DESIGN FUTURES: CULTIVATING STRATEGIC FORESIGHT COMPETENCIES IN DESIGN EDUCATION

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PAPER ABSTRACT: Future thinking and speculation practices can be seen as a crucial premise to approach solving a problem in an innovative way. It is particularly profitable at circumstances in which challenges are complex, vague, and ambiguous. Future thinking incorporates two particular approaches: diverging and converging. It requires both a flexible way of understanding, to come with different thoughts, and know-how to make responsible decisions. This paper reviews the literature crossing Strategic Foresight and Design disciplines with the accentuation put on how innovation design students, educators and design practitioners may engage with the future to investigate the challenges to decision-making they highlight. Combining Foresight and Design, as part of Strategic Planning processes, can help the emergence of new and more creative possibilities and conceivable outcomes, cultivate the incorporation and arrangement of diverse stakeholders, and provide for continuous learning through prototyping and experimentation by utilizing design tools and approaches to attain more profound knowledge and arrangement around current reality. A framework was presented to integrate speculation and strategic foresight approaches in design education highlighting the significance of the strategic foresight Design approach and explaining the theoretical background behind creating the framework. A participatory design workshop was conducted to explain methods used to support and validate the results of the theoretical background in order to further develop the framework. This framework can be adopted in the design field in order to facilitate the process and to support practitioners' decisions to select suitable tools.

Keywords: Strategic Foresight, Speculation, Future Thinking, Design education, Innovation.

1. INTRODUCTION

Throughout history, people have made an effort to predict what will happen in the future. Futurology, trend forecasting, foresight, and predictions are a few terms used to describe the concept of "looking into the future," but they all involve predicting the future in some way. It is clear that progress is being made as more people acknowledge the value of trend information in design and a larger business network. Presently, a new paradigm and perspective are being signalled by the database and the new conditions brought about by communication and information technology in design activities (Sheil, 2008). Design thinking offers problem-focused, critical thinking strategies while enabling innovative mind-sets to research and analyse design solutions (Adams, 2015). The overlap increases when user-centric designers are unable to provide information on end users because they won't exist for at least ten years. It is difficult for future-focused design and systemic design inquiry to make projections into the mid- to long-term

future since key components' values are always changing. In order to shed light on current systems and aid in short-term forecasting and decision-making, researchers make an effort to gather as much data as they can while designing for the present. Nevertheless, future reality is not a one-size-fits-all scenario. Researchers' subjective hypotheses about how outside factors might affect a system will take an infinite number of different turns (Ritchey, 2014).

The research problem is caused by the lack of information on the use of foresight research in design education. The following questions need to be brought up, looked at, and resolved:

- Why is it important to incorporate foresight research methods into design education?
- How might the foresight techniques employed in design education affect coming up with original ideas?
- What kind of effects would implementing strategic foresight in design education have on learning experiences?

The main idea of this paper is that the results of innovative design courses might be affected by a pedagogy that adapts the strategic foresight approaches in design practices. The objectives are to highlight existing approaches that might be expanded into more formal methods. A case-study was employed together with background literature-based research to create the framework for the approaches selection. The paper is structured like follows: First, the activities in strategic design—which may provide opportunities for future product, service, or integrated system innovations—are compared to the strategic foresight process as a traditional practice for dealing with the future and its inherent limitations towards long-range planning. The design-inspired foresight method is described. It aims to gather viewpoints on problems that could be affected by upcoming events and, as shown by applied research, could define the design education in the far future. As a result, significant lessons are offered for modifying design-inspired foresight techniques in design education. An example outcome demonstrates the Delphi method, which allows designers and interdisciplinary teams to engage with futures in form of scenario statements. Derived through synthesis and consensus from industry and academic experts, these statements are their shared visions for desirable futures.

2. BACKGROUND

Those who can think strategically and analytically as a team to solve problems are in great demand today and tomorrow. Technology breakthroughs have fundamentally altered how information is gathered, created, and communicated. It is questionable if education can produce critical and creative thinkers who can satisfy the demands of the social and economic environments of now and future (Fehr & Jonas 2013).

