

Beyond Forecasting: A Design-inspired Foresight Approach for Preferable Futures

Jorn Buhring, The Hong Kong Polytechnic University, School of Design, Hong Kong, Joern.buehring@polyu.edu.hk

Ilpo Koskinen, The Hong Kong Polytechnic University, School of Design, Hong Kong, ilpo.koskinen@polyu.edu.hk

Abstract

This paper engages with the literature to present different perspectives between forecasting and foresight in strategic design, while drawing insights derived from futures studies that can be applied in form of a design-inspired foresight approach for designers and interdisciplinary innovation teams increasingly called upon to help envisage preferable futures. Demonstrating this process in applied research, relevant examples are drawn from a 2016 Financial Services industry futures study to the year 2030. While the financial services industry exemplifies an ideal case for design-inspired foresight, the aims of this paper are primarily to establish the peculiarities between traditional forecasting applications and a design-inspired foresight visioning approach as strategic design activities for selecting preferable futures. Underlining the contribution of this paper is the value of design futures thinking as a creative and divergent thought process, which has the potential to respond to the much broader organizational reforms needed to sustain in today's rapidly evolving business environment (Buchanan, 2015; Irmak, 2005; Muratovski, 2016).

strategic design, forecasting, foresight, managing uncertainty, design-inspired foresight, preferable futures

Over the last two decades, the role of design in business has gradually expanded beyond merely creating and communicating better products. Design is now being understood by its totality of activities, and the competencies that span vertically across innovation, product development, market and strategic decision-making, and the capabilities that converge horizontally across interdisciplinary stakeholder teams responsible for creating sustainable value propositions that ensure the organization's future (Bohemia, Rieple, Liedtka, & Cooper, 2014; Heskett, 2001; Lojacono & Zaccai, 2004). Over the same period, progressive organizations have noted the favourable use of design principles applied to problem-solving, sparking the popularity of design thinking processes and applications toward transformative innovations in a global economy (D. Dunne & Martin, 2006; Oster, 2008). Design principles as strategic tools in the development of an organization's future-orientation, positioned strategic design as an organizational competence that looked beyond one-time creative outputs (e.g. products or services), toward design as an organizational activity that can lead to sustained innovation and competitiveness (Boztepe, 2016;

Heskett, 2001; Mozota, 1998). Consequently, as design and innovation are becoming increasingly synonymous in both meaning (e.g. Design Thinking) and reach (e.g. products, services, business models, and systems), the priority task of the world's top management, economic, and educational leaders is to effectively manage knowledge and to generate an innovative and highly adaptable workforce culture.

With creative processes today being applied beyond a given product or service lifecycle, design-led innovation teams are recognizing the forward-looking perspectives of conceptualizing design, in practice and research, as the imagination and creation of possible futures (Grand & Wiedmer, 2010). Indeed, as businesses must learn to navigate disruption, make sense of complexity, and adjust to an uncertain future, the organization's decision-makers have to prepare for what lies ahead so that the enterprise remains at the cutting edge, while maintaining credibility and leadership (Bevolo & Brand, 2003).

In this context designers have been relying on trend forecasting techniques to interpret social, technological, economic, and environmental drivers that help inform and identify future product propositions formulated in a state of 'believability' (Evans, 2003). Equally, interdisciplinary innovation teams practicing design thinking have been empowered to search for breakthrough ideas with the help of user-centred research, behavioural observations, and technology and design road-mapping techniques, to uncovering the unexplored human needs and desires that inform opportunity spaces for innovation (Gabrielli & Zoels, 2003; Meroni, 2008). Beyond the theory and practice of forecasting, however, how can designers and design-led innovation teams really engage with possible futures and go beyond forecasting micro-scale product or service solutions? More pointedly, how can they strategically develop a vision of whole systems futures in *a world that could be*, by taking varying perspectives - be it an organization desired, the marketplace to come, the industry to be, while considering evolving consumer behaviours and cultural patterns?

Design Futures

The design world has created several practices for getting a grip on futures. Some practices are familiar to researchers from other disciplines even though their outward appearance might be different. One premise behind user studies is that by studying existing reality closely enough, designers can then discover things that might contain the seeds of the future. These techniques usually start from ethnography, which is used to open up existing practices to cultural probing which stimulates imagination as a base for accessing design opportunities. Designers have also built versions of natural labs (or in design parlance, "the future is already happening somewhere") (Manzini & Vezzoli, 2003; Molotch, 1996, p. 257-9), studied street fashion (also sometimes known as cool hunt) (Polhemus, 1994), and studied mobile technologies first in Scandinavia and then in Korea. A variety of this argument lives in studies of extreme users inspired by von Hippel's notion of lead users (Djajadiningrat, Gaver, & Fres, 2000), in crowdsourcing techniques (Kurvinen, Koskinen, & Battarbee, 2008), and in experience prototyping techniques (Buchenau & Suri, 2000). A recent trend in design is propounding fiction as a way to create futures (Bleecker, 2009; Dunne and Raby, 2013).

Some design-world techniques typical to design are farther away from research. One class consists of conceptual techniques like *haute couture*, concept cars, and electronic prototypes that probe futures in trade shows, expos and design media (A. Dunne & Raby, 2001, 2013). Other conceptual techniques have their origins in utopic architecture that has given architects means for exploring ideas that are currently impossible but yet interesting enough to generate conversations and to prepare for the future (Margolin, 2007). Designers also sometimes borrow from art to explore alternative ways of *being* by disrupting reality. For example, Martino Gamper's *If Gio Only Knew* (Miami/Basel in 2007) was a study of imagination hidden in Gio Ponti's classic pieces of furniture. Out of design disciplines, architecture has had a strong utopian strand. Finally, fashion and textile design build around the notion of trend analysis and focus on capturing and turning trends into bases for design and production (Regan, Kincade, & Sheldon, 1998).

These design-specific techniques have their roots in a variety of design practices that gives them their quiddity. This is also the case in what can be called performative techniques that focus on preparing a future that would be more easily manageable from a design perspective. One technique is design vision (Keinonen, Kokkonen, Piira, & Takala, 2004). For example, *The New Everyday* from Philips Design was meant not so much as a study of the future, but a way to shape expectations in ways that would make design easier (Marzano, 2005). Another class consists of co-branding explorations like *Nothing Happens without a Reason* by Tobias Rehberger and Artek design furniture (2009), a concept café in Venice, which extended the portfolio of Artek and brought free advertisement in media. The final performative technique starts from within the design world, and is exemplified by design projects under Officina Alessi (Marzano, 2003). These projects let Alessi to explore the future through student work (Figure 1).



