rules "*guide the interaction between individuals and the system and are not focused on any one individual*" (Kimball et al., 2004, p. 4). But the individual agents are controlled by rules on how they interact with each other, which is controlling the behaviour of the individual. If none of the participants followed the "rules" then there would be chaos – which the facilitator is trying to prevent. The facilitator imposes rules to govern the behaviour of the individuals in interactions with each other – removing the possibility of self-organization and emergence. The facilitator has pre-structured and pre-determined the group's behaviour.

In addition, why are the participants not allowed to self-organize? Based on this principle, a group, put together to perform a task, would generate their own complex behaviour based on already existing simple rules. These simple rules can be called cultural norms. If self-organization is inherent in all systems then there is no need for

the facilitator to impose rules since order emerges from the flow of interactions between individuals. What then is the role of the facilitator?

There is no reference cited to the description of "complexity science", nor do the authors elaborate on the term, so it is uncertain as to which systems-analysis approach they are referencing. Based on the description of the characteristics of complex systems it seems most likely that they are referring to the American branch of "chaos theory." In this model it is possible to see the neo-mechanist approach to systems analysis. The systems view is applied only to the observed object, in this case the client group, and the facilitator remains outside the system.

This approach maintains a determinist, closed, mechanist approach. The facilitator generates and implements the rules, pre-determined by the facilitator. The group has no input in creating the rules. The group is looked upon as a system in which the facilitator intervenes. The facilitator is not seen as part of the system, rather, he or she is seen as a *deus ex machina* that creates and governs the rules of the system, while maintaining an objective stance.

This model is significant because it is based on a chapter from the forthcoming *IAF Facilitation Handbook*. Its inclusion in the handbook indicates an endorsement by the IAF. Since the IAF's characteristics of facilitator's competencies are dominated by the mechanist approach this provides further credence that it is a transitory model, straddling the dominant and emerging period.

### The MG Taylor *Scan, Focus, Act* Model

The MG Taylor *Scan, Focus, Act* model, which is the primary structuring process model of the *DesignShop*® collaborative work system, and the *Accelerated Solutions Environment*® represents another facilitation model that is based on systems analysis.

The MG Taylor systems were created by Matt and Gail Taylor. An architect by training, Matt Taylor was motivated to improve the way different groups collaborated on large architectural projects. Gail Taylor was a public school teacher using the Montessori method of teaching. The two met and began discussing their mutual interest in adult learning and group collaboration. Eventually marrying, Matt and Gail Taylor integrated the two disciplines of architectural theory and adult learning theory to create new methods for collaborative work: the various MG Taylor systems. The work system reviewed in this report is the *DesignShop* facilitation session comprising collaborative work models and an environment called the *Accelerated Solutions Environment* (ASE). Each of the sessions is between 4 or 6 days, consisting of preparatory days, event days, and post-event days.

MG Taylor first licensed the *ASE* and *DesignShop* system to the American consulting firm *Ernst & Young* in 1997. *Ernst & Young* was purchased by French consulting firm *Cap Gemini* to form the new firm of *Cap Gemini Ernst & Young*. The firm re-branded itself *Capgemini* in 2004.

Capgemini has 18 ASE locations worldwide in addition to several mobile sites. The sites are organized by region: Americas (Hubs: Cambridge, Chicago, Cupertino, El Segundo, New York, Toronto, Washington; Spokane, Detroit, Minneapolis), Europe (Copenhagen, Grenoble, Helsinki, Milan, Munich, Paris, London, Utrecht), Asia Pacific (Sydney).

This model was reviewed as part of the project-grounded research, "recherche-projet" (Findeli, 2003, p. 16), a component of the masters program for which this paper is written4. The ASE was selected as the location for the field research project. The field observations were made while working in the capacity of a support staff member

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4 "Design and Complexity" option. M.Sc.A. Faculty of Environmental Design (aménagement). University of Montréal, Montréal, Québec.

(knowledge worker) for the Cupertino ASE from August 24-31, 2003, and the Toronto ASE from July to September 2004. Knowledge workers support the facilitation staff in the preparation and execution of the ASE systems, and clients during the sessions.

***The Scan, Focus, Act (SFA) model*** This model serves as the process model for guiding the facilitator's actions and for describing the primary group activity. The model comprises three stages: scan, focus, and act.

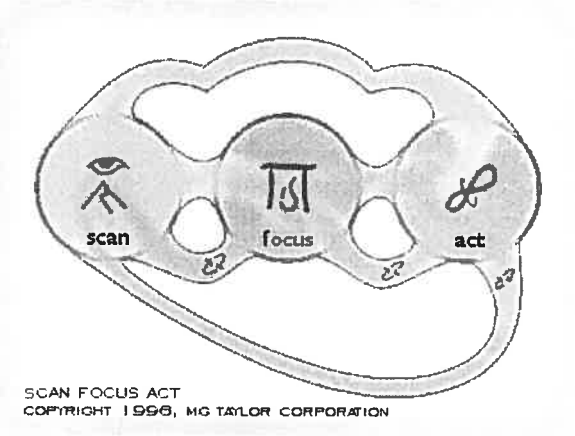


***Figure 6: The MG Taylor Scan, Focus, Act Model***

***Scan*** In the **Scan** phase the situation is explored and models of what has been discovered are built. There are two types of models built based on the two main aspects to this phase: exploration, and viewpoint. Firstly, conceptual models are built based on the information gathered. Secondly, mental models are built reflecting the viewpoint of those engaged in exploration and information gathering.

***Focus*** In this phase the different models created in the **Scan** phase are further scrutinized, evaluated and refined. More robust models are built that go beyond the conceptual models of the Scan phase. This phase also implies choice-making concerning what will be discarded and what will be saved for the next iteration of the models.

***Act*** In this phase the models are put into action and tested.

***Feedback*** This is not a phase of the model but considered an important part since it allows for the iterative nature of the model. Through feedback, the different phases of the model are interrelated and allow for a cyclical movement through the different phases. Though it is not stated specifically, feedback is represented by the two curved arrows between all the phases.

Different characteristics have been identified as applying to the model. They are:

***Various Cycle*** Different stages may take different time frames than other cycles. Some **Scan** stages may last two days while **Focus** stages may last only two hours. The cycles can last hours or days. The organization may work in the **Scan** stage for years as it pertains to Research and Development departments.

***Fractal in Nature*** This characteristic recognizes that each of the stages is represented in each of the stages simultaneously. In order to scan, one must also act. To act one must focus.

***Non-linear*** The model is not only linear or cyclical but can be implemented in repetition. Each stage is the recognition of different activities and can be used to name those activities as would naturally be observed in a group. The process can be used as *Scan, Focus, Act* or in any order. *Focus* can precede *Scan*, and *Act* can precede *Focus* and *Scan*. A group can spend quite a bit of time exploring and acting before returning to making choices.

***Correct Sequence*** There are six combinations, or ways of ordering the **Scan**, **Focus** and **Act** stages. Each of the six combinations can be considered as six strategies applicable to different situations. The model can be used to describe past activities or plan for future ones.

***Design Template.*** **Scan Focus Act** is used by Facilitators and Transition Managers as a quick way to design events like **DesignShop®** processes.

***Diagnostic Tool*** The model can also be used in after-action reviews to look for holes or gaps in the planning and implementation process.

***Distinguishing characteristics of the MG Taylor system*** According to MG Taylor there are five distinguishing characteristics of their facilitation method:

> **Characteristic 1**: It is based on a multiple-level awareness of physical, emotional, mental/intellectual and spiritual dimensions of our work.
> **Characteristic 2:** It is model-driven. Our models are robust and comprehensive; they provide insight that allows this multi-faceted work to succeed.
> **Characteristic 3:** It is eclectic, knowledge-driven. A facilitator in this method relies on a wide range of knowledge of different fields; this knowledge is necessary to be able to participate fully as a designer of the outcome.
> **Characteristic 4:** We believe the facilitator has to retain the ability to be directive. There are times when we tell our client what they must do in order to succeed. When we have a solution to offer, we offer it; when we know the tools required to get the job done, we tell them.
> **Characteristic 5:** We rely on an open-ended creative process: rarely does one create what one sets out to create – this is a myth; our process is "release around a focus: captured release of creativity and group genius; we facilitate the creative process – it's not a matter of simply removing barriers, getting people past their blind spots in an otherwise assumed/normal process of work. This is a different methodology. Design is a process of discovery. The design process leads to the uncovering of the information required to create elegant solutions to difficult problems (Bartoo, 1993, iii).

It is stated that the models are based on cybernetics and systems thinking. The goal is that the participants using these models as guides will stop "*trying to fix the parts*"

but instead will "*redesign the system.*" (Bartoo, 1993, p. 145).