2.1 STRATEGIC APPROACH IN DESIGN

Strategic design are activities that integrate systems of products, services, and communications in organizations highly dependent on shared value creation across different groups of participants, clients, and relevant stakeholders. Using strategic design activities as a tool for decision-making, the designer can weigh the rigid constraints imposed by an organisation (internal environment) against ecological and social impacts, as well as the cultural sensibilities and symbolic meaning that shape the external environments in a society that is rapidly changing (Meroni, 2008).

In the past, Product Service Systems (PPS) have relied heavily on strategic design to move the innovation focus from product (or service) design to an integrated product-service solution. Yet, growing corporate complexity and the dangers it entails, as a result of globalisation, technology improvements, and a shift in power towards the consumer, place new expectations on strategic design that go beyond achieving short-term innovation goals (Manzini & Meroni, 2007). In fact, strategic design activities used in foresight may give decision-makers a comprehensive understanding of impending problems. Here is where visualisation, prototyping, and creative thinking can advance more future idealised visions (Koh, Slingsby, Dykes, & Kam, 2011; Manzini & Vezzoli, 2003).

2.2 DESIGN-INSPIRED FORESIGHT

The creation of future value and the development of perceptions about the future that may guide decisions or strategies needed to prepare for a desired future are notable intersections between the business and design practice. Evidence reveals that businesses who have acknowledged the value of strategic design are indeed those that attain long-term competitive advantages (Grant, 2010; Heskett, 2009; Martin, 2009). This development highlights the importance of theoretical and practical knowledge in design-related strategic foresight initiatives (Bohemia et al., 2014; Evans, 2012; Grand & Wiedmer, 2010). In fact, the goal of using a design-inspired foresight approach is to integrate expert insights with trend analysis, early change indicators, and signs of change to create a deeper knowledge of viewpoints that could help shape the future. A design-inspired foresight strategy also offers chances for storytelling and visualisation design to increase the impact of the study's findings. So, futures thinking improve the anticipatory consciousness, as Glenn (2003) suggests. We are often reminded that sometimes the apparent advantages of foresight may only become clear in retrospect (Simonton, 2012).

2.3 STRATEGIC FORESIGHT DESIGN FRAMEWORK

The incorporation of foresight methods into design education calls for a holistic viewpoint supported by contextual data on the market and its many sectors as well as trade shows, exhibitions, market reports, etc (Wang, 2010). By examining expected economic trends across nations, potential business developments are suggested (Academy of Design 2013). Two crucial characteristics in using foresight techniques must be taken into account in order to better grasp future views and the methodology, and strategies required to involve company stakeholders in futures thinking: Regarding the types of research (qualitative, quantitative, or semi-quantitative), as well as the techniques used to collect and process data (Butter, Brandes, Keenan, & Popper, 2008). Researchers frequently must rely on the opinions of specialists who are better aware of what is going to happen in the future when using foresight approaches like issue identification (Rowe & Wright, 2001). Experts can identify the most crucial uncertainty because they have tacit knowledge of particular business factors. The Delphi methodology, first proposed by the RAND Corporation in the 1950s, is one of the recognised foresight techniques. The Delphi method is a qualitative research approach that is particularly well adapted to capturing experts' forward-looking viewpoints since it is structured and enables a group of people to collectively think about, reflect on, and express opinions on challenging subjects (Linstone & Turoff 1975). While foresight provides scenarios based on trends and

uncertainties that are feasible, design futures thinking is more likely to produce situations that are preferred (Buhring & Bishop 2020). When dealing with complicated topics, it has proven to be a popular tool to involve experts in group communications, elicit individual perspectives, and then seek group consensus. The fact that experts stay anonymous throughout the Delphi conversation, which makes this method more conducive to independent thought on the part of each participating expert, is frequently cited as a major strength by studies that have used the Delphi method (Denzin & Lincoln, 2000). The ability of experts to be geographically scattered is another advantage of the Delphi method. Participants can communicate around the issue and receive sequential feedback during numerous rounds of inquiry without ever having to come together as a group (Garrod & Fyall, 2005). While the aim of futures studies is on finding external changes that may reveal prospective ramifications, a horizon (environmental) scanning model serves as an acceptable theoretical framework to direct a Delphi futures study.