Figure 1: Some design foresight technique, clockwise from left: haute couture, concept cars, performance design, co-branding that prepares the futures, and paper architecture

When we look at these practices through future studies, we gain some clarity to how these techniques work. Forecasting is usually defined as an estimation of the unknown (Armstrong,

1985), the predication of time periods before, during, or after the current one (Martino, 1993), and the anticipation of the future based on historical and current knowledge and trends (Coates, 1996). It is useful when data is available and a development or trend can be projected to show changes over time. Under these conditions, trends can be identified with a known likelihood to help inform decisions on what alternatives to the present can be thought of. Through this process, stakeholders in design and innovation can prepare for - or at least envisage the future.

While forecasting is useful when considering the impact of current knowledge projected into a future point in time, a foresight approach is required when challenges and opportunities in the far-distant future cannot be predicted based on knowledge of trends (Gavigan, 2001; Woudhuysen, 1997). Here, the two main attributes of foresight techniques concern the nature of inquiry (qualitative, quantitative or semi-quantitative), and the methods to gather and process information (Butter, Brandes, Keenan, & Popper, 2008). Foresight methodologies use foresight techniques such as macro trend analysis and expert knowledge to explore alternative futures (Figure 2) and classify them into *possible*, *plausible*, *probable*, and *preferable* (Voros, 2001); Dunne and Raby (2013) present a variation of this model. Foresight methodologies express these in form of futures scenario statements that help prepare for, or indeed actively shape the future, and these methodologies are usually qualitative rather than quantitative in nature (see Cuhls 2003).

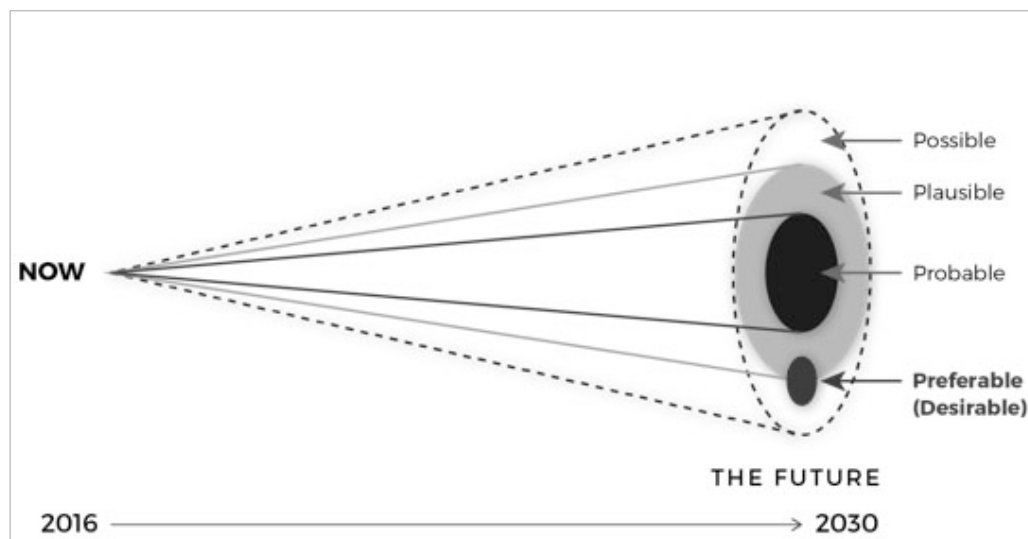


Figure 2: The “future cone” - adapted from Hancock and Bezold (1994)

When we map existing design world practices into this distinction, we see that most practices are closer to foresight. Maybe this is because forecasting fits better to designers’ self-image as creatives who are called into breaking existing thought patterns. If the defining criteria are a quantifiable estimate of the likelihood of a trend, the only technique that fits in the forecasting category is trend analysis like in textile and fashion design. Due to the structure of these industries, it is possible to capture the future with a reasonable degree of confidence to initiate design processes. In contrast, foresight is needed in volatile high-tech industries in which prediction is difficult and too costly, and the best way forward are creative guesses about the

future. There, at best designers can create visions of the future, and tell which one in their opinion are probable, preferable (designers would talk about utopias), dystopic, and beyond that, merely possible.

Design has many ways to see into the future, but the lack of concise methodological discussion means these techniques do not connect well to future studies. Maybe for this reason, it is difficult to know the limits of current foresight and design techniques (Hines & Zindato, 2016). These limits are, furthermore, implied under the guise of concepts like creativity and radical innovation. These discourses remains obscure for non-designers, many of whom are decision-makers trained in business and engineering. The following pages present an applied research case study of combining a well-known foresight method with design techniques. The study consciously tried to create a mixed methodology that would be understandable and inspiring to designers and non-designers alike. The method used as a basis for foresight was Delphi, a proven foresight technique in the field of futures studies. The study was, however, done in a design school, thus affording opportunities for visualization design, and storytelling techniques to enhance the impact of the study findings.

Designing design-inspired foresight through Delphi: Financial industry in 2030

An industry increasingly at risk in dealing with uncertainty, is the Financial Services industry. The Financial services sector is a core pillar of economic activity in most markets, such as greater China (Yulong & Hamnett, 2002), and inherent within are major drivers of change linked to consumer behaviours, new technology, and disruptive business models. Legacy players in financial services are showing signs of losing their competitive edge, while start-up companies (e.g. FinTechs) are using advanced technologies, innovative business models, and value created for a social consumer to disrupt, and fundamentally change the way financial services are being delivered (Chishti & Barberis, 2016).

Consequently, financial services companies not only having to respond to these concurrent changes, they have to prepare for those that are potentially looming in the future. The Financial Services industry, therefore, provides an ideal case for applying foresight in determining futures perspectives; as recent studies suggest, major events or unexpected concurrences of factors are likely to change the global geopolitical or macroeconomic balance over the next 20 years (Pascual-Ramsay, 2015). Not only is the content of *what* types of foresight methods are relevant to the design research and practice domains, furthermore, lessons can inform the methodological *how* when engaging research participants in forward thinking toward preferable futures (Bell, 2005).

As introduced earlier, foresight methods can be described by two fundamental attributes, namely by their nature of inquiry (qualitative, quantitative or semi-quantitative), and the capabilities of methods to gather and process information based on evidence, expertise, interaction or creativity (Butter et al., 2008; I. Miles, 2002). To engage in foresight and issue identification, researchers often must rely on the opinions of experts who are better aware of what is going to happen in the future (Rowe & Wright, 2001). Since experts possess tacit knowledge over specific business aspects, they can identify and judge the most critical uncertainties (Linstone & Turoff, 1975).