***The Accelerated Solutions Environment*** The ASE is a specially designed collaborative work_environment structured by several functions: collaborative work space (Breakout Rooms), group reporting space (Radiant Room), knowledge-sharing spaces, work-stations, and production centres. The goal of the environment is to create a pleasant creative atmosphere, free from physical and environmental barriers to collaborative work.

***Roles*** Within a **DesignShop** there are different individuals and groups who take on different roles: participants, sponsors, group facilitators, process facilitators, and knowledge workers. **Participants** are individuals from the client organization. They also include session sponsors and other Capgemini consultants. **Sponsors** are senior executives from the client organization who have engaged Capgemini. They offer the direction for the session and work with the facilitators to identify the content and structure for the session. The role of **facilitators** is occupied by Capgemini engagement consultants who have a previous relationship with the client or are dedicated ASE facilitators. They lead the session and interact directly with the participants and sponsors. **Process facilitators** are responsible for managing the DesignShop process. They manage the knowledge workers and interact with the facilitator and sponsors in order to adapt the process to the needs of the client. Process facilitators usually are promoted from experienced knowledge workers. **Knowledge workers** act as support staff for the session and are responsible for executing the *DesignShop* methods, systems, and models in order to help participants focus on their task. The focus is on helping participants identify and express their personal knowledge, communicate it to others, and then synthesize that knowledge so as to be able to decide as a group. There are nine distinct spheres of responsibility for knowledge workers: documentation, environment, graphics, knowledge wall, music, process facilitation, production, video, and writing. A single individual may be responsible for each sphere. For smaller events a single team member may be responsible for several spheres.

***Theoretical Analysis*** The SFA model successfully removes the problem orientation and focuses on collaborative work. However, the systems thinking approach of the models remain of the first generation.

The model has removed the problem orientation from the traditional problem-solving model, by focusing on the stages of scanning, focusing, and acting. The scan stage is not directed towards problem identification. It looks at a general situation, the exact nature of which is decided upon by the group.

*SFA* successfully models the cybernetic principle but fails to represent second-order systems thinking through the omission of the subject and the object. The end result is that the model is limited in its ability to guide the interventions of a facilitator since there is no facilitator, subject, or object in the model. There is no relationship shown in the model with which the facilitator can work. The model then limits itself in terms of helping a facilitator structure his or her interventions. This idea is further validated by field observations of the model in use that is discussed in detail later in this section.

Though the SFA model expresses systems thinking because it is fractal, non-linear, and open, the model as implemented is not. The experience, for the most part, maintains the closed, linear, control model of other models. The participants do not share in setting the agenda, managing the work space, or shaping the design methods. The entire system, environment, music, activities, and methods are pre-determined. It is a closed box. They go through the process but have no say in how the process works. Senior sponsors are allowed to shape the process, after hours, behind closed doors. This just reinforces the closed nature of the system.

***Field Observations*** Other criticisms of the model are developed based on observations of the model in use within the context of several *DesignShop* sessions.

***Models poorly implemented*** Models and systems are poorly implemented due to an insufficient understanding of the models by facilitators. The facilitation staff does not have educational or professional experience in facilitation, organizational development, or systems thinking and therefore do not have a theoretical background to fully understand the model. The result is that the facilitation staff knows how to execute the ASE methodologies but do not have the theory to be able to master the material. The result is a lack of responsiveness to the needs of the groups. The facilitators are in a situation similar to line cooks at fast food restaurants; they know how to make a burger, but not how to cook.

***Limited Use of Models*** There is a limited use of models used by the facilitators. The MG Taylor system comprises 18 models but only the SFA model is introduced to clients or referenced by staff. In addition, the model was not used to structure the group's activities, rather relying on the *Straw Dog*, the daily schedule of events. In discussion with sponsors and other facilitators the **straw dog** is used as the framework for structuring the events and their interventions along with the modules. Facilitators were seen discussing with sponsors the "needs" of the group. The group would be diagnosed as "needing" a creativity exercise, or team-building exercise and the appropriate module would be added to the schedule. The appropriate activity module would be identified and then added to the Straw Dog agenda schedule. The SFA model was not used to identify the next steps. The SFA model is introduced by the facilitators, but the activities of the participants are rarely linked to the stages of the model, creating a gap between the presentation of the SFA model as the structuring framework for their activities.

***Models Need to be Simple*** As already remarked above, the majority of the 18 models that create the MG Taylor "modeling language" are not used. It would appear that it is just too complicated and detailed to be useful to the facilitator. It would seem that no matter how accurately a model describes a given situation it is limited by the capacity of the facilitator to use the model in his or her daily practice. A simple model is more valuable and more likely to be used than a complex model even if it is less accurate,

robust, detailed, or comprehensive.

***Systems thinking is not understood by facilitators or participants, and is therefore not used*** Based on their explanation of the model to participants and its use, the facilitators do not mention the systemic nature of the model or explain systems thinking to the participants. Models constructed by staff or participants are not based on the evaluation of systems. As systems thinking is not well understood by the facilitators, the participants are not encouraged to think with a system approach. **Scribers**, knowledge workers whose task is to write and draw on the radiant room whiteboard during group sessions, recording and synthesizing the groups exploration of their situations, do not model the situation based on systems thinking either. They illustrate the group topics using graphics and text, but no systems-based models.

The experience of working within a system allows for new insights concerning the implementation, use, and effect of models. Living up to its name, the MG Taylor Accelerated Solutions Environment and its accompanying models and systems help groups more quickly identify and document group knowledge, and develop action plans based on that information. The context of the facilitation situation, particularly all aspects of physical and data management are superbly designed and implemented. However, there is a disconnect between the theoretical description of the facilitation methods and the actual use and implementation of those models during facilitation sessions. The *DesignShop* as a collaborative work system for creative action is a success at managing the collaborative work environment, but the models do not contribute much to the success of the quality of the creative output of the participants as they are poorly implemented and generally not understood. Specifically the SFA model does not seem to be a very useful tool to guide the facilitators' interventions.

Each of the models categorized as belonging to the transitory period express aspects of the dominant paradigm and emerging paradigm. The methods manifest the characteristic of being based on evaluating systems (emerging period). However, they follow first-generation systems thinking that can be considered a form of neo-

mechanism. The dominant period characteristic shared by two of the methods is the focus on problem-solving, which is considered to be a characteristic of the mechanist paradigm.

# 8 The Emerging Period: Systemic Facilitation Methods

Since current facilitation methods are dominated by mechanist thinking, new systemic methods of facilitation need to be developed or integrated from other disciplines. In order to find or develop appropriate methods, the characteristics of systemic facilitation need to be created in order to obtain criteria against which to evaluate prospective models. To do so, complex principles are applied to the task of facilitating design. The application of complex thinking forces a shift in paradigm in facilitation methods, resulting in characteristics of the dimensions of facilitation that radically change the task of facilitation, the primary process, the structure, and the role of the designer. The facilitator continues to help groups with process, but the nature of those processes change. Accepting the impossibility of maintaining objective neutrality, the facilitator actively participates in the generation of content, to different degrees. The emphasis is not on control but process – the process of project development. The project being the "field" and the "object" of design (Findeli, 2003). A review of possible characteristics of systemic design facilitation is given below.

***Facilitator*** The facilitator's role is no longer to control group process and structure in order to achieve a pre-determined goal within a pre-determined time frame, but rather to accompany groups and be available as a resource in the journey of discovery that is project development. The value of the facilitator is in his or her experience in the role

of guide and experience in the process of project development.

***Group*** Since the design process and design projects are collaborative – the designer no longer has the final decision-making authority concerning the project (it can be questioned whether, for complex projects such as architectural projects, the designer ever really had the final decision-making authority). As a result, the designer is now hired not as an expert in problem-solving or aesthetics, but in getting the group to design collaboratively. Certain architects, in particular Rem Koolhas and Renzo Piano, seem to already represent the role of designer as facilitator. Both work collaboratively with clients and other sub-trades, working with them to determine the final form of architectural projects.

***The facilitator is non-neutral*** The dimension of the observing subject is represented by the facilitator *and* the client group. Unlike the mechanist paradigm that keeps the facilitator and the client group separate, the complex approach integrates them both within the dimension of the subject. In addition, the dimension of the subject can be occupied by anyone participating in the design process including clients and customers. Design being the primary group process in this model, anyone within the subject dimension can be considered a designer.

Once a facilitator is engaged by a group, the facilitator and the group together create what can be considered a *project system*. The concept of the project provides the structure for the facilitator and group activities. It is the structure of the project that provides a cohesive identity unifying the activities of the group. The facilitator and the client group are both represented in the subject dimension of the project system because both participate in the development of the system.

