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TOWARD PROSPECTIVE REASONING IN DESIGN:
AN ESSAY ON RELATIONSHIPS AMONG DESIGNERS’ REASONING, BUSINESS STRATEGIES, AND INNOVATION

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RÉSUMÉ
VERS UN RAISONNEMENT PROSPECTIF EN CONCEPTION : ESSAI SUR LES RELATIONS ENTRE LES RAISONNEMENTS DES CONCEPTEURS, LES STRATÉGIES D’ENTREPRISE ET LES INNOVATIONS

Le concepteur d’un produit ou service tente toujours d’anticiper les besoins et les activités humaines de façon à créer de nouveaux artefacts qui seront utiles, simples, efficaces et fourniront une expérience utilisateur positive. Mais sur quelle base peut-on appréhender les raisonnements des concepteurs ? Cet article propose une synthèse des modèles de raisonnements en design d’innovation, les commente puis les organise conceptuellement. À partir d’une revue de questions pluridisciplinaires, l’auteur souligne, dans un premier temps, l’existence de quatre approches fondamentales des stratégies de conception : une approche classique fondée sur un retour sur investissement rapide, une approche évolutionniste basée sur la mise en compétition des firmes, une approche processuelle qui souligne l’importance des transactions entre les individus et leur organisation, et enfin une approche systémique qui montre que les individus sont imbriqués dans des systèmes sociaux et économiques interdépendants. Dans un deuxième temps, les modèles de raisonnement en conception sont mis en relation avec les visions philosophiques qui les guident : positive, constructive, pragmatique et inclusive. Ces visions et approches sont finalement croisées de manière à dégager dans un troisième temps, six modèles de raisonnement en conception : le modèle de la résolution de problème, le modèle herméneutique, le modèle de pratique réflexive, le modèle de la participation de l’utilisateur, le modèle de l’implication des communautés sociales et le modèle de l’usage des normes de conception. Finalement, les conclusions indiquent qu’en matière d’ergonomie, le concepteur doit intégrer un raisonnement prospectif qui lui permettra de mieux gérer la complexité des stratégies d’innovations actuelles.

Mots-clés : modèle de conception, stratégie d’innovation, conception de services et produits.

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I. INTRODUCTION

Strategic planning has been associated with a rational, objective, structured, analytical, and convergent mindset, which most executives regard as abstract, and remote from their daily work. Strategic thinking within organizations and businesses has often been seen as complementary, and crucial to finding the most efficient models to maximize innovation-management efforts. By involving creative, divergent, and synthetic mindsets, as well as associated practices (Jacobs & Heracleous, 2007), new methods and paradigms are then introduced, which efficiently serve existing and new markets with new or modified products and services (Ansoff, 1986; Christiansen, 2000). However, Utterback and Abernathy (1975) have claimed that processes, and the focus of innovation, change as a firm matures, underscoring its fluid nature with respect to the firm, and to the environment in which it operates.

Likewise, Veryzer (1998) discussed innovation from the perspective of “technological capability” and “product capability” dimensions. In this context, innovation involves advanced dynamic capabilities that do not exist in current products and cannot be achieved through the extension of existing technology. This “dynamic capabilities” approach allows the firm to create new products and processes, and to respond to changing market circumstances using a subset of its capabilities (Teece, Pisano, & Shuen, 1997). Processes and facilitating dynamic capabilities combine different kinds of specialized knowledge, which constitute the essence of product innovation, and are represented by knowledge creation and absorption, integration, and reconfiguration (Bravo Ibarra, Mundet Hiern, & Suñé Torrents, 2009).

In response to positivist worldviews, which engage strategic planning, the rhetoric explains that businesses exist for two main reasons: some exist to make profit, while others serve non-profit making goals. In this context, engineering-inclined industrial designers tend to adopt a classical strategic planning, problem-solving, and merely profit-oriented approach, which is seen as too prescriptive. If perceived through a “strategy or design as practice” lens, this approach can be criticized as being superficial, extending only the mainstream positivist views of strategy (Carter, Clegg, & Kornberger, 2008).