To identify the major issues through design-inspired foresight, which the organization (Private Bank), the industry (Financial Services), the market (greater China), and indeed consumers (Affluent Chinese) might face in the distant future (2030), a constructivist approach was employed to collect data from a predetermined group of experts with special knowledge in private banking, wealth management, technology, and social science discourse.

Data were collected from these experts engaged in business operations, products and services innovation, and the strategic direction of Private Banking futures using a modified Delphi technique. Delphi is a structured, iterative research process that allows a group of individuals to reflect upon and provide sequential feedback on complex issues while remaining anonymous (Donohoe & Needham, 2009; Linstone & Turoff, 1975). The method is valuable in contexts where experts would otherwise be unable to participate in a study, and has been successfully applied in futures forecasting (Rowe & Wright, 2001).

A three-stage Delphi survey process was developed based on Day and Bobeva's (2005) "Generic Delphi Toolkit", where the first stage is an exploratory stage, and further distillation and utilization stages build on the issue categories and themes generated during the first stage to gain deeper, detailed insights and achieve consensus among the experts of what are the preferable futures. Specifically, the objective of the first stage was to gain a broad conceptual understanding of the issues (by issue groups, categories, and their emerging themes) that the financial services providers and relevant experts perceived as challenges, opportunities, and future possibilities. The emphasis was on how each individual expert expressed his/hers understanding of preferable, or indeed, desirable futures.

As a data collection technique, the Delphi is relevant in a design-inspired foresight project where uncertainty over factors that may influence an organization or industry, can be discussed freely amongst a diverse group of topical experts without fear of retribution from their expert peer group (Weber & Ladkin, 2003). The technique itself involves a set of opening questions, which are presented to the Delphi panel through an online (web-enabled) survey tool. Once individual experts have completed their questions, the data is summarized and a set of new questions are designed based on the findings from the first round (Figure 3). This process is then repeated until consensus on the issues presented is reached (Turoff & Hiltz, 1995).

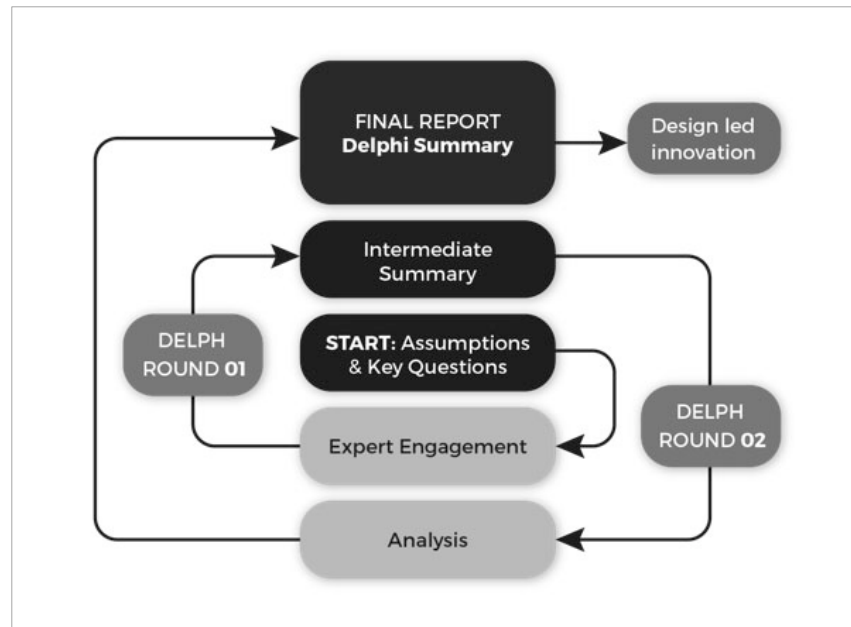


Figure 3: A Two-Round Delphi Survey, and Analysis stages

Stage One - Exploration

Planning and preparing for a Delphi survey is perhaps the most important step toward achieving a successful outcome, as the focus is placed on identifying and communicating the main research problem to be addressed. During this stage, the research team has to identify and select expert participants, design and test a data collection tool, develop a series of carefully constructed survey probing questions, and decide on the data analysis framework and method (Day & Bobeva, 2005).

Important consideration should be given to the overall aspiration of the study purpose and objectives. According to Andranovich (1995), the study problem (purpose) and questions posed should match the study participants' interests in order to ensure meaningful participation. For example, is the inquiry intended to be broad: 'What will the future look like?', or is the issue under inquiry quite specific to an organizational aspect or hypothetical future? Stakeholders within the organization may have varying motives, be it that some are interested in exploring ways of navigating change and making sense of disruption. For others, the most important outcome is gaining a collective understanding of emerging challenges or opportunities, or uncovering the deeper changes in stakeholder values, behaviours and beliefs.

It is advised that project teams preparing for a design-inspired foresight visioning approach engaging experts as informants of preferable futures, should allow ample time to describe the project aims and objectives, as to articulate the research problem and ensuing questions, and identifying experts needed on the Delphi panel to achieve the overall study outcome (Donohoe & Needham, 2009).

Sampling

Financial service experts were selected with the assistance of a global leader in Private Banking and Wealth Management “Company ABC”. Selecting experts from various disciplines will ensure reliability of opinions, and securing the right expert candidates is an important aspect of conducting a Delphi study. Project teams have to remain resourceful in sourcing panel participants, as there are no certainties that targeted experts are committed to participate in a time-consuming Delphi study. Moreover, the selection process has to remain rigorous and adhere to a set of predetermined selection criterion relevant to the study focus (Linstone & Turoff, 1975).

In this design-inspired foresight study, the selection criterion was determined by obtaining a holistic understanding from experts across functional disciplines that included strategy, innovation, client engagement, product development, Information and Technology Systems (ITS), and Marketing disciplines. To achieve a balanced view from different perspectives, a small group of academic scholars from social science, cultural, and technology backgrounds were invited to join the Delphi panel. The group of experts were engaged via an online data capture tool, which they had selected as the preferred method of communication.