The result of the linking of the facilitator with the group is that the facilitator can no longer be considered neutral. Rather, he or she is considered a co-collaborator in the construction of the models in the system. The inclusion of the facilitator with the client group and other participants in the subject dimension changes the

characteristics of the facilitator from that of a neutral process manager in the mechanist paradigm to that of an active co-designer.

The subject dimension can be considered the driver's seat of a project. Placing the facilitator in the driver's seat recognizes the influence of the facilitator in determining the direction of the project and his/her right to participate in the decision-making process. In the complex approach the subject is recognized as the observing subject that constructs an understanding of the observed object. To be within the subject dimension is to be in the position of creator of the concepts of the object.

Connected to the dimension of the project is the dimension of the subject, object, and environment. This means that the dimension of the subject is also part of a project. As the project is a construction, then even the group and its membership is not a given but a construction of the group. The project, then, is not an expression of one construction, the design task, but also contains the projects for the other dimensions as well. As each dimension becomes an object for the group, the object manifests the hologrammatical principal by containing the other dimensions within it, as each dimension becomes an object to the group. The end result is that in a complex approach, the facilitator and the client group do not co-create only their understanding of the object, but of the environment and the subject too. That means that the object also contains the dimensions of the subject/project/environment. If the subject is the facilitator/group, and the subject is represented in the object dimension, then the facilitator/group becomes an object. The subject (facilitator/group) then views itself, the subject (facilitator/group), as an object. This implies that even the facilitator/group is not a given, but is a construction of the facilitator/group represented by models in the project dimension. The subject constructs itself and is aware of its own self-construction. The manifestation of the subject in the object dimension creates the possibility for self-reflection on the role of the facilitator and the nature of the group.

***Project: Common Group Task*** In the mechanist paradigm the facilitation task was

structured around the concept of the group, and the focus was on problems. Management writers state that organizations are structuring around the concept of the team or group (Nelson and McFadzean, 1998). The team is not the primary structuring principle of organizations; rather, it is the concept of the project. It is the project that provides the unifying organization that gives cohesion to team membership. Individuals comprising teams and groups derive their identity by having a shared goal that is common to all of them. Being a member of the team is not the common identifier because it is self-referential. One cannot define membership in a group based on a formality; it must be based on a shared purpose. The project also provides a common 'object of design' for both the facilitator and the group. Though, they are both integrated into the dimensions of the subject, this model allows them to have different tasks that are unified by the concept of the project.

***Group Process: Design*** The group process for systemic facilitation is systemic design and has already been described in detail in the preceding chapter. Refer to the section on systemic design for a complete description.

***Facilitation Process: Guiding Project Development*** The facilitation process is the means by which the facilitator structures and proceeds with his or her interventions in a group. In the complex approach it is recognized that all subjects perceive the world by means of models that represent their projected understanding of the object. As discussed earlier, due to the hologrammatical principle, all system dimensions are necessarily projections. As projections, they do not represent reality as it is, but are seen as subjective constructions. Projecting understanding is a continual process of construction. This in part expresses the underlying concept of uncertainty that is the starting point for complex thinking. If all expressions of understanding of the world are mediated by projects, then there are no known certainties.

The facilitation process is circular, and retro-active. The process has no stopping point; rather, the process of facilitation is continually iterative. In addition, the process is retroactive; the facilitator's interventions in the group, in turn, change the

facilitator. For this reason, it is not possible for the facilitator to pre-structure a facilitation session, because he or she does not know the consequences of such intervention. And, as the facilitator is a co-collaborator with the client group, he or she cannot determine the nature of the interventions without the group. In order for the project group (that includes the facilitator) to determine the nature of the role of the facilitator it is necessary for the group to be present, which means holding a facilitated session.

The act of projecting is not merely a technical solution. In the complex approach, it is recognized that projecting is an expression of personal/collective (participative) choice. Design tasks are not technical problems, they are personal choices that are a reflection of the individual as designer, "*The project not only has been described above as a plan inasmuch as it is more than planning, arranging or projecting. Existentially, the project defines the action of projecting oneself, and acting as a project in itself*" (Narvaez, 2000, p. 48). To develop a project is to design. To be a designer is one who develops projects (Levy, 1987).

> The project depends directly on the experience of the individual who develops it and, consequently, relies on his or her knowledge and understanding of reality, jointly with the conception about possibilities of change. Knowledge derived from the project is of a *poietic* nature. Nonetheless, it may be defined in the following broad categories: development and encouragement of projection and ideation abilities; expression and communication of the project; proprio-perception of the project and its recording; social, environmental, and personal conditions for its development (Narvaez, 2000, p. 48).

The project is described in relationship to the individual but can also be applied to the group. The design-knowledge categories listed can be used as a description for project development. If design thinking is project development, then this list can be considered a brief description of the processes that would be the responsibility of the design facilitator. The facilitator would develop and encourage projection and

ideation abilities, the expression and communication of the project, the perception and recoding of the project, and the multiple conditions of project development.

It is agreed that facilitation is about moving from state A to state B. However, in the complex model there is no destination, only iteration, since the process of conceptualizing the project, which is a system, is in a constant process of conception. The project is an idea that can never be realized (Bouthinet, 1999). There are results from the process, but they are not considered as a destination or goal.

For the facilitator this means that all interventions with a group begin with uncertainty. Uncertainty concerning all the dimensions of the system: what is the subject, what is the object, what is the project, and what is the environment? This can be translated as: who are we, what are we doing, where are we, how and why are we doing it, and what is it? The structure for the *it* is the concept of the project. In addition, since the facilitator and the group are both subjects, the facilitator cannot begin setting the boundaries of the project system without the involvement of the group. To do so would not represent the group's understanding, only that of the facilitator. Without the group's participation, there is no project system, and that is the system that is being constructed.

Everything is open and closed. The project, object, environment and subject are all open to observation, construction, and projection. This includes the role of the facilitator, who is just one individual among the group. This leaves the facilitator in the position of needing to help a group with a group process without a reference point. Since the dimension of the project system is constructed projections, and as complex models, they are never complete, the facilitation task is continually uncertain. The facilitator must begin intervening when he or she does not know the following: the group membership, the group design task, the group design process, the group design environment, or timeframe. What methods can a facilitator use when he or she does not have any continually existing reference points?

As can be seen by this description, existing models of facilitation founded on the mechanist linear paradigm cannot manage the task of facilitating complex design. In complex design,

> The practitioner does not come to a situation with fixed, pre-defined problem statements, but undertakes an investigation and engages in dialogue through which appropriate metaphors emerge. These metaphors are arrived at by both the practitioner and the client in the specific situation (Coyne and Snodgrass, 1995, p.61).

How do design facilitators begin to facilitate a group design project if they don't know what the design task is, who the team will be, and what process they will be using? How to help a group proceed from state A towards to state B, if state A and B are both unknown, and worse, are constantly changing? This expresses a design paradox: "*How do we achieve a goal that keeps changing?"(*Coyne and Snodgrass, 1995, p. 41). This situation arises when the goal of the project changes as more information is learned concerning the situation, external factors force a change, or the context has changed so much that the design becomes irrelevant or obsolete by the time the project is complete (Preiser, Vischer, and White, 1991).

Systemic design as the primary group process radically changes the nature of the facilitator's methods for intervening with a group. The structured linear approach of the facilitation process used in the mechanist paradigm is ineffective to guide the interventions of the facilitator because it goes against the open, dynamic and exploratory nature of systemic design. What is needed is an approach that provides an open framework to guide the facilitator's actions.

Helpers in the field of helping relationships are confronted by a similar challenge. The discipline of helping relationships, a general model of counseling, "*can be defined as assisting clients in exploring feelings, gaining insight, and making positive changes in their lives*" (Hill and O'Brien, 2002, p. 4). The model is based on an individual (the Helper), through conversation and working with a client (the Helpee),

helping to manage problem situations or unused opportunities, discussing new possible scenarios for those situations, and then developing a strategy to realize those changes. The process of helping relationships is based on empathic listening that serves as a general model for professionals who need to work with people and understand their situations in order to help them resolve problem situations or unused opportunities. Like design and facilitation, helping is concerned with the process of change and transformation from one state to another.

The helper begins working with a client without knowing who the client is, what is the client's problem(s), and therefore what processes to use. The helper uses a three-stage helping model that guides his or her interventions before knowing what the problem is or what processes to employ. A model is used that can guide the facilitator's actions when no known variables aside from the presence of the design facilitator are known. This general three-stage helping model meets the requirements for a model of a design facilitator. It offers a way of acting even if the design team is variable, the task is unknown and the process is undetermined. The task is unknown but the structure is not. The task of the facilitator is to help the group determine what are the states and then develop strategies to transition the conceptions of state A to state B. It is suggested to adopt the three-stage model used in the field of helping relationships.