These theoretical concepts on strategies can be confusing, but they motivate us to take a broader, interconnected look at different worldviews, and at generic approaches to strategizing with respect to design-reasoning models (Lie, 2012). In particular, because of the transition from a manufacturing to a service economy, where business agendas have shifted from goods-oriented to services-oriented (Gloppen, 2011), human-centered methods and tools are becoming more important to investigate future interactions between humans and new artifacts, which remain to be imagined (Robert & Branger, 2012).

These issues will be addressed as follows: first, we present generic approaches for innovation strategy; secondly, we discuss the visions of reasoning in design; finally, we articulate reasoning models with prospective ergonomics.
II. GENERIC APPROACHES TO STRATEGY

The motivation behind a company’s vision and choice of strategy is usually encapsulated in various theories of action in order to achieve competitive advantage (Whittington, 2003). To provide decision makers with fundamentally different ways of thinking about strategy in a wide range of situations, four perspectives on strategy were created and mapped according to process and outcome (see figure 1). These approaches are classical, evolutionary, processual, and systemic. When emphasizing the “outcomes” axis, the “plural” dimension should be interpreted from a more nuanced perspective, considering both the short and the long term, as well as “egoistic” and “altruistic” ambitions of the organization, in contrast to the profit-maximizing dimension. The “processes” axis illustrates a spectrum between deliberate and emergent ways of planning.

II. 1. CLASSICAL APPROACH TO STRATEGY

According to Whittington (2003), profit-maximising is the highest goal of business and rational planning for classicists. This classical theory claims that if Returns-On-Investments (ROI) are not satisfactory in the long run, the deficiency of the business venture should be corrected, or abandoned (Sloan, 1963). Key features of the classical approach are the attachment to rational analysis, the separation between planning and execution, and the commitment to profit maximization (Ansoff, 1986; Sloan, 1963).

II. 2. EVOLUTIONARY APPROACH TO STRATEGY

Evolutionary approaches do not rely on top-management skills to plan and act rationally. Competition is not to be addressed by detached planning and calculation as in the classical approach, but by being engaged in an on-going struggle for survival. In the search of profit maximization, natural selection will determine who are the best performers and the ones that survive (Einhorn & Hogarth, 1981).
II. 3. Processual Approach to Strategy

Supporters of processual approaches believe that the existence of a “rational economic man” is not possible, because due to the imperfections of human nature, we cannot oversee all factors at the same time (Cyert & March, 1963). In contrast to classical and evolutionary approaches, and abandoning profit-maximizing ambitions, processual methods do not strive for the ideal but aim to work with what reality offers. Practically, this means that firms are not always united towards a single goal such as profit making. Instead, individuals with different interests, acting in an environment of confusion and mess, determine the course of action. Through a process of internal bargaining within the organization, members set goals among themselves which are acceptable to all.

II. 4. Systemic Approach to Strategy

Densely interwoven social systems influence the means and ends of a systemic approach and define what a suitable behavior is for their members in terms of economic activity (Whittington, 2003). Hereby, the organization is not simply made up of individuals acting purely in economic transactions, but of individuals embedded in a network of social relations that may involve their family, state, professional and educational backgrounds, even their culture, religion, and ethnicity (Whittington, 2003).

III. Philosophical Worldviews for Design Reasoning

With respect to business strategizing, design thinking and designing, philosophical references and epistemological worldviews are introduced here as a foundation for the discussion of the four generic strategy perspectives in conjunction with “Design Reasoning Models”. As explained by Creswell (2009), a worldview can be defined as “a basic set of beliefs that guide action,” and it is similar to a paradigm, or epistemology. The types of philosophical beliefs held by managers and designers will often have a great impact on how they apply theories, methods, and techniques. Four different worldviews can be distinguished: positivism, constructivism, pragmatism and advocacy, will be presented; they are illustrated in figure 2. The positioning indicates that the presented worldviews may take various forms and should not be considered as rigid and separate, but rather as overlapping to varying degrees. However, the differences between the various worldviews (especially positivist and constructivist) determine how different strategic perspectives and “Design Reasoning Models” will be anchored.

III. 1. Positivism and Post-positivism

Positivism also referred to as the “scientific method,” or the “empirical method,” claims that there exists an objective reality, independent from the observer. A structured approach enforces the scientific need to assess and
identify causes that influence outcomes. In this view, ideas are reduced to a discrete set of “sub-ideas,” which must be tested using careful observation and measurement of the objective reality. Unlike positivism, post-positivism offers a vision that is more nuanced, and better suited to the study of management and to design science; it recognizes that we cannot be absolutely positive about the truth of knowledge when studying humans (Philips & Burbules, 2000).