In order to help management plan the future course of action, horizon scanning can be defined as "the collecting and use of information regarding events, trends, and relationships in an external environment" (Choo, 2002, p.84). While several horizon scanning models have been created by foresight practitioners, the central processes of scanning, analysing, and synthesising are shared by all of them (Talwar, 2010). The "Three Horizon Model," which Baghai, Coley, and White first proposed, is a useful horizon scanning model (1999). The "Three Horizons" paradigm, as suggested by Curry and Hodgsen (2008), enables various futures and strategic approaches to be integrated to systems and structures and related to various speeds of change as necessary (Figure 1).
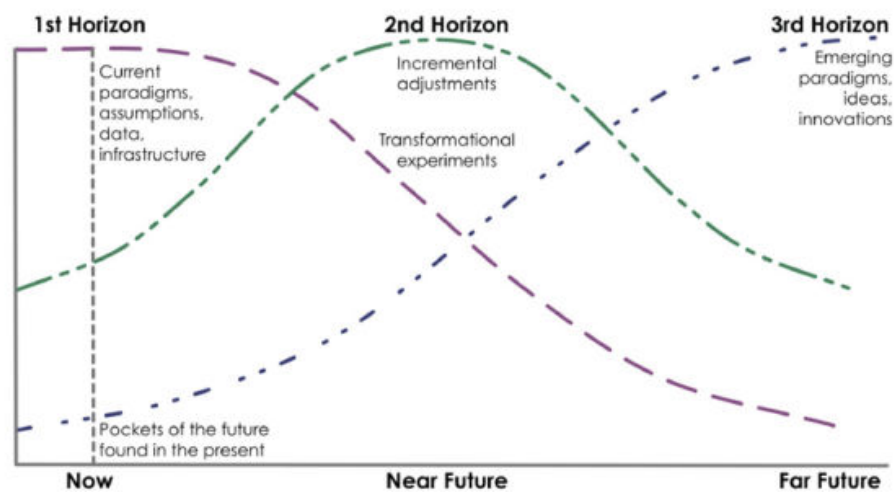

Figure 1. Schematic of the futures-oriented Three Horizon model.

According to the schematic, potential transition points can be picked out depending on whether they are likely to be disruptive or incremental innovators. As a result, the first horizon concentrates the discussion on the current systems ; it has a strong strategic fit with the objectives of the study. Nevertheless, as new forces or elements enter the picture over time, it starts to lose its fit. The third horizon, on the other hand, is concerned with flimsy arguments, options, or indications regarding the development of systems that

may have an impact on the status quo of the environment. The space (referred to as the second horizon) between these two horizons is where systems generally become unstable as they move from the known to the unknown (or untested).

Essentially, foresight procedures incorporate foresight tools like macro trend analysis and subject matter expertise to investigate potential futures (Voros, 2001). Hancock and Bezold's (1994) futures cone (Figure 2) serves as a useful metaphor of four categories of alternative futures (possible, plausible, probable, and preferred), with the focus being placed on imagining (or constructing) preferable futures in order to engage people in futures thinking. The futures cone's power rests in the methodology used by its users, as the cone enables planners to watch pertinent developments and compare them to the scenarios' plausibility in a methodical and logical progression (Voros, 2001).
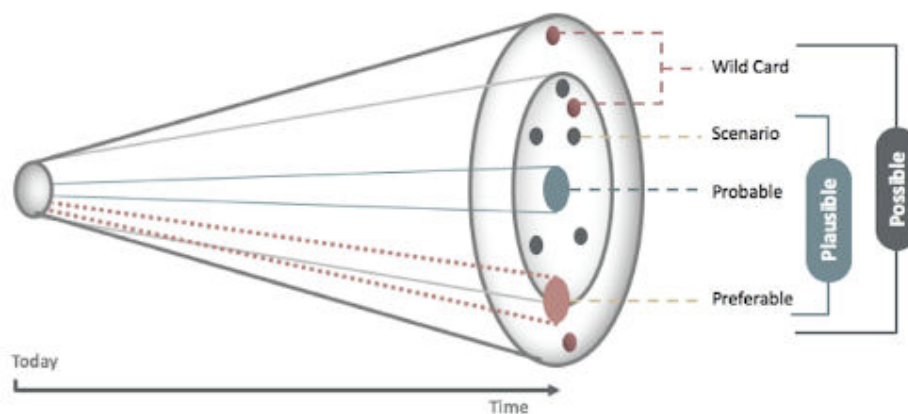