The canonical problem-based model of helping developed by Gerard Egan (1986) describes an eclectic problem-management model of helping. Though the model is described as a problem-management model, the model itself does not refer to problems making it possible to adapt the model to activities other than problem-solving. The problem-management model has three stage: Stage I: present scenario; Stage II: preferred scenario; Stage III: action – getting the new scenario on line.

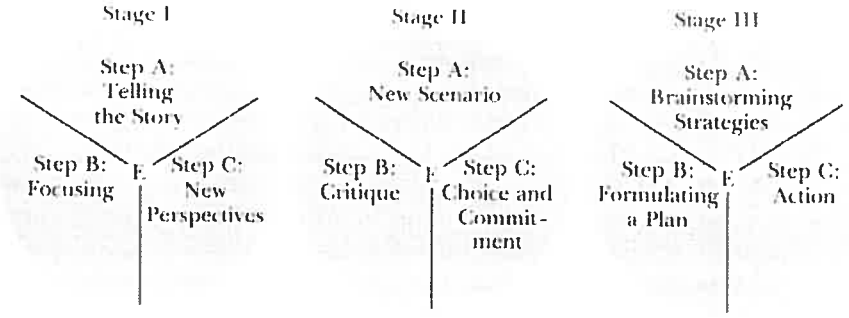


***Figure 8: The Three Stages of the Skilled Helper Model (Egan, 1986, p.52)***

> Stage I. The client's problem situations and/or opportunities are explored and clarified. Clients can neither manage problem situations nor develop opportunities unless they identify and understand them. Initial exploration and clarification of problems and opportunities takes place in Stage I.
>
> Stage II. Goals based on an action-oriented understanding of the problem situation are set. Once clients understand either their problem situations or opportunities for development more clearly, they may need help in setting goals – that is, help in determining what they would like to change.
>
> Stage III. Action: Strategies for reaching goals are devised and implemented. Finally, clients need to act on their new understandings; that is, they have to work at turning the preferred scenario into reality. (Egan, 1986, p.34)

The model closely resembles **the state A- state B** structure model of design. The language of the stages also parallels Simon's definition of design. The first stage of the model, "current scenario" parallels the "existing situation" described in Simon's definition, as does the second stage, "preferred scenario", and "the preferred situation." This model helps establish the parallels between the structure of the design process and the helping relationship process but since the development of the process remains focused on a problem-based approach it is more laborious to adapt to facilitating complex design. Another model is presented that is similar to the Egan model but is not based on problem-solving and remains more open, making it a better candidate to serve as a process for facilitating design.

The Hill and O'Brien model of helping relationships is based on a three-stage model of: exploration, insight, and action.

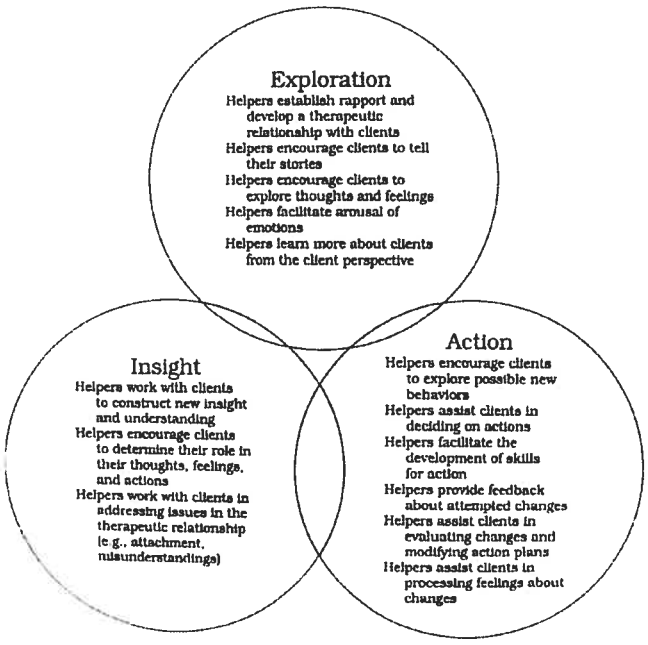


***Figure 9: Exploration, Insight, Action Model of Helping*** *(Hill, O'Brien, 2002, p.22)*

**Exploration Stage.** The exploration stage helps clients explore their thoughts, feelings, and actions. Clients have the opportunity to express their emotions and explore the complexity of their situation. This stage also provides an opportunity for the helper to establish a rapport with the client and learn about the client's situation. In the case of design, the exploration stage can be seen as an "individual mapping" stage. The design team describes its own individual understanding of the current situation including members' feelings, thoughts, and actions.

**Insight Stage.** The insight stage helps clients understand their thoughts, feelings, and actions. Clients start taking responsibility for their actions and start exploring alternative perspectives. As applied to design, this stage would have the design team integrate its "individual models" into an integrated "group model" of the design task. In the group map team members integrate the individual models of_other members

but also of other participants, users, or those affected and involved in the project such as distribution and manufacturing partners.

**Action Stage** The action stage helps clients decide what actions to take on the basis of their exploration and insight. Having an understanding of their situation, taking responsibility for it, and having a broader understanding of the situation that goes beyond their own viewpoint, clients are now ready to take actions that will change their current scenario. For the design project, the action stage is when members of the design team begin to make decisions on how they can change their current model for a preferred one and what actions are needed to realize those changes.

The strength of this model is its adaptability and its efficacy in 'open' situations. The process allows for the exploration of each of the dimensions, discussion during the insight stage, and finally, decision in the action stage. The stages are non-linear and therefore they can be re-iterated repeatedly. It is possible to begin at either the insight or action stages. The role of the facilitator, then, is to help guide the group through the three stages in relationship with the four dimensions of the project system. It is its ability to create a framework that is flexible and adaptive that interests us in the process of design.

***Facilitator Role: Co-collaborator*** The role of the design facilitator is to help groups with the process of design. The task of the group is to develop a deeper understanding of the existing state and the preferred state. The role of the facilitator is to help this process along by employing the skills (Egan, 1986) and intentions (Hill and O'Brien, 2002) of the helper. The helper interacts with the client through conversation; therefore the skills needed by the helper are communication-focused. The main communication skills identified are *attending* and *active listening*, *empathy* and *probing* (Egan, 1986, p.72). **Attending** skills are focused on the helper's presence and relationship to the client. **Active listening** includes understanding nonverbal behaviour and verbal messages. The helper's **intentions** include: setting limits, getting information, giving information, supporting, focusing, clarifying, instilling

hope, promoting insight, promoting change, dealing with resistance, and challenging (Hill and O'Brien, 2002, pp. 364-365).

A review of facilitation methods reveals two challenges for integrating design with facilitation: the first challenge is that the field of facilitation does not recognize design as a group process; the second challenge is that current methods of facilitation are primarily influenced by the mechanist paradigm and are therefore incompatible with the emerging paradigm of design. Due to its roots in psychology, facilitation does not recognize design as a group process because psychology does not recognize it. The field of psychology recognizes separate and discrete processes such as problem-solving (to reason and analyze abstract information), creativity (to produce new ideas and products), decision-making (to choose a course of action) (Aamodt, 1991). Design, in turn, could be seen as "devising courses of action" (Simon, 1969) and should be considered and integrated into psychology.

The characterization of facilitation by the *International Association of Facilitators* (IAF), the pre-eminent facilitators' certification body[5] is evidence of the domination of the mechanist paradigm of facilitation methods. The mechanist approach is incompatible with systemic design, because facilitators see themselves as being substantially neutral with regard to the group content. In addition, the primary group process is problem-solving, a linear process that pre-structures activity according to problem and solution. Problem-solving as the primary process necessitates that the facilitator's process be similar to the group process. The facilitation process is also problem-solving and focuses on control. It pre-determines the problem, and then organizes the facilitation according to the problem-solving process. The session is pre-structured even before the group meets.

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5 Several of the *International Association of Facilitators'* fundamental competencies for certification are listed as evidence of the dominance of the mechanist paradigm: predefine a quality product and outcomes with a client, understand problem-solving and decision-making models, trust group potential and model neutrality, be vigilant to minimize influence on group outcomes, and maintain an objective, non-defensive, non-judgmental stance (IAF, 2004).

There are methods that describe themselves as being based on a system or systemic approach. However, a review of the methods reveals that they are all dominated by first-generation systems thinking, belonging to the neo-mechanist paradigm. Therefore these methods can be categorized as belonging to the transitory period, as outlined by the theory of paradigm shift.