Conceptual Foresight Framework

Questions directed at industry and scholarly experts were framed with the help of a horizon scanning model, which is appropriate in futures studies as the focus is on identifying external trends and developments that may suggest potential implications of early signals of change. Horizon scanning may be defined as “the acquisition and use of information about events, trends and relationships in an organization’s external environment, the knowledge of which would assist decision-makers in planning the organization’s future course of action” (Choo, 2002, p.84). Many horizon scanning models have been developed by those practicing foresight (Talwar, 2010). Their commonalities, however, are scanning, analysing, and synthesizing stages as central components of a model framework. As Curry and Hodgson (2008) suggest, the “Three Horizons” model enables diverse futures and strategic methods to be integrated to systems and structures, and connected to different speeds of change as applicable (Figure 4).

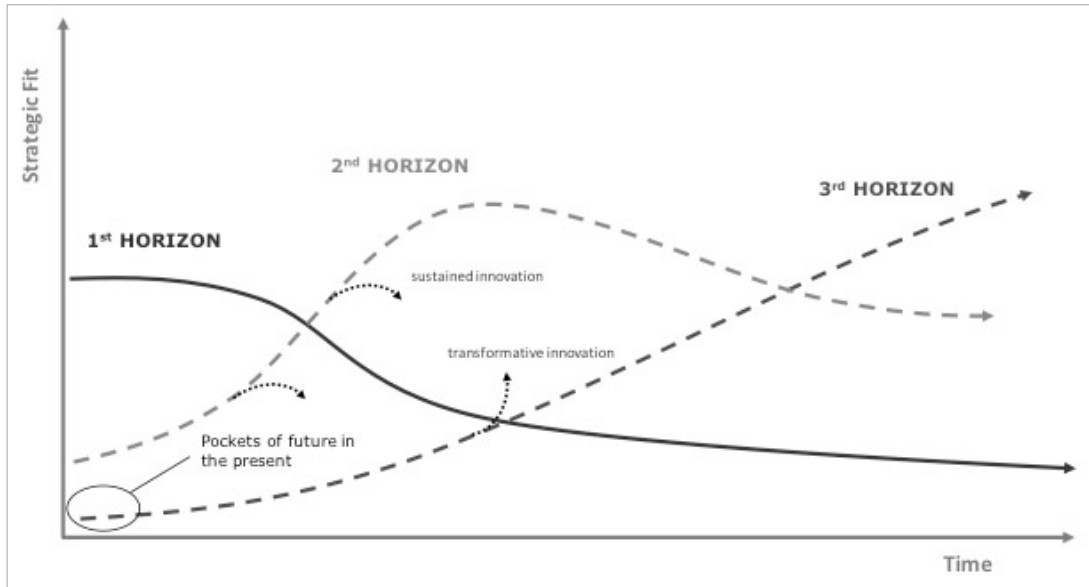


Figure 4. Schematic of the futures-oriented Three Horizon model

During the analysis stages, project teams can, as the schematic depicts, identify potential transition points based on their likely disruptive or incremental innovation tendencies. As such, the 1st Horizon focuses the conversation on the prevailing systems (business as usual); it has high strategic fit to the organization's mission, however, over time it loses its purpose as external forces or factors come into play. The 3rd Horizon, conversely, deals with weak signals, options or arguments about the future of systems that may have consequences to the present environment as it is known. In-between these two horizons is the space (2nd Horizon) where the transition from the known to the unknown (or untested) occurs, and where systems are typically unstable. The time distance between horizons depends on the industry domain or nature of inquiry; the third horizon often requires that systems can be allowed to change significantly (Sharpe & Hodgson, 2006).

Important for research teams who employ the horizon scanning model in a design-inspired foresight visioning approach, is that the 3rd Horizon perspective is deeply informed by worldviews and the values in which the individual expresses his/hers opinions. It is here where expert informants exercise their power of voice and experiment, which Inayatullah (2004) suggests makes the "Three Horizon" model such a useful tool as alternative scenarios are informed by different worldviews and logic. In a long-range (e.g. 10 - 15 years) futures study, it is therefore plausible that experts are no longer constrained by their current views of organizational bias, thus expressing their deep-founded beliefs and values that inform a desirable organization in context of preferable futures.

Stage Two - Distillation

During the second Delphi stage (distillation), a group of 12 high-calibre private banking services experts and scholars were presented with a sequence of three major open ended questions. A key objective was to identify the issues that experts considered might impact the organization, the

industry, the market, and affluent consumers in 2020, and 2030. For example, opening the Delphi survey (Round 1), the expert panel was asked to respond to the following question:

1. When considering each of these four perspectives, what are the early signs that will potentially change the way and future (2020 and 2030) of private banking?
 - a) the organization,
 - b) the market,
 - c) the industry,
 - d) the Chinese consumer.

For each of the questions presented, experts were asked to nominate at least one issue, and provide their rationale for each issue pertaining to the four perspectives to the year 2020, and 2030. As a result, in this question example, a minimum of eight nominated issues were anticipated to emerge for each expert enrolled in the Delphi.

The focus of the data collection phase in a Delphi survey is on developing group consensus about preferable (desirable) futures; which in this study, was predominantly focused on the futures of Private Banking to the year 2030. This study involved a series of two rounds, which were conducted over a period of four months. At the completion of the first round, a content analysis was conducted on the data obtained from the experts, and a total of 237 nominated issues were extracted. As a first step in data reduction, issues were identified, and the rationale offered by the experts for their individual opinions were coded and further sorted across each of the four aforementioned perspectives (M. B. Miles & Huberman, 1994).

Four primary issue clusters emerged, comprising of 8 unique issue groups, and 25 issue sub-groups. Standing out were 8 dominant sub-issue groups. Table 1 shows the data analysis findings, where the data reduction process is presented from right to left.

Table 1. Data Analysis – Issues by cluster, group, sub-group, and dominant issue sub-groups

Issue Cluster [4]	Issue Groups [8]	Dominant Issue Sub-Groups [8]	Issue Sub-groups [25]
Industry (106)	1. Financial Services Industry (democratization) 2. Private Banking (Operating Model, Products)	- Competition (11) - WM Operating Model (23)	1. Partnerships 2. Adaptability of Local/Global banking models 3. Competition 4. Products and Services 5. Value Innovation 6. Next-generation of financial services 7. WM Operating Model 8. eWealth Management
Consumer (53)	3. Psychographic Change 4. Social / behavioural Change	- Next generation of digital transformed consumers (6) - Consumer values (9)	9. New generation of digital transformed consumers 10. Rising Affluence 11. Increasingly Sophisticated Consumers 12. Assurance (clients) 13. Client Engagement 14. Consumer Behaviour 15. Consumer Values 16. Inequality 17. New Workforce Types
Macro (42)	5. Financial Services Market 6. Global (growth/instability) 7. Regulatory (State Control)	- Economic Development (10) - Globalization (7) - Regulatory Environment (18)	18. Economic Development 19. Globalization 20. Monetary Policy 21. Regulatory Environment 22. Regulatory/Governance
Technology (36)	8. Technological (growth/instability)	Technological Innovations (22)	23. Technological Innovations 24. Systems Integration 25. Digital Transformation