Figure 2. "Cone of plausibility" designed by Charles Taylor in 1988.

A design-inspired foresight approach, chosen methods, and techniques used in the 2030 futures study are provided as stakeholders become more aware of the reforms required to adapt to the relentless transformation of the business environment. Furthermore covered are key takeaways for applying or modifying foresight methodologies in the design and innovation process.

3. METHODOLOGY

A design-inspired foresight approach is presented through applied research. The methodology followed in this research is qualitative accompanied by a participatory workshop in the form of an attempt to integrate strategic foresight approaches in innovative design education. In order to develop the framework, the author employed qualitative data collection and analysis techniques. This was to assess the outcome of the process. The methodology of anticipation follows a systematic enquiry using the author observant techniques during the workshop followed by a comprehensive analysis of results. The workshop consisted of 3 panels with 8 Participants in each and 24 participants in total. Participants were chosen from different backgrounds and professions (Design Researchers, Academics, Professionals, Sustainability Experts, entrepreneurs..Etc.,) to understand further implications for the diversity of disciplines and backgrounds.

3.1 RESEARCH DESIGN-THEORETICAL FRAMEWORK

The "Three Horizon" model (see Figure 1) served as a theoretical framework that gave study participants the chance to simultaneously engage in short-, medium-, and long-term futures thinking, thereby approaching a particular topic over three different time horizons. For instance, participants were given an introductory question that was relevant to the present in order to engage Delphi specialists across several time horizons: What are the significant topics that constitute the business, and which will need to be defended and keep expanding? This enquiry dealt with issues relating to representations of ongoing expansion and was related to the first horizon (Dator, 2009). Participants in the Delphi panel were invited to reflect on the following questions as they explored topics pertaining to the third horizon: What are the significant change-drivers that will fundamentally alter in 2025 and 2030? The Delphi participants were required to identify with a variety of perspectives that were taken into consideration when designing the survey questions. For instance, a response to the industry and consumer viewpoints were sought.

3.2 DATA COLLECTION- DELPHI METHOD

The primary goal of Delphi is to obtain understanding of how different academic and industrial experts respond to a series of survey questions and the synthesised opinions they are given in succeeding survey rounds (Figure 3). An online (web-enabled) survey tool is used to offer a set of introductory questions to the Delphi panel as part of the actual procedure. After each expert has finished answering their own questions, the information is compiled, and new questions are created in light of the results of the first round. Thereafter, until agreement is attained, this procedure is repeated (Turoff & Hiltz, 1995).
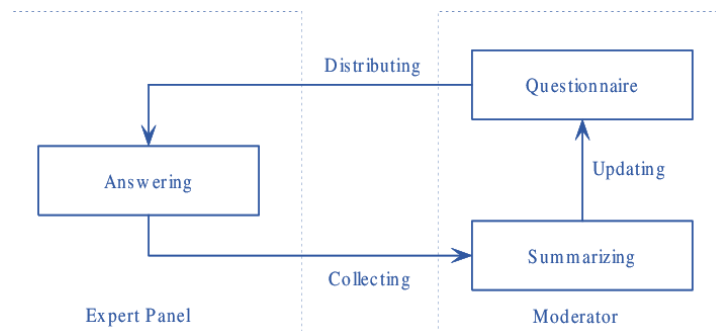
Figure 3. Procedures of Delphi data collection.