# Discussion

This paper began with Cross's assertion that design methods are changing and his proposition to structure the comparison of those changes not by generations but by paradigm. The framework of paradigm shift is helpful in making a comparison of methods because it highlights the role of paradigm – a way of seeing the world – in influencing the development of methods. Cross proposed that the shift in paradigm was from an industrial to a post-industrial paradigm. The industrial period paradigm was attributed to belonging to a mechanist approach but the underlying theory informing the emerging period was not described an so it was suggested that complexity theory assume that role.

The methods were then reviewed by evaluating how they manifested the characteristics of the principles of either paradigm. The characteristics of the mechanist and complex paradigms are summarized in Table 2.

*Table 2: A Comparison of The Mechanist and Systemic Approach (De Coninck, 1996, B, liberal translation)*

| MECHANIST APPROACH | SYSTEMIC APPROACH |
|---|---|
| Closed and distinct object | Open system |
| Comprising elementary parts | Comprising open sub-systems |
| As elements are decomposed into elements; simple rules govern their combination | The interaction of elements [dimensions] and the environment |
| The object is independent of the observer and is in its natural environment (the object is given) | The observed forms a system with the observer (the object is constructed by the observer who has projected it) |
| Linear causality (cause and effect) | Circular causality (retroaction) |
| Archetype: machines, clocks | Archetype: living organisms |

The result of this exercise revealed that current design methods characteristics manifest the principles of the mechanist paradigm. Design methods are recognized as comprising a model of the designer (role), model of the design task (object of design), and model of the framework of the process of design (process). In the mechanist approach: 1) the object is a closed and distinct comprising of elementary parts, 2) the elements are reduced to more simple parts in order to understand their function and

their combination are governed by simple rules, 3) the object is independent of the viewer and the object is a given, 4) the object follows linear causality. These characteristics are manifested in design methods in the following ways:

1) ***The object is closed and distinct comprising of elementary*** **parts** The design task is represented by an object that is viewed as being closed and independent of its environment. The exact function and value of the object is pre-determined by the designer. If the consumer uses the design incorrectly it is because the consumer is using the product "incorrectly." The object is designed to serve its function and is not designed to interact with it's environment (but it does as we will see). The automobile is designed in relationship to the road but not as part of a larger transportation system. It is designed as an isolated and independent entity that does not interact with other cars directly. It does interact with the environment in terms of air pollution and landfill pollution after it is scrapped but this is a concern that still does not seem to be a paramount concern to car designers (that includes manufacturers) given the current transportation options manufactured.

For facilitation, the object is represented by the group that comprises of individual members. The facilitator's role is to intervene with this object to ensure its smooth operation.

2) ***The elements are reduced to more simple parts in order to understand their function and their combination are governed by simple rules*** The object is independent of the designer that creates it. It can be argued that cars are designed to "create pollution" thought most designers would deny that that was their intention. Nevertheless, that is the end result of their actions. They see themselves independent of the objects they create. This separation of designer and object contributes to the lack of responsibility taken by designers and manufacturers.

The group dynamic is reduced to elementary parts and actions. The group is either negotiating, communicating, problem solving, or decision making etc. The activities

of the group are explained using only these activities. By understanding these group processes the groups functioning can be explained.

3) ***The object is independent of the viewer and the object is a given*** The designer works to identify "the problem" which is considered a given and independent of the viewer. The designer's job is to discover the reality as it is including the problem. One result of this approach when designing with multi-disciplinary design teams is that each participant has their own truth of "reality" which is shaped by their disciplinary approach to viewing the problem. As they do not see their disciplinary bias, only the perception of the "truth," collaborative design quickly stagnates into stalemates over who has correctly perceived the "truth" of the problem.

The facilitator is considered a neutral party outside of the group. Their exclusion to the group extends to the models whereby the facilitator is not included in the group or not even represented at all.

4) ***The object follows linear causality*** The current design methods follow the same framework as outlined by mechanism: analysis, synthesis, and evaluation. As an object or situation can be described as a mechanism, the challenge is to analyze the current situation and identify the broken part of the mechanism, "the problem," that is inhibiting the usual operation of the machine. Once the problem is "discovered" (as the problem exists independent of the designer) a solution can then be created to solve that problem.

Like the mechanist design process, the primary group process for mechanist facilitation methods is based on problem-solving. The facilitator helps the group with this process by identifying the problem, solving it, and then taking action to implement those changes. The facilitator may even pre-determine the problem area to be worked on by the group.

***Inherent Contradictions of the Mechanist Approach*** There are many contradictions

among the espoused characteristics of the facilitation methods of the mechanist paradigm. The facilitator's role is to intervene in group situations and improve the outcome of group process while maintaining neutrality. Neutrality would imply no affect. An affect would imply non-neutrality. How can the facilitator's actions have an affect and at the same time remain neutral? Some author's state that the facilitator's neutrality is only in relationship to group content. The purpose of the group's processes are to understand and transform the content – how can the processes and direction of the facilitator not influence the group members? How is it that the facilitator can be seen outside of the group when the foundation of group theory states that each member impacts the group dynamic? Why is the facilitator the exception?

In addition, there is little consensus on the different dimensions of facilitation and what dimensions are influenced by the facilitator. The Schwarz model (figure 8) lists the physical environment under the dimension of context – a dimension that is not influenced by the facilitator in their environment. In the McFadzean and Nelson model (figure 7), the physical environment is listed as one of the responsibilities of the facilitator as it plays a crucial role in the failure or success of a facilitated session. The contradiction and incoherency between the different models offers evidence of the researchers forcing their paradigmatic theory onto their models despite the obvious contradictions. Kuhn suggests that these contradictions are evidence of a discipline in crisis that precedes a shift in paradigm.

The emerging design methods outlined by Cross and other researchers are well described by the systemic approach and the complexity paradigm. The characteristics of the systemic approach can be summarized as: 1) an open system comprising of open sub-systems, 2) the interaction of elements and the environment, 3) the observer forms a system with the observed (the object is constructed by the observer which has project it), 4) circular causality.

1) ***An open system comprising of open sub-systems*** For design this means that the design task is no longer an object but a system. In the case of the automobile the car

is seen as being a system comprising of sub-systems and a sub-system of a larger system itself. The car has sub-systems (safety systems, electrical systems), while at the same time it is a sub-system of a larger system (transportation).

For facilitation the facilitation task is no longer structured around the group (an object) but around the project (a system). The group was viewed as an object independent of the facilitator therefore the facilitator could claim or had to claim, neutrality in relationship to the group. In the systemic approach the facilitator's task is structured around the concept of the project – and the project is a system – that includes the facilitator. As the facilitator is included in the system, he or she co-creates the system with the members of the group. As a co-creator he or she can not be considered neutral. The project is a good framework for facilitators because it does away with the notion of facilitator neutrality and better describes the collaborative group situation found in facilitation. The project provides a common interest that provides identity for the different group members of the project. They can be identified as being part of the same group as they have a shared project in common. It is the project that gives them a shared identity and not being part of the group. The project maintains group identity while at the same time is flexible and adaptive, being able to change over time. The topic of the project can change over time while providing identity for the group.

2) ***The interaction of elements [dimensions] and the environment*** As there are no objects in a system, to make a clearer distinction between elements and object, elements will be described as dimensions. In design, a move away from objects, to dimensions and the environment, allows for a broader and integrative understanding of situations. It recognizes that industrial products do not exist in a vacuum but reside within environments that may be social, economic, and environmental. Simply put, the systemic approach takes a look at 'the big picture.' A hospital is described not as just a building but as a place of health related to the larger physical environment (including neighbourhoods, cities, it's impact on the natural environment) but also as an environment for the humans living within it's walls.

Systemic design becomes the best description of the activity of making change and transformation done by groups. It provides the largest frame that includes all the activities currently recognized by facilitation methods such as problem-solving, communication, etc., while distinguishing it from other activities.

With the group as an object replaced by the project as a system, the facilitator is placed within a project and with the client, rather than separate and apart changing the relationship of the facilitator and the client. This change, recognizes the reality of the actual situation and no longer needs to go through theoretical gymnastics to maintain, at all costs (even coherency), the notion of facilitator neutrality. Rather than a neutral expert outside the process, the facilitator becomes a fellow traveler in trying to understand existing situations and co-creator of actions to shape preferred situations. This approach recognizes every individuals role in naming the world, and therefore, creating the world in which we live.

3) ***The observed forms a system with the observer (the object is constructed by the observer which has projected it)*** Designers recognize their role in constructing their understanding of the existing and preferred situation and that they are linked to any artifacts they create. Designers are ethically linked to the actions they take. Designers also can reflect upon the action of observing, creating opportunities for self-reflection.