During the data analysis stage, close consideration as to whether or not further opinion-seeking Delphi rounds were needed to reach consensus among the experts, are critical steps in the distillation stage. For this study, the focus was placed on generating scenario statements, which were developed as a synthesis; a method of qualitative content analysis designed to explore issues at a deeper level (Minichiello, Aroni, Timewell, & Alexander, 1990), thereby presenting panel participants with an expression of an idea derived from their combined responses in subsequent Delphi rounds. This data analysis process produced a series of scenario statements across the four perspectives (organization, industry, market, and consumer) that captured the combined opinions in synthesis. In the second round of the Delphi, the likelihood of occurrence rating, and the mean value of the group's consensus on the scenario statement (Figure 5) were designed as consensus-reaching indicators.

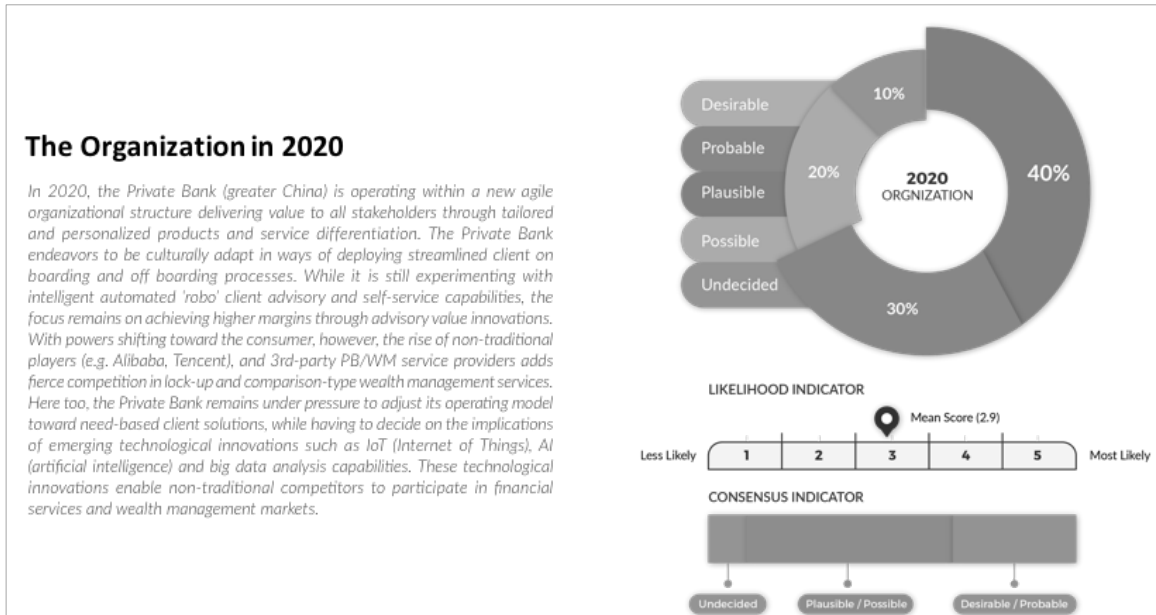
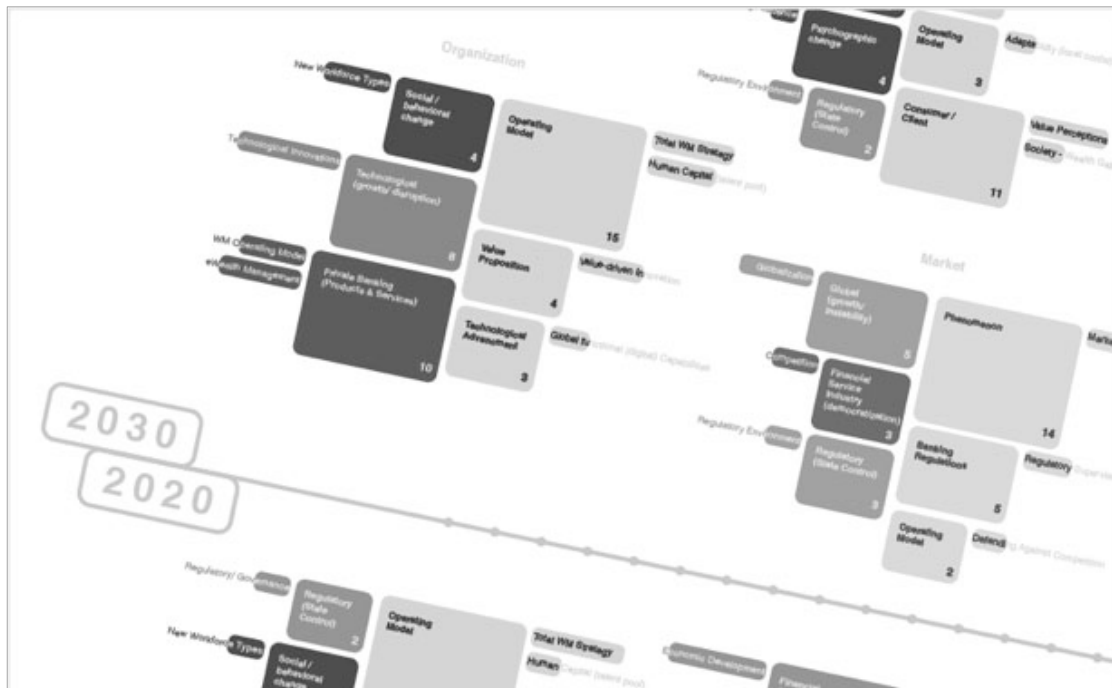


Figure 5. Futures Scenario Statement example, with ‘likelihood-of-occurrence’ and ‘consensus mean value’ visualization

Stage Three – Utilization

From the analysis of data obtained at the completion of the Delphi survey, a summary report was issued to those participants that had completed all Delphi survey rounds, or they had expressed an interest in the final outcomes of this futures study. In this third stage, designers adopting a design-inspired foresight visioning approach have further opportunities to apply data visualization and storytelling techniques. The data visualizations in this study were presented in form of “cloud-tags” and “tree-maps” charting types (Figure 6), conveying important issue clusters, groups, and sub-groups, and their related themes obtained over two distinct time horizons (2020, 2030). The motivation behind this approach was to engage, at a later stage, design-led innovation teams with the Delphi survey findings, consequently channelling the discussions and ideation efforts toward specific outcomes that the data collection and analysis phase of a design-inspired foresight study would produce.