Although the Delphi method is widely used across most research fields (Powell, 2003), there are still several difficulties to be overcome throughout the application stages. This is valid, especially for those who are using this strategy for the first time (Ayton, Ferrell, & Stewart, 1999). In order to overcome these difficulties, toolkits have been created for the study of particular topics of enquiry, such as sustainability and wellbeing (de Meyrick, 2003), Heritage and Urban Planning, Resilient Communities management (Donohoe & Needham, 2009), Design management, and others (Okoli & Pawlowski, 2004). Day and Bobeva's (2005) "Generic Delphi Toolkit" (GDT) is a toolkit that has shown to be useful in foresight surveys

(Buhring, O'Mahony, & Laitamaki, 2011). It helps direct the consensus stages. Today, we can expect to use Delphi method including artificial neural networks, genetic algorithms, and artificial life to manage the demand with incomplete information. Artificial neural networks are developed because they can describe complicated, nonlinear processes without requiring an assumption about how input and output variables should be related.

3.3 DATA ANALYSIS – FORESIGHT RESEARCH

A broad inductive strategy of data analysis is advised when gathering qualitative data using the Delphi method. The main emphasis is on the conclusion that result from the identification of the issues and the justifications that each individual expert offers for the issue they propose. By this method, the information gathered can be categorised and sorted according to different time frames (e.g. 2020, 2030). This strategy adheres to the guidelines for coding and analysing qualitative data (Miles & Huberman, 1994). Data reduction, according to Miles and Huberman (1994), refers to the process of choosing, abstracting, and altering the data that appear in notes or transcriptions (p.10). The authors also emphasised the advantages of employing a matrix technique to analyse huge volumes of data.

Figure 4. Process discovery during the workshop.

3.4 SCENARIO BASED FUTURES

In order to create a vision of desirable futures, key creative industry stakeholders and planners are becoming more reliant on the usage of scenario building and analytic tools. New creative thinking approaches are required to define the future vision.

4.   RESULTS & DISCUSSION

Producing futures scenarios that aid in preparing for, or even actively shape, views of the future is a fundamental goal in conducting a design-inspired foresight study because foresight approaches are typically qualitative rather than quantitative in nature. In foresight, the emphasis is placed on "...the world as it could be, through the conception and realisation of possible futures," to use Grand & Wiedmer's words from 2010 on page 2. In this way, a design-inspired foresight approach is based on original interpretations of diverse trends, STEP (Socio-cultural, Technological, Economic, and Political) drivers of change, and the insights of subject matter experts. Hence, a design-inspired foresight approach can enable

key stakeholders to think strategically and make sense of complexity while organising creative resources at all decision-making levels (Kelliher & Byrne, 2015). The design-inspired foresight paradigm can also be seen as a collective problem-solving, and preferred-change because designers and interdisciplinary innovation teams depend on multidisciplinary participants to work together to eliminate uncertainty and anticipate potential futures (Baraquero, 2014). The focus is on identifying the primary research topic, therefore getting ready for a Delphi survey is probably crucial to a successful conclusion. At this phase, the research team must choose and recruit experts, design and evaluate a data collection technology, create a set of thoughtful survey questions, and pick a framework for data analysis (Day & Bobeva, 2005). The study purpose and objectives' overarching aspiration should be taken into account when drafting the problem statement. According to Andranovich (1995), the study problem (purpose) and questions should align with the participants' interests. It is advised that researchers planning a design-inspired foresight study give themselves time to articulate the research problem and objectives, and choose the experts who will serve on the Delphi panel to produce the desired results (Donohoe & Needham, 2009).

An 8-step analysis process was established for this case study; the processes are listed in the following table (Table 1).