In the case of facilitation the facilitator is recognized as part of the group they are facilitating and collaborate with them to explore their understanding of the existing situation that also includes the group in the process of exploring their understanding of the current situation.

4) ***Circular causality*** Recognizing circular causality, designers no longer see the design process as a linear with an end stopping point, but as a continuous process of reflection and understanding. Building a hospital necessitates an understanding of the

doctors, patients, maintenance workers within it, and the relationship of the building to it's environment, and within the greater health system. As the environment of the hospital and the systems within keep changing, it is not possible for the designers to ever be able to fully 'understand' the situation. As everything is in flux, the design of the hospital is seen as a continual process, actively participated in by all those affected by the design.

The facilitator can no longer pre-determines or structures group activities. The tasks of the systemic facilitator is to sit with the client group and collaboratively determine what is the project. They help the group with this process through the traditional facilitation techniques of empathic listening, clarifying statements, and representing ideas graphically. Determining what is the project includes all aspects of the project: what is it, who does it affect, who should be included in developing the project? The project also includes managing the project itself including the role of the facilitator. How are we going to identify what the project is? What role do we want the facilitator to play? This pushes the responsibility back to the group, empowering them, but also in the mean-time allowing them to practice 'designing.' They determine all aspects of project development including the kind of work environment they would like, and when and how are they going to meet.

***Benefits of the Systemic Approach*** Some of the descriptions used to help categorize the methods by period were taken from descriptions of the disciplines by professional associations. Both design and facilitation professional associations are promoting a definition of the discipline and methods that align with the dominant period and the mechanist approach. It can be concluded that the professional associations represent the dominant opinion of the discipline. Therefore, it can be argued that the design and facilitation disciplines are still dominated by the mechanist approach.

Systemic methods recognize that design is no longer an individual process but a social group process engaged in by everyone. The result of the redefinition of the process of design is that it calls into question the role, function, and purpose of the

designer; if everyone designs, what is the role of the designer? It is suggested that the role of the designer in the systemic paradigm is as a facilitator of the design process. The discipline and methods of facilitation were introduced. Reviewing current facilitation methods by the same paradigmatic framework used for design methods reveals that they too are dominated by the mechanist paradigm. The primary group process is based on problem solving and the facilitator is neutral tasked with controlling and pre-determining the groups outcomes. The result is that current facilitation methods are philosophically incompatible with systemic design and there fore can not be integrated.

For design methods to be integrated with facilitation methods new approaches based on complexity theory need to be developed. Systemic facilitation methods founded on complexity theory principles with systemic design replacing mechanist problem solving as the primary group process.

## 8.1 The Design Facilitator, The Facilitative Designer

If helping guide a group through process is a description of the function of facilitation, then the description of the facilitator as a process guide is a good description of the role of the designer in the systemic paradigm. Facilitation is about movement, helping a group move from state A to state B, a process of changing states. The structure of the complex design process (recursively changing state A to state B) parallels exactly the structural model of facilitation (guiding groups from A to B). If changing states is a description of design then the primary activity of the facilitator is design. Both roles concern an individual helping a group with the process of changing states. The challenge is to help the system and the participants (including the facilitator as he or she is within the system) develop the project. A result of the integration of design into facilitation, and the adoption of facilitation methods by design, is that the roles separating a facilitative designer, and a design facilitator disappear.

Facilitation can apply to many different facilitative roles and disciplines. Facilitator as consultant, trainer, manager, or leader (Schwarz, 2002) and now designer. In addition it can be interpreted in three ways, as a technique, a discipline (métier), or as a function (Lévesque, 2000). **Facilitation as technique** recognizes that in part facilitation involves skills, processes, methodologies, and techniques, used by the facilitator in order to successfully intervene in group situations. Design facilitation as a **technique** could be employed by anyone involved in the process of group design. He or she would not necessarily be a neutral third party but could simply be a member of the design team. As a profession it raises several questions: who is a group design facilitator, is it a designer who has mastered facilitation, or is it a facilitator who has mastered design? This question is not answered in this paper but will need to be addressed in future research. **Facilitation as profession** recognizes that for some facilitation is their full-time activity and occupation, facilitation can be seen as a profession. The person engaged in this profession is identified with their work, the person "is a facilitator." **Facilitation** can also be seen **as a function**. A function is described as being imposed by the general culture and encompasses broad qualitative activities. Functions include the domain, the missions, the purpose, demands and the responsibilities represented by the function of facilitation.

Group design facilitation as a **function** would mean that a designer as facilitator would be designated as responsible for managing group design process for the project. As a facilitator, Levesque quickly sketches five responsibilities of the facilitative function:

1. Assist the adaptation to change
2. Take advantage of possibilities
3. Provoke, help and realize projects
4. Facilitate the circulation of information
5. Foresee and redirect tensions and conflicts

Applied to design, these five facilitation responsibilities describe the role of the design facilitator as some who: help assist a group adapt to change, take advantage of possibilities, provoke, help and realize project, facilitate the circulation of information, and foresee and redirect tensions and conflicts – all within the context of design projects. What are design projects? Adopting the systemic perspective – design projects are any projects that involve recursively changing states and reflecting upon the action of recursively changing states while doing so.

***Benefits of the Integration of Design and Facilitation*** There are numerous benefits to the integration of design and the field of facilitation, and in turn, the integration of facilitation with design. One possible benefit for facilitation would be having design as a new framework for understanding the process of change and transformation that better describes the nature of the activities of groups and a systemic structure that is more integrative. Design is a social process and therefore is affected by group dynamics. Design in turn can benefit from the rich and detailed research and methods developed by facilitation to explain group dynamics. Design research would not need to begin from scratch to develop the function of facilitation. Existing methods and techniques can be integrated into the emerging structure of design.

Integrating design with facilitation not only changes design methods, but facilitation methods. If the designer is a facilitator, the main group process facilitated by the designer is systemic design. Systemic design as a meta-process can provide coherency to the multiple sub-processes already recognized by the field of facilitation. Problem solving becomes a sub-process to design, rather than design as a sub-process of problem solving. It integrates the process of problem solving, decision making, communication, and creativity within one framework. It allows for the inter-relationship between these processes, where before they were separated and isolated, following the principles of mechanist thought. As a meta-concept, or meta-process, design does not pre-structure collaborative work. The systemic facilitation model does not do away with mechanist methods of facilitation, but repositions them within the larger framework of complex facilitation, much in the same way that complexity

theory integrates research that is conducted based on mechanist principles. Group theory and facilitation techniques are still valid within this approach. The difference is that group dynamics describe the characteristics of the subject dimension of the system, that includes the facilitator, rather than representing only the group as the object. In the mechanist paradigm the facilitation task (the thing the facilitator works on) for the facilitator (subject) is the group (object) – an isolated entity. The systemic approach sees the group not at as an object but as a system comprising of four dimensions (subject, object, project, environment). The facilitator is no separated from the group (system) but is part of it represented in the subject dimension along with the group. The adoption of design as a meta-concept would help reduce the confusion and continued invention of new processes to describe the activity of intentional change that currently exists within the field of facilitation.

There is no consensus currently in the field of facilitation as to the best description of the action defined as problem solving, creativity, innovation, decision making or innovation. In the meantime, other disciplines are embracing what can be described as a designerly way of looking and working in the world – with no mention of the word design. Facilitators have already begun developing methodologies that involve design-like processes, and product managers are supervising the entire life cycle of products, in addition to all the technology and sub-processes related to project development, such as managing inter-group communication and dialogue, and managing the physical space of the participants.

There is an opportunity for the field of design to assume a leadership position as facilitators of design –the collaborative, creative, transformative and recursive action of changing man and his environment. If, as this thesis proposes, design is the best process to describe this action, then the field of design could lead. But to assume a leadership position it would necessitate an understanding of traditional facilitation techniques as well and an understanding of collaborative design.

***Designer as Facilitator: A New Role for the Designer?*** The traditional role of the industrial designer is that of a form giver for industrial products (Golsby-Smith, 1996) or as a computational problem solver. This paper suggests a new role for the designer as a facilitator of design. The designer is asked to work with other members of the design team who may be clients, users, or stakeholders from other disciplines impacted by the development of the product or service in question. There are numerous different goals for the designer as facilitator, one of the most common is to help the other collaborators in the design process express their views, articulate their values to the other stakeholders, and then discuss future possibilities and the actions necessary to achieve those possibilities.

Early definitions of designers saw them as an intermediary to help humanize industrial technology. The designer was a new type of collaborator, neither artists nor craftsperson, more of an integrator, a go-between and a process guide, in short, a facilitator. Rather than be something new, this is a return to the initial concept of the role of the designer as a collaborator working with industry and society.