Figure 2. Overview of different worldviews and design theories (Bonnemaire & Liem, 2011).

III. 2. CONSTRUCTIVISM

Constructivism, also referred to as “social constructivism (in terms of learning through interaction in groups)” or “social construction of reality (concerning the created artefact as a result of group interaction),” is affiliated to postmodernism (rejection of absolute truth). It differs radically from post-positivism (Gross & Levitt, 1994; Matthews, 1998), because we are constrained by our own perception; as such, it can only consider reality to be co-constructed by individuals in a social context (Lincoln & Guba, 1985). Constructivist research focuses on the contexts and interactions among individuals as beliefs change over time based on described realities. Researchers seek to capture the complexity of multiple views, which are socially and historically influenced.

III. 3. PRAGMATISM

This worldview seeks to clarify meanings based on situations, actions and their consequences rather than antecedent phenomena as in post-positivism (Cherryholmes, 1992). Great importance will be placed on how to derive knowledge about the problem without debating whether reality is objective or
subjective. This means that an ideology, or proposition, may be considered true as long as it is justified and functions purposefully, based on how its propositional meaning connects to the practical consequences of accepting it. Therefore, the truth of an idea needs to be tested to prove its validity within a given context, whether the context is social, historical, economical, or political.

III. 4. Advocacy

Related to constructivism in the embracement of human-centered considerations, this worldview advocates the needs of marginalized individuals who face issues of social justice. Examples of issues, which are addressed in this worldview, are empowerment, inequality, oppression, domination, etc. Individuals need to be included in the research and design process in order not to be further marginalized.

IV. MODELS OF DESIGN REASONING

With respect to the different perspectives on strategizing, epistemological worldviews were introduced in the above section as a foundation for the discussion of six models of design reasoning. According to their relevance for design practice (Lie, 2012), these models are:

- **Problem-solving model.** Often attributed to Simon (1996), this model represents a systematic and deterministic design approach, inspired by a mechanistically inspired engineering process, where the main problem is partitioned into smaller sub-problems accompanied by sub-processes, which can be solved using problem-solving methods.

- **Hermeneutic model.** The central challenge in this model is to gain a sustained and increasing understanding of the designed product, its contexts, values, and functions until the manager or researcher decides that saturation has been reached (Prasad, 2002). As the potential solutions and the choices faced are practically infinite, the designer must reduce this variety by establishing a direct understanding among its objectives, processes and solution. This model therefore implicitly posits that the designer’s personal experience, and the subjectivity of the design process, are key elements (Coyne & Snodgrass, 1992).

- **Reflective practice model.** The constructionist reflection-in-action theory is perceived as a reaction to the rational problem-solving philosophy (Schön, 1995). As design problems are unique and difficult to generalize, this model focuses on the designers’ or developers’ actions and efforts, with respect to reflective and conjectural conversations with the situation in order to reinterpret and to improve the problem as a whole. Methods applied by the designer are to be based on acquired knowledge, experience, and reasoning.

- **Participatory model.** In the transition from a user-centered to a participatory approach, designers act as facilitators to fill-in the gap between their own perception and understanding of “Design” problems and those
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of stakeholders (Sanders & Stappers, 2008). In this participatory design activity of interpretation, information gathering and facilitation, users make critical decisions in the design process, which is an acceptable way of dealing with these “wicked” problems (Clarke & Steward, 2003).

- **Social model.** As design activities are enabled by the social community in which they are situated, a growing conscience of the designers’ role in society marked the beginning of a social model of the design process (Papanek, 2005). Here, professional reasoning is based on the collective wisdom of a community of practitioners, the scope of which is wider than to merely promote social and economical sustainability.

- **Normative model.** In this prescriptive model, “Design” solutions are fitted to certain standards, values and conventions, in accordance with their role and responsibility. The normative framework can be understood as guidelines that should be followed in order to satisfy certain criteria (Van Rompay, 2008).