Data Analysis: The 8 Process Stages (Table 1)

Data Coding Method - Round 1 of Delphi
1. Data capture - Round 1
2. Issue type analysis of the data (current and emerging)
3. Analysis of the data for "units of meaning" (emerging issues and themes)
4. Data analysis to identify issues and themes
5. New kinds of data
6. Data arranged by topics, themes, categories, and spans of time
7. Data synthesis from (four) viewpoints
8. Scenario statements for each perspective and subsequent Delphi rounds across the time horizon.

Using this data coding procedure, more analysis in the form of "key words" can be gleaned from the justifications each panellist gave for the subjects they had chosen. The results led to a series of scenario statements that summarised the consensus views of the expert panel. In order to investigate topics in greater detail, scenario statements were created as a synthesis (Minichiello et al., 1990). This provided panel members with an articulation of an idea generated from their combined responses in following Delphi rounds. The outcomes revealed the selections' diversity but almost 98% of participants strongly agreed that the scenarios selected includes updated information which scored the biggest number of agreement among almost all. This design-inspired foresight study's data analysis was planned to yield a number of future scenario statements that encapsulated the collective insights acquired from the Delphi expert panel. At the start of the second round of the survey, the first Delphi round results are presented to the expert panel. Participants are given the chance to analyse the remarks and confirm the main points of their collective thoughts on the matters that were deemed crucial, both now and in the future, as those

discussed in this paper. Design-inspired foresight activities aim to equip stakeholders to create the organisations' future present, as well as these anticipated futures. (Curry & Hodgson, 2008, p.2). In the second Delphi round, experts were given ten scenario statements to choose from, each of which reflected concepts that had been researched and synthesised from their combined first-round responses. Each statement was given a likelihood of occurrence rating index, which was created as a consensus-reaching indication using mean value analysis of the group's agreement. Results were analysed, each scenario has been examined to investigate the terms with higher level of selections from the participants and in which category. For example, Scenario 1 and 2 has been classified as a "Goal and Familiar with" by participants then concept scored 75% while scenario 3 scored 50%. Elimination of selections has been done based on the selections of the participants and on the elimination exercise.

5. CONCLUSION

This paper responds to calls for a deeper comprehension of future views as well as the approaches, and strategies required to involve stakeholders, designers, and interdisciplinary innovation teams in futures thinking. This study focused on foresight in design as the imagination and development of potential futures, looking beyond strategic planning in business based on historical and present knowledge and trends. Through applied research, a case study that emphasises the value of foresight as an emerging activity in strategic design and innovation introduced a design-inspired foresight approach. Techniques for forecasting and planning were extrapolative and predicated on the idea of continuity (Buhring & Bishop, 2020).By using a design-inspired foresight methodology, the emphasis is placed on acquiring deeper insights through Delphi-like procedures, departing from conventional management strategies that include making predictions about the future based on what is known today. The objective of the 2030 futures study described in this report was to assist individual stakeholders in identifying and settling on desired futures. It is difficult to connect the present with desired futures in a way that "...helps to recognise the diverse futures which may develop as a result of conflict between the embedded present and these envisaged futures," as experienced researchers in foresight acknowledge (Curry & Hodgson, 2008, p.2). The value of using a design-inspired futures approach, on the other hand, comes from creating futures scenarios that transform into potent visions of ideal futures. Designers and multidisciplinary innovation teams can work with decision-makers from this vantage point to create innovation strategies and routes that could help the company accomplish its goals over a range of time horizons. As a result, significant advancements in theoretical and applied knowledge of design foresight processes can be made, and design researchers can learn how to adapt current foresight techniques like those discussed in this study. Design-inspired foresight activities aim to equip important stakeholders to create the future present, as well as these anticipated futures. (Curry & Hodgson, 2008, p.2). The study calls for some future modifications in the context of Embedding futures thinking in the design curriculum that include; adopting Interdisciplinary approaches in design education, Investigate recent pedagogies and strategies to optimize the innovative design educational process, developing creative scenarios and imagination skills, using forecasting methods in design education to generate creative practices and innovation in education, and engaging students and practitioners in more collaborative learning activities.

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