As we transition to a post-industrial economy, the designer's role will remain, only the characteristics of the design task will change from a focus on industrial objects to cultural and technological systems. In the past it was focused on creating industrial objects, and therefore the designer was an industrial designer. As systems become the dominant technological artifacts the designer becomes a systems designer.

There is a suggestion that the role of the designer as intermediary and integrator should be expanded from society, and industry to include science, and technology (Levy, 1987). As a facilitator, the role of the designer would then be to continue in the role of intermediary but also include the responsibility of helping others understand the relationship between all four dimensions. The role of helping others understand and manage our complex technological societies is a valuable role with much greater social prominence than the role of stylists of industrial products.

## 8.2 Limitations of the Complexity Approach

The complexity approach based on constructivism posits that all knowledge to be constructed by the subject. This approach has been very useful for constructing methods for group facilitation as it recognizes that each individual constructs their understanding of all phenomena. The fact that all knowledge is constructed by the subject is also a limitation of this approach as it is not able to account for other aspects of the human experience that are not 'rational' or based on other perspectives. Knowledge construction in the complexity paradigm is an active cognitive process on the part of the subject who builds an understanding of the world. This approach can not account for approaches that do not rely on the subject actively, consciously, or rationally explaining their understanding. The approach keeps knowledge in the realm of the "mind" so to speak and continues to separate the subject from the body ignoring other types of knowing including kinetic or intuitive understanding of phenomena. Many artistic conceptions of the world are physical, emotional, and intuitive. They can not be easily integrated into this approach as the understanding of the world can not be easily explained or modeled rationally.

Another limitation of the complexity and constructivist approach is that only the subjective human point of view is constructed. To understand other phenomena on their own terms is difficult as this theory is based on the subject's experience. As humans, we have a tendency to project our human experience onto the phenomena being observed. An excellent example is the anthropomorphization of animal behaviour. We apply human emotions and experiences such as fear, love, desire onto animals. This is not a statement whether animals do, or not have emotions, but rather an admission of the attribution to animals of our own emotions. It is acknowledged that animals may not share all our emotions, however, if they do not share all our emotions, is it not possible, that there are animal emotions not found in the human experience? How can we know? How can we construct a model of our understanding of an emotion we ourselves cannot experience? This is just an example of how the

constructivist approach is limited by it's reliance on the subject's active rational construction of all knowledge based on their human experience. If design is a process of world creation that includes the transformation of the self, then the challenge for the ongoing development of group design facilitation methods for co-creating the world should be the development of methods based on philosophy that is inclusive of all aspects of the human experience including the intuitive and integrating multiple perspectives.

# Conclusion

When a transition of paradigm is complete, the profession changes its view of the field, its methods, and its goals. The shift from the mechanist paradigm to the systemic paradigm inverts the key characteristics of design and facilitation methods, the design task shifts from objects to systems and culture, the process from individual problem solving to changing and modeling states as a group, and the role of the designer from an individual to the role of the designer as facilitator of group design process. With the designer serving in the capacity of facilitator, the methods of facilitation need to change in order to be philosophically compatible with systemic design and the complexity paradigm. The key characteristics for systemic facilitation methods are proposed that replaces problem-solving as the primary group process with systemic design, the facilitation task from the group to a project system, and the role of the facilitator from a neutral third-party responsible for pre-determining and controlling group behaviour to that of a co-creator and process expert.

Design studies researchers have been stating that design methods are in the process of changing for the last forty years – almost from the beginning of the design methods movement. However, as demonstrated by categorizing design methods by mechanist and complexity paradigms, it appears that most remain within the first generation of design methods founded on the mechanist paradigm. Few advances have been made in the evolution of design methods because new methods do not address the philosophical underpinnings of the methods they are trying to change or if they do, the extent of the impact of the underlying philosophy is not fully appreciated. Culturally, those societies shaped by western European philosophy continue to be dominated by the philosophy of Déscartes and mechanist thought as evidence by current design and facilitation methods – even if his influence is not known or made explicit. It is partly due to this lack of self-awareness of the philosophical foundations that shape our world vision that contributes to the lack of advancement in changes in design methods at large. Until a shift in paradigm away from Cartesianism is made

any future attempts at changing design methods will have little impact. Any attempt to do so would be like trying to build a brick house out of wood. No matter the amount of desire, tinkering or effort applied it will always result in the construction of a wooden house. The first step in shifting paradigm is to recognize the role of philosophy in determining our understanding of the way we see the world and how they shape our methods for changing the world around us. This paper began this work by suggesting that current methods are shaped by the mechanist paradigm based on the philosophy of Déscartes and suggest that the way forward is to create new methods based on the philosophy of complexity as outlined by Morin.

The challenge is how to integrate two disciplines that are in transition. What methods and techniques from the dominant period can be adapted to the emerging period, and what needs to be eliminated? This paper lays the foundation for describing the emerging complexity paradigm of design and facilitation and shows the inter-relationship between the two. The two have an inter-relationship but both can exist only in the emerging paradigm. Current facilitation methods are dominated by the mechanistic paradigm focusing on problem solving and therefore can not integrate the process of systemic design. Those facilitation methods that state that they are systemic follow first generation systems thinking and therefore are categorized as belonging to the transitory period. The result is that there are currently no systemic facilitation methods. As this paper only describes possible characteristics of complex design facilitation and not the methods themselves, complete methods and models still need to be developed in order to: articulate and describe the emerging role of the designer as facilitator, to educate future generations of designers in the new paradigm, and to improve design methods to ensure the future viability of the design profession in its long coveted role as intermediary between man and technology. If the emerging paradigm of complexity establishes itself as the dominant paradigm and designers do not develop facilitation methods that harmonize with that paradigm, they will forfeit that role. The way to proceed is to further development their built on a philosophical approach founded in complexity science.

# Bibliography


Aamodt, M.G. (1991). *Applied industrial / Organizational Psychology.* Wadsworth, Belmont, CA.

Bartoo, P. (1993). *A Manual of Facilitation*, Version 1 Draft, Unpublished paper.

Bens, I. (2000). *Facilitating with Ease!* Jossey-Bass, San Francisco.

Bouthinet, J-P. (1999). *Psychologie des conduites à projet.* PUF, Paris.

Cagan, J., Vogel, C. M. (2002). *Creating Breakthrough Products: Innovation from products planning to program approval.* Prentice Hall, Upper Saddle River, NJ.

Coyne, R., Snodgrass, A. (1995). "Problem Setting Within Prevalent Metaphors of Design", *Design Issues*, vol.11, no.2, Summer, pp. 31-61.

Cross, N. (1981). "The coming of post-industrial design", *Design Studies*, vol. 2, no. 1, January, pp. 3-8.

Cross, N., Clayburn-Cross, A. (1995). "Observations of team work and social processes in design", *Design Studies*, vol. 16, no.2, April, pp. 143-170.

De Coninck, P. (2004). "Méthodologie du design -DIN 2220 Cours 02: Vision globale", [http://www.aedii.qc.ca/v2/cours/index.php?cours=DIN2220&PHPSESSID=8d062e02b738800d7de12981d41d0573], class notes, University of Montréal. (September 14, 2004).

De Coninck, P. (1996). "De la disciplinarité à la transdisciplinarité : à la recherche

De Coninck, P. (1996). "De la disciplinarité à la transdisciplinarité : à la recherche d'une panacée ou d'une attitude?", *Info-Stoper*, vol. 4, no.1, March, University of Sherbrooke, Sherbrooke.

De Coninck, P. (1996, B). "Une approache systémique de la gestion inteégrée des déchets et des résidus. Considérations preliminaries pour le domaine de la santé", *Ruptures*, vol. 3, no.1, pp. 29-41.

De Coninck, P. (1993). *Du mécanisme à la systémique: vers une modélisation complexe de la technique*, Université de Montréal, Montréal.

Denton, H.G. (1997). "Multidisciplinary team-based projects", *Design Studies*, vol. 18, no. 2, April 1, pp. 155-170.

Diani, M. (1988). "Immateriality takes Command", *Design Issues*: vol. 4, no. 1 & 2, Special Issue 1988, pp. 6-11.

Dorst, K. (1997). *Describing Design: A comparison of paradigms*, Delft Univ. of Technology Faculty of Industrial Design, Delft, Pays-Bas.

EAD (2004). "Design System Evolution", *6th International conference of the European Academy of Design*, [http://ead06.hfk-bremen.de/], University of the Arts, Bremen, Germany, (March 29-31 2005).

Egan, G. (1986). *The Skilled Helper: A Systematic Approach to Effective Helping*, Brooks/ Cole, Pacific Grove, CA.