V. DISCUSSION

Correlations and conjectures exist among worldviews, generic strategies and models of design reasoning (see figure 3). In terms of methods and processes, an argument will be made for participative and interactive methods to address pluralistic ways of strategizing with the objective of anticipating and designing innovative, user-centered products and services.

![Figure 3. Extension des stratégies génériques à des modèles de raisonnement en conception basés sur les visions philosophiques du monde.](image-url)

Figure 3. Extension of generic strategies to models of design reasoning based upon philosophical worldviews (adapted from Whittington, 2003, figure 2.1, p.10).
V. 1. THE RELATIONSHIP AMONG WORLDVIEWS, GENERIC STRATEGIES 
AND MODELS OF DESIGN REASONING

Although process and outcome are different for strategizing and 
designing, the understanding of similarities among different generic 
strategies, worldviews and models of design reasoning will be invaluable 
for designers and business managers to create better products and services. This understanding will lead to an appreciation that business methods 
and tools for exploring innovation are somehow similar in nature 
to those used for designing. The following examples demonstrate these similarities.

A positivist worldview underpins the classical strategy approach, where 
profit making is planned and commanded. This is in line with a focused 
and structured problem-solving approach, where a systematic design proc-

ess (Roozenburg & Eekels, 1995) defines the solution space. The norma-
tive reasoning model is exemplified by how a strict and concrete program 
of requirements complements this problem-solving approach.

The evolutionary and processual strategic approaches are built upon 
a pragmatic worldview. Lacking a debate as to whether reality is objective 
or subjective, the emergent characteristics of these strategies determine 
how organizations behave to achieve their profit-making targets or goals. 
For instance, as a subset of prospective ergonomics, an evolutionary business 
strategy, complemented by a reflective way of designing, would suffice 
in the imagination and creation of design solutions to address emotional, 
hedonistic, and aesthetic issues (Robert & Brangier, 2012).

Similarly, there are design-reasoning attitudes, which can be aligned 
with these emergent approaches. The reflective practice addresses design 
issues from a constructivist, though pragmatic, perspective. Hereby, con-
jectural conversations with the situation holistically reinterpret the design 
issue (Schön, 1995). The participatory element, where different stakehold-

ers are actively or passively involved in the design process, is a real-life 
and pragmatic phenomenon, which aligns well with an emergent strategy 
driven by pluralistic objectives, but which may not always lead to profit-
maximizing or to an optimal design solution.

The systemic strategy is socially constructed and therefore the real-
ity is co-constructed by different stakeholders and individuals in a social 
context (Lincoln & Guba, 1985). Although processes are planned and 
deliberate, multiple objectives exist because of the complexity of multiple 
views, which are socially, historically, culturally, and contextually embed-
ded in respective communities of practice. Considering a community of 
design practitioners, the use of selected methods and tools, combined with 
personal experience and subjectivity, occupy a central place in a design 
process, which is based on hermeneutic and social reasoning. From a 
prospective-ergonomics and design perspective, the designer attempts to 
anticipate human needs and activities so as to create new artifacts that will 
be useful and provide positive user experience (Robert & Brangier, 2009). 
Reiterating the importance of systemic embeddedness, contexts, values, 
and functions should be considered here as a key element in getting any 
collaborative process going, involving different stakeholders.
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V. 2. Service design as a pluralistic approach towards strategizing

As technological products continue to converge and become increasingly more important in consumer’s daily lives, services expectations continue to rise. This trend requires a shift from production to utilization, from product to process, and from transaction to relationship (Vargo & Lusch, 2008).

Supported by resource-based views and dynamic-capability theories (Teece, Pisano, & Shuen, 1997), services are seen as dynamic activities and processes, while goods are static objects (Gummesson, 2007). Based on consumer-centric and plural intra-organizational perspectives (Michel, Brown, & Gallan, 2008), companies are challenged to conceptualize services that are perceived valuable by all, extending the service-dominant logic to a larger, complex network of collaborating actors (Vargo & Lusch, 2008). Within this pluralistic and systemic business and design context, it is justified to take a closer look at worldviews and models of design thinking and reasoning, as well as human-centered methods and tools, which can support these models.