Farther, utilizing storytelling narratives and imaginary creations, serves as an effective way to engage with the intended readership of a design-inspired foresight study in both entertaining, informing, and energizing ways. Stories can change or enhance readers' perceptions of futures, seeing themselves in different perspectives, and identifying their "self" by interpreting and completing the story in his or her head (Sametz & Maydoney, 2003). In this 2030 futures study, personas were created that embodied the essence of futures scenario statements in verbal and non-verbal communications intended to connect the reader on both analytical and emotional levels (Figure 7).

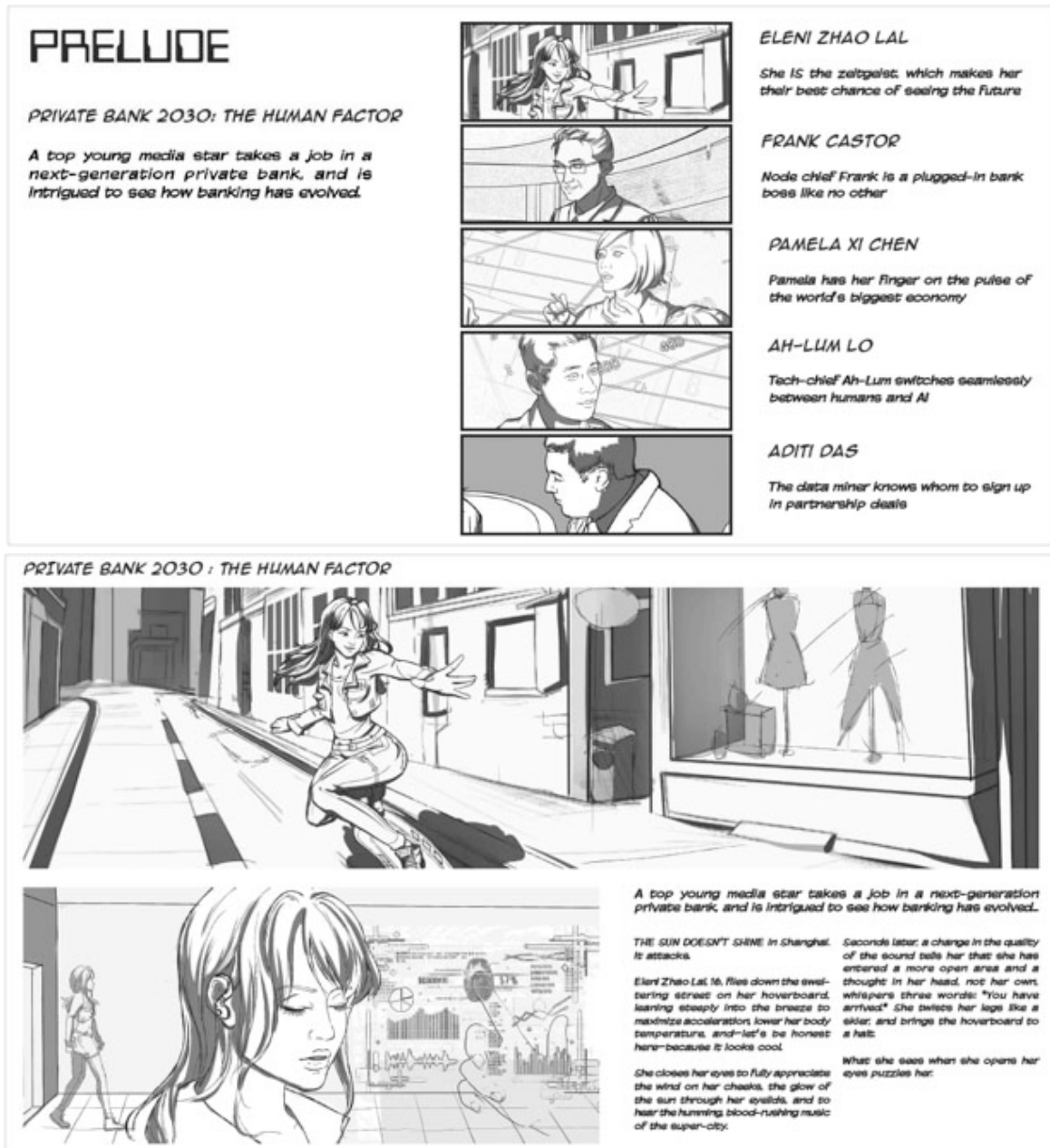


Figure 7. Data Visualization in form of storytelling persona and narratives

Milestones toward preferable futures: Backcasting

At the conclusion of the three-stage Delphi survey, and the data analysis and reporting stages of a design-inspired foresight visioning study, design and innovation teams have the opportunity to transform the knowledge and insights gained into a preferred futures conceptualization and prototyping plan. With foresight perspectives generated over 5, 10, or even 15-year intervals, design teams can use a 'backcasting' process (Figure 8) to break down preferable (or desirable)

futures scenarios, and, by developing strategies and milestones, plan for how these futures may be attained (Vergragt & Quist, 2011).