Evans, B., Powell, J. A., Talbot, R. (1982). *Changing Design*, John Wiley & Sons, Toronto.

Findeli, A. (2003). "Design et complexité: un projet scientifique et pédagogique à

visée transdisciplinaire", *L'Autre Forum*, May, pp. 11-17.

Findeli, A. (2001). "Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion", *Design Issues*: vol. 17, no. 1, Winter, pp. 5-17.

Findeli, A. (1997). "Theoretical, Methodological, and Ethical Foundation for a Renewal of Design Education and Research," *The New Academy*, Barcelona, October, pp. 5-17.

Forster, M. R. (1998). "Kuhn's Structure of Scientific Revolutions", [http://philosophy.wisc.edu/forster/220/notes_8.html], (October 30, 1998).

Fortin, R. (2000). *Comprendre la complexité: Introduction à La Méthode d'Edgar Morin*, L'Harmattan, Saint-Nicolas, QC.

Gibson, J. L., Donnelly, J. H. Jr., Ivancevich, J. M., Konopaske, R., (2003). *Organizations: Behavior Structure Processes,* McGraw-Hill/Irwin, New York.

Golsby-Smith, T. (2001). *Pursuing the Art of Strategic Conversations*, Doctor of Philosophy, Social Ecology, University of Western Sydney.

Golsby-Smith, T. (1996). "Fourth Order Design: A Practical Perspective", *Design Issues*, vol. 12, no.1, Spring, pp. 5-25.

Grant, D.P. (1979). "Design Methodology and Design Methods", *Design Methods and Theories*, vol. 13, no. 1, January.

Gregory, S.A (1966). *The Design Methods*, Butterworths, London.

Hill, C. E., O'Brien, K. M. (1999). *Helping Skills: Facilitating Exploration, Insight,*

*and Action*, APA Books, Washington, DC.

Hunter, D., Bailey, A., Taylor, B. (1995). *The Art of Facilitation*, Fisher Books, Cambridge, MA.

IAF (2004). "IAF Foundational Competencies for Certification", [http://www.iaf-world.org/i4a/pages/Index.cfm?pageid=3331], (November 6, 2004).

Jonas, W. (2001). "A Scenario for Design", *Design Issues*, vol. 17, no.2, Spring, pp.64-80.

Jones, P.H. (1998). *Handbook of Team Design*, McGraw-Hill, New York.

Jones, P. (1997). "Design Facilitation for Teams: Managing and Planning Team Interaction", [http://poetics.org/redesgin/working.htm], (August 4, 2004).

Jones, J.C. (1981). *Design Methods: Seeds of Human Futures*, John Wiley and Sons, Toronto.

Jorgensen, H. (2004). "Creating Human-centreed Innovation", *Index: Magazine – Design to Improve Life*, [http://www.index2005.dk/news/news_item.2004-08-31.1532858903], (September, 2004).

Justice, T., Jamieson, D. W. (1999). *The Facilitator's Fieldbook*, HRD Press, New York.

Kaner, S., Lind, L., Toldi, C., Fisk, S., Berge, D. (1996). *Facilitator's Guide to Participatory Decision-Making*, New Society Publishers, Gabriola Island, BC.

Kimball, L., Weistein, N., Trish, S. (2004). "Maximizing Facilitation Skills Using Principles of Complexity Science", *OD Network Annual Conference*, Session 201,

[http://www.odnetwork.org/conf2004/followup/201M.pdf], (October, 4).

Kuhn, T. (1970). *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago.

Le Moigne, J-L. (1995). *Les épistémologies constructivistes*, PUF, Paris.

Le Moigne, J-L. (1990). *La modélisation des systèmes complexes*, Dunod, Paris.

Le Moigne, J-L. (1977). *La théorie du système général*, PUF, Paris.

Levy, R. (1988). "Le projet: une project de soi", *Informel*, February, pp. 7-11.

Levy, R. (1987). "Design industriel: micro-plaquette de silicium ou proaction culturelle?", *Informel*, November, pp. 22-25.

Lévesque, A. (2000) *Partenaires multiples et projet commun.* L'harmattan, Paris.

Mahoney, M. L. (1991). *Human Change Processes: The Scientific Foundations of Psychotherapy,* BasicBooks, New York.

Margolin, V., Buchanan, R. (eds.) (1995). "Myth and Maturity: Toward a New Order in the Decade of Design", *The Idea of Design*, MIT Press, Cambridge Mass.

McFadzean, E., Nelson, T. (1998). "Facilitating problem-solving groups: a conceptual model.", *Leadership & Organization Development Journal*, vol. 19, no. 1, pp.6-13.

Morin, E., Ciurana, É-R., Domingo Motta, R. (2003). *Éduquer pour l'ére planétaire*, Éditions Balland, Paris.

Morin, E., Le Moigne, J-L. (1999*). L'intelligence de la complexité*, L'Harmattan,

Montréal.

Morin, E.; translated by Bélanger, J.L.R. (1992). *Method: The nature of nature*, Peter Lang, New York.

Morin, E. (1990). *Introduction à la pensée complexe*, ESF éditeur, Paris.

Morin, E. (1977). *La Méthode*, Editions du Seuil, Paris.

Narvaez, L. M. J. (2000). "Design's Own Knowledge", *Design Issues*, vol. 16, no. 1, Spring, pp. 36-51.

Nelson, H., Stolterman, E. (2003). *The Design Way*, Educational Technology Publications, Englewood Cliffs, NJ.

Nelson, T., McFadzean, E. (1998). "Facilitating problem-solving groups: facilitator competences", *Leadership & Organization Development Journal*, vol. 19, no. 2, pp. 72-82.

Miller, S. D., Hubble, M. A., Duncan, B. L. (1996). *Handbook of Solution-Focused Brief Therapy*, Jossey-Bass, San Francisco.

Popper, K.R. (1968). *The Logic of Scientific Discovery*, Hutchison, London.

Preiser, W. F.E., Vischer, J. C., White, E. T. (1991). *Design Intervention: Toward a More Humane Architecture*, Van Nostrand, New York.

Putz, G.B. (2002). *Facilitation Skills: Helping Groups Make Decisions*, Deep Space Technology Company, Bountiful, UT.

Quarante, D. (1984). *Éléments de design industriel*, Maloine, Paris.

Rehm, R., Cebula, N., Ryan, F., Large, M. (2002). *Futures That Work: Using Search Conferences to Revitalize Companies, Communities, and Organizations*, New Society Publishers, Gabriola Island, BC.

Rittel, H.W.J., Webber, M.M. (1984). "Planning Problems are Wicked Problems." in *Developments in Design Methodology*, Cross, Nigel (ed.), J.Wiley, Toronto.

Rittel, H. (1973). "The State of the Art in Design Methods", *Design Research* and Methods, vol. 7, no. 2, April.

Rittel, H. (1972). "Second-generation Design Methods", in *Developments in Design Methodology*, Cross, Nigel (ed.), J.Wiley, Toronto.

Rough, Jim (2004). "Choice-Creating", [http://www.tobe.net/topics/choice.html], (November 7, 2004).

Roozenburg, N.F.M., Eeckels, J. (1995). *Product Design: Fundamentals and Methods*, John Wiley and Sons, Toronto.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Reflect in Action*, Basic Books, New York.

Schön, D. A., Bucciarelli, L. L. (1988). "Design Theory and Methods – An Interdiscipoinary Approach", *Design Theory '88: proceedings of the 1988 NSF Grantee Workshop on Design Theory and Methodology*, Newsome, Sandra L., Spillers, W.R., Finger, Susan, editors.

Schwarz, R. (2002). *The Skilled Facilitator*, San Francisco, Jossey-Bass.

Senge, P. M. (1994) *The Fifth Discipline*, Currency, New York,.

Sharry, J. (2001). *Solution-Focused Groupwork*, SAGE, Thousand Oaks, CA.

Simon, H.A. (1969). *The Sciences of the Artificial*, M.I.T. Press, Cambridge, MA.

Strauss, D. (2002). *How to Make Collaboration Work*, Berrett-Koehler, San Francisco.

Taylor, Matt. (2003). "SFA Model", [http://www.mgtaylor.com/mgtaylor/glasbead/SFA.htm], (February 5, 2003).

Thomsett, R. (2002). *Radical Project Management*, Prentice Hall, New Jersey.

Webne-Behrman, H. (1998). *The practice of facilitation : managing group process and solving problem*, Quorum ,Westport, Conn.

Weisbord, M., Janoff, S. (2000). *Future Search*, Berrett-Koehler, San Francisco.

WordNet (2003) Princeton University, version 2.0 (on-line dictionary), [http://www.cogsci.princeton.edu/cgi-bin/webwn], (2003).