V. 3. Human-centered management and design methods

Referring to a service-oriented way of strategizing and designing, interactive human-centered methods are becoming more important in facilitating the search for (strategic) design solutions, leading to the fulfillment of plural objectives. These human-centered methods can be characterized as less strict and structured, but rather playful in fostering effective strategy formulation and design (Jacobs & Heracleous, 2007). Individuals explore management issues through group processes that involve a facilitated playful mode of interactions. An example of a method, which facilitates these interactions, is explicit narratives where generative dialogues are used to spur conversations about strategic challenges (Barry & Elmes, 1997).

Within the context of design practice, significant efforts are concentrated on user-centered design to develop and analyse future scenarios (Veryzer & Borja de Mozota, 2005). At the same time, design researchers distinguish between traditional experimental methods and design-study methods (e.g., narrative accounts and interpretive frameworks), broadening the debate on positivist and “post positivist” science and advocating the need for a new epistemology that meets the needs of “human sciences” (Phillips & Burbules, 2000). This also implies that product design should start from a deep analysis of user needs, lifestyles, and cultures (Belliveau, Griffin, & Somermeyer, 2004). For exploring service innovation within the plural domain of Whittington’s strategic framework, human-centered and design driven-approaches are seen as equally important. The latest is hardly based on formal roles and methods (Verganti, 2008), but is considered as a manifestation of a reconstructionist or social-constructionist view of the market, determined by interactions among different stakeholders (Kim & Mauborgne, 2005).
VI. CONCLUSION

This article proposed a strategic and methodological framework as a foundation for understanding prospective knowledge. The positioning of generic strategies, worldviews and design reasoning models according to process and outcome, indicates that there are similarities among them.

Concerning design processes to meet the expectations of creating prospective products and services, both a deliberate and an emergent turn can be adopted. In particular, technology-based companies are most at ease when objectives and problems are clearly communicated among the project stakeholders through structured product planning and industrial design processes, characterized by an analysis-synthesis way of working. However, as companies exist through people who are operating in embedded contexts of culture, place, family, etc., creative breakthrough ideas are in reality initiated and emerging from daily activities. In such a contextualized setting, reflective design practices and a conjecture analysis way of designing are most relevant in anticipating future needs and solutions where profit-maximization is not the only priority.

Considering the creation and envisioning of needs, systematic as well as reflective human-centered design methods involving the participation of a wide variety of stakeholders should be promoted to generate prospective and creative solutions for (lead) users. Hereby, the role of the designer can be twofold: facilitative, by being able to introduce and manage participatory design session, as well as visionary, by being able to imagine future products and services, and convince lead-users to accept them through a hermeneutic way of design reasoning.

As prospective ergonomics targets various aspects of “innovation”: aesthetic (hedonistic/emotional), user-functional, service, etc. all generic strategies are relevant for the anticipation and imagination of implicit needs and wants as well as to create future solutions, which have not been identified yet. Based upon the type of problem, context, company objectives, and stakeholder expertise, ergonomists, designers and business managers should jointly decide what type of generic strategy to adopt before using the relevant design-reasoning models, processes and methods. Additionally, social, technological, economical, environmental, and political factors are important contextual determinants, which should be included if plural objectives are to be met through systemic or processual strategizing.

From a designer perspective, the use of human-centered approaches should be balanced as well as critically advanced by design-driven methods and tools. In this context, the input from experts outside the realm of direct users can lead to even more surprising and creative solutions.

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**Summary**

The aim of this article is to reflect upon philosophical worldviews and models of “Design” reasoning in light of four generic approaches of business strategizing, based upon their relevance for prospective ergonomics and design practice. Through comparisons of Business Management and Design Thinking literature, similarities can be found among worldviews, generic strategies and design-reasoning models. The understanding of these similarities is to be used as a framework by business managers, design managers and designers to distinguish between pluralistic and more focused strategies for innovation, as well as to categorize methods and tools according to process and outcome. Finally, by taking a pluralistic turn in this strategy framework a closer look will be provided on how prospective products and services should be valued and designed in complex and competitive developed economies. Results also indicate that the prospective role of the designer should be more and more facilitative, being able to manage complex constellations of users, organizations and other stakeholders who will be involved in the creation of prospective products and services. A more inclusive innovation strategy is to be adopted, where human-centered methods and tools take more center stage to assist in anticipating hidden needs and creative solutions.

**Keywords:** Innovation, Generic Strategies, Models of Design Reasoning, Worldviews, Services.

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