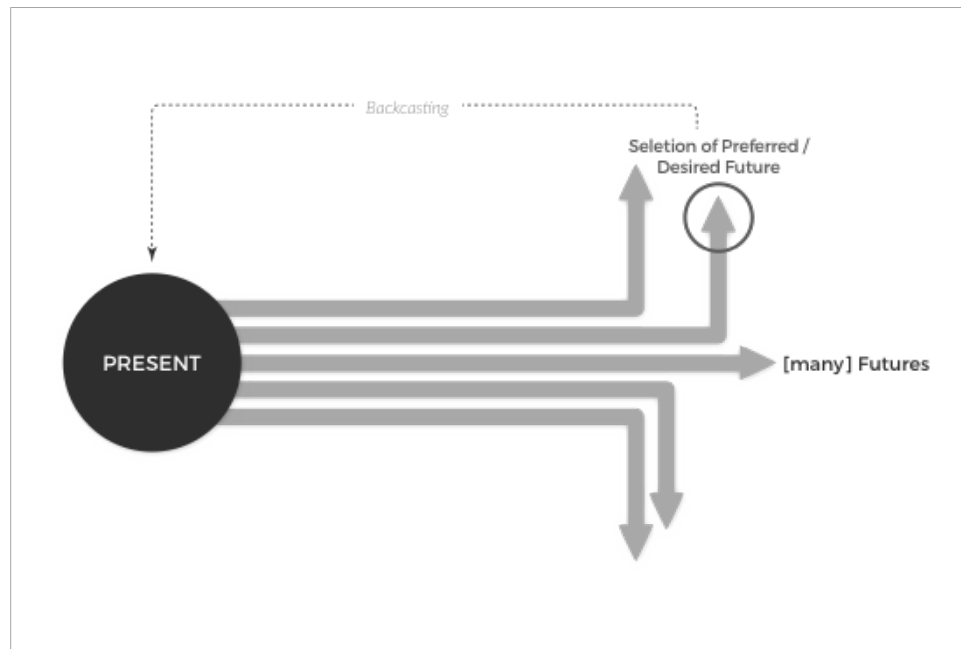


Figure 8. Backcasting a preferred future to the present

Discussion

This paper has introduced a design-inspired foresight visioning approach as an emerging activity within design-led innovation and strategic design processes. Looking beyond forecasting, which creates scenarios of futures using historical and current data and builds trends to develop products or services solutions, the emphasis in this paper was placed on foresight in design as the imagination and creation of desirable futures scenarios. By way of example, a design-inspired foresight approach was presented based on a 2016 Delphi study exploring Private Banking industry futures to the year 2030.

Important considerations and the inherent gaps in conventional methodologies in forecasting were addressed through the deployment of a design-inspired foresight approach. With this paper, a further aim was to demonstrate the expanding role of design in foresight toward the design teams and organizations' readiness and ability to deal with systemic uncertainties in today's business environment. Indeed, as the role of design in business is expanding across all aspects of innovation, design-inspired foresight activities aspire to include visualization and prototypes of alternative possibilities that help organizations in their strategic innovation decision-making processes. In other words, foresight techniques are applied to inform the strategic innovation direction, which has the potential to shape the organizations' future (Mankoff, Rode, & Faste, 2013).

Beyond the traditional organizational practices of predicting the future based on (usually linear) historical and current data, this paper introduced selected methods, techniques, and tools which were applied to envisage organizational, industry, market and consumer perspectives of preferable, or indeed desirable futures in the Private Banking sector. As seasoned practitioners in foresight acknowledge, whichever methodology or method may be applied to futures studies, challenges remain to connect the present with preferable futures in ways that "...helps to identify the divergent futures, which may emerge as a result of conflict between the embedded present and these imagined futures" (Curry & Hodgson, 2008, p.2).

While acknowledging that there are many methods in conducting design foresight, as highlighted in this paper, the value of a design-inspired futures approach is based on the strategic use of exploring alternative futures scenarios. Based on these preferable (or desirable) visions of alternative futures, designers and interdisciplinary innovation teams may further emphasize these future directions through data visualization and storytelling techniques. From this position, designers and business stakeholders can work together to develop innovation strategies, and apply, for example, a *backcasting* process to determine the physical feasibility of a particular preferred or desirable future scenario. Unpacking each scenario into milestones and prototyping briefs, designers can further apply their skills to help visualize, or indeed demonstrate concepts toward preferable futures.

In this context, the paper contributes to theoretical and practical knowledge in applying foresight approaches linked to design, while offering designers, researchers, and foresight practitioners practical examples of employing, or adapting existing foresight methods such as the Delphi technique, the "Three Horizons" model, and futures scenarios as further inputs for design-led innovations.

References

- Andranovich, G. (1995). *Developing community participation and consensus: The Delphi Technique* (Vol. WREP0131): Western Regional Extension Publication.
- Armstrong, J. S. (1985). *Long-range forecasting*: Wiley New York ETC.
- Bell, W. (2005). Creativity, skepticism, and visioning the future. *Futures*, 37(5), 429-432.
- Bevolo, M., & Brand, R. (2003). Brand design for the long term. *Design Management Review*, 14(1), 33-39.
- Bohemia, E., Rieple, A., Liedtka, J., & Cooper, R. (2014). *Proceedings of the 19th DMI: Academic Design Management Conference: Design Management in an Era of Disruption*: Design Management Institute.
- Boztepe, S. (2016). *Design expanding into strategy: evidence from design consulting firms in: P. Lloyd & E. Bohemia, eds.* Paper presented at the Proceedings of DRS2016: Desing + Research + Society - Future Focused Thinking.
- Buchanan, R. (2015). Worlds in the making: design, management, and the Reform of Organizational culture. *She Ji: The Journal of Design, Economics, and Innovation*, 1(1), 5-21.
- Buchenuau, M., & Suri, J. F. (2000). *Experience prototyping*. Paper presented at the Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques.
- Butter, M., Brandes, F., Keenan, M., & Popper, R. (2008). How are foresight methods selected? *foresight*, 10(6), 62-89.
- Chishti, S., & Barberis, J. (2016). *The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries*: John Wiley & Sons.
- Choo, C. W. (2002). *Information management for the intelligent organization: the art of scanning the environment*: Information Today, Inc.
- Coates, J. F. (1996). A thriving future for terrorism. *Technological Forecasting and Social Change*, 51(3), 295-299.
- Curry, A., & Hodgson, A. (2008). Seeing in multiple horizons: connecting futures to strategy. *Journal of Futures Studies*, 13(1), 1-20.
- Day, J., & Bobeva, M. (2005). A generic toolkit for the successful management of Delphi studies. *Electronic Journal of Business Research Methods*, 3(2), 103-116.
- Djajadiningrat, J. P., Gaver, W. W., & Fres, J. (2000). *Interaction relabelling and extreme characters: methods for exploring aesthetic interactions*. Paper presented at the Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques.

- Donohoe, H., & Needham, R. (2009). Moving best practice forward: Delphi characteristics, advantages, potential problems, and solutions. *International Journal of Tourism Research*, 11(5), 415-437.
- Dunne, A., & Raby, F. (2001). *Design noir: The secret life of electronic objects*: Springer Science & Business Media.
- Dunne, A., & Raby, F. (2013). *Speculative everything: design, fiction, and social dreaming*: MIT Press.
- Dunne, D., & Martin, R. (2006). Design thinking and how it will change management education: An interview and discussion. *Academy of Management Learning & Education*, 5(4), 512-523.
- Evans, M. (2003). *Trend forecasting for design futures*. Paper presented at the European Academy of Design 5th International Conference, Barcelona, 2003. Proceedings... Barcelona.
- Gabrielli, S., & Zoels, J.-C. (2003). *Creating imaginable futures: using human-centered design strategies as a foresight tool*. Paper presented at the Proceedings of the 2003 conference on Designing for user experiences.
- Gavigan, J. P. (2001). *A practical guide to regional foresight*: FOREN.
- Grand, S., & Wiedmer, M. (2010). *Design fiction: a method toolbox for design research in a complex world*. Paper presented at the Proceedings of the DRS 2010 conference: Design and complexity.
- Heskett, J. (2001). Past, present, and future in design for industry. *Design Issues*, 17(1), 18-26.
- Hines, A., & Zindato, D. (2016). Designing Foresight and Foresighting Design: Opportunities for Learning and Collaboration via Scenarios. *World Future Review*, 8(4), 180-192.
- Inayatullah, S. (2004). Causal layered analysis: Theory, historical context, and case studies *The causal layered analysis reader: Theory and case studies of an integrative and transformative methodology* (pp. 1-52): Tamkang University Press.
- Irmak, O. (2005). Applying the Futures Studies Approach to Design. *Proceedings of EAD*, 6, 29-31.
- Keinonen, T., Kokkonen, V., Piira, S., & Takala, R. (2004). Konseptisuunnittelun työtapoja. *Teos Keinonen, Turkka & Jääskö, Vesa (toim.): Tuotekonseptointi. Helsinki 2004*.
- Kurvinen, E., Koskinen, I., & Battarbee, K. (2008). Prototyping social interaction. *Design Issues*, 24(3), 46-57.
- Linstone, H., & Turoff, M. (1975). *The Delphi method: Techniques and applications*: Addison-Wesley Pub. Co., Advanced Book Program.
- Lojacono, G., & Zaccai, G. (2004). The evolution of the design-inspired enterprise. *MIT Sloan Management Review*, 45(3), 75.
- Mankoff, J., Rode, J. A., & Faste, H. (2013). *Looking past yesterday's tomorrow: using futures studies methods to extend the research horizon*. Paper presented at the Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.

- Manzini, E., & Vezzoli, C. (2003). A strategic design approach to develop sustainable product service systems: examples taken from the 'environmentally friendly innovation' Italian prize. *Journal of cleaner production*, 11(8), 851-857.
- Margolin, V. (2007). Design, the future and the human spirit. *Design Issues*, 23(3), 4-15.
- Martino, J. P. (1993). *Technological forecasting for decision making*: McGraw-Hill, Inc.
- Marzano, S. (2003). *The new everyday: Views on ambient intelligence*: 010 Publishers.
- Marzano, S. (2005). *Past Tense, Future Sense: Competing Through Creativity: 80 Years of Design at Philips*: Bis Pub.
- Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. *Strategic Design Research Journal*, 1(1), 31-28.
- Miles, I. (2002). Appraisal of alternative methods and procedures for producing Regional Foresight. *STRATA-ETAN High-level expert group "Mobilising the Potential Foresight Actors for and Enlarged EU*.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*: Sage Publications.
- Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1990). In-depth interviewing: Researching research. A resource for social scientists and practitioner researchers: Oxford: Blackwell.
- Molotch, H. (1996). LA as design product: how art works in a regional economy. *The city: Los Angeles and urban theory at the end of the twentieth century*, 225-275.
- Mozota, B. B. (1998). Structuring strategic design management: Michael Porter's value chain. . *Design Management Review*, 9(2), 26-31.
- Muratovski, G. (2016). Paradigm Shift: report on the new role of design in business and society. *She Ji: The Journal of Design, Economics, and Innovation*, 1(2), 118-139.
- Oster, G. W. (2008). Practitioners corner: Derailing design thinking. *International Journal of Leadership Studies*, 4(1), 107-115.
- Pascual-Ramsay, Á. (2015). Global Risks and EU Businesses. *The Global Context*, 10.
- Polhemus, T. (1994). *Street Style: from Sidewalk to Catwalk* (Thames & Hudson: London).
- Regan, C. L., Kincade, D. H., & Sheldon, G. (1998). Applicability of the engineering design process theory in the apparel design process. *Clothing and Textiles Research Journal*, 16(1), 36-46.
- Rowe, G., & Wright, G. (2001). Expert opinions in forecasting: the role of the Delphi technique. *Principles of forecasting: A handbook for researchers and practitioners*, 125-144.
- Sametz, R., & Maydoney, A. (2003). Storytelling through design. *Design Management Journal (Former Series)*, 14(4), 18-34.

- Sharpe, W., & Hodgson, A. (2006). Technology forward look. *London: Foresight Programme*. Retrieved February, 29, 2008.
- Talwar, R. (2010). Scanning the Horizon *Trends and Issues in Global Tourism 2010* (pp. 237-268): Springer.
- Turoff, M., & Hiltz, S. R. (1995). Computer based Delphi processes (pp. 55-88): London, Kingsley Publishers.
- Vergragt, P. J., & Quist, J. (2011). Backcasting for sustainability: Introduction to the special issue: Elsevier.
- Voros, J. (2001). A primer on futures studies, foresight and the use of scenarios. *Prospect: The Foresight Bulletin*, 6(1).
- Weber, K., & Ladkin, A. (2003). The convention industry in Australia and the United Kingdom: key issues and competitive forces. *Journal of Travel Research*, 42(2), 125.
- Woudhuysen, J. (1997). *Structuring Information for Designing the Future*: Design Management Institute.
- Yulong, S., & Hamnett, C. (2002). The potential and prospect for global cities in China: in the context of the world system. *Geoforum*, 33(1), 121-135.

Author Biographies

Dr Jorn Buhring is a Research Assistant Professor at the The Hong Kong Polytechnic University - School of Design; his research focus is on human-centred value innovation with emphasis on user engagement in experiential environments. Addressing future perspectives, Jorn explores design foresight, vision and fiction approaches and techniques aimed at designers and interdisciplinary innovation teams. The aim is to advance emerging design and innovation processes in business through change-provoking futures thinking, and testing these through quantifiable demonstration and applied research initiatives.

Dr Ilpo Koskinen has been working as professor in design schools in Helsinki, Aarhus, Melbourne, and Hong Kong. His main research interests have been mobile multimedia, design in cities, and the methodology of design research. His recent work expands his earlier work on constructive design research into social design. His mission is to use research to expand the methods and conceptual horizons of design from within the discipline.