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Two approaches to foresight-driven design

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Abstract: As a response to rapid and uncertain environmental change, foresight has emerged as an approach offering a future-oriented framing to design practice. Using theory on foresight, design, and change management, this paper reports a case study on how companies engage with foresight combined with design at a strategic level to become more future-oriented in their process and better prepared for taking long term action in the present. Through observations and interviews, the study follows companies participating in the development program *Future Now* facilitated by the Danish Design Center. We identify two distinct company approaches to foresight-driven design, involving distinct types of reasoning about the future, and leading to different types of strategic directionality. Further, we explore strategic timing and resources as possible moderators for which of the two approaches companies adopt. Our findings illuminate the different ways foresight can be used in combination with design at a strategic level.

Keywords: foresight; strategic design; change management; innovation management

1. Introduction

Scholars argue how traditional planning and forecasting methods have become obsolete, since these do not account for incalculability (Buehring & Bishop, 2020). As Buehring and Bishop (2020, p. 409) propose, “a fast changing environment requires a change in how decision makers do their work”. This essentially counts for their assumptions about change and the future, but also the methods they use at a strategic level. As noted by Gümüşay and Reinecke (2021, p. 236), “Do we actually need to wait until something exists before we can build theories about it?”. This challenges traditional planning approaches, as it calls for new reasoning and methodology. Fortunately, the practice of *foresight* promotes methods and tools for anticipating alternative images of the future. Contrary to *forecasting*, *foresight* is a discipline arguing that the future is not predetermined and, therefore, it cannot be predicted but influenced and therefore created (Minkkinen, 2020). Thus, foresight treats the world as it is – complex and uncertain, which is useful in an increasingly volatile world.



Buehring and Bishop (2020, p. 409) further argue that “conventional and reactive approaches need to be replaced with creative, [and] proactive capabilities” (ibid.). For this reason, many organisations have turned towards *design* as a future-oriented way of “thinking out of the box” and implementing strategic goals, using creative thinking principles to become user-driven and co-creative (ibid.). By sharing tools for narrating possible alternative futures, especially scenarios, the future and change are intrinsic for both foresight and design practice (Hines & Zindato, 2016), and several design scholars have already presented emerging design practices particularly concerned about affecting the future. For instance, *Transition Design* advocates for a specific “design-led societal transition toward more sustainable futures” (Irwin, 2015: 229) where long-term visions of sustainable futures are causing designers to look for knowledge to act upon in new places. Also, *Speculative Design* and *Design Fiction* is included under the “design futuring” umbrella term referring to the loosely defined concept of being “concerned with future alternatives [...] which seek to produce knowledge through debate, contestation, reflection etc.” (Howell et al., 2021, p. 2)

Following Buehring and Bishop (2020, p. 417), strategic foresight and design in combination “provide the decision maker with an image of potential new future worlds and the actions that might influence those worlds”. Therefore, foresight can be implied as the future oriented context for design practice, while design embodies and conceptualize desirable future for foresight practice; “thus complimenting each other to envision, inspire, experiment and communicate the direction of where to go” (Buehring & Bishop, 2020, p. 410). Buehring and Bishop (2020) also labels the combination as a *new approach* to strategic decision making and describes it in opposition to a *traditional approach* to planning. Where the purpose of a traditional approach is to work *in* an existing system, the new approach aims at working *on* existing systems to make *transformational* change rather than *incremental* improvement and the focus is therefore on rethinking systems instead of being bound to them – as in Transition Design. Where the typical way of thinking with the traditional approach includes *mechanical* and *cause-effect* reasoning, the new approach holds a more *organic* and *emergent* way of thinking, meaning that the world is not seen as a machine but as an organism that can transform in desirable and intentional ways. In such a world, flexibility and adaptability are more important than consistency and rigidity (ibid.), why understanding how decision imagine alternative futures is important (Gümüşay & Reinecke, 2021, p. 241).

1.1 Inbound and outbound change

As foresight and design bring different perspectives to change, Buehring and Bishop (2020, p. 419) argue that “every strategic foresight project should involve design and every strategic design project should involve foresight at all levels of strategic decision making”. Thereby, foresight as a complement to a traditional planning approach is concerned with *inbound change* since it makes practitioners look for what *might* face them in an external dynamic landscape. By creating possible future scenarios, it is possible for practitioners to explore what is not yet known. The traditional activity for inbound change is *forecasting*. However, following Buehring and Bishop (2020), this should be replaced by *foresight* to make it

more relevant to present conditions (ibid.), leading to exploring multiple *possible* futures rather than making specific predictions about how it will be (Slaughter, 1995). Dator (1998, p. 303) formulated this into three earlier mentioned “laws” of the future, stating that as the future is not *predetermined*, it cannot be *predicted*, but alternative futures can be *envisioned*. He emphasized that the importance of studying the future lies in the understanding of how people imagine the future can have consequences for their actions. Conversely, design is concerned with *outbound change*, as it can guide open-ended and creative change coming from the company to the external environment. Through prototyping and visualization, design can enhance vivid images of what the future could look like, which makes it easier to pursue (ibid.). The traditional actions towards outbound change are planning and acting but should be replaced by design to make it more suited to the environment wherein the changes are to be made (ibid.).

Following Sarasvathy (2001), working towards a clearly defined goal and working driven by current means are two distinct attitudes of reasoning in terms of decision-making and value creation. The first way, *causation*, is an end-driven logic where the business manager formulates a strategy and a clearly defined problem space and then create a plan to reach the end goal. “Causation processes take a particular effect as given and focus on selecting between means to create that effect” (ibid, p. 245), which is arguably applicable to creating inbound change following a strategic anchor placed in the future. The second way of reasoning, *effectuation*, builds upon the idea that some managers do not work with strategic planning towards an end-goal, since they might lack knowledge or resources to do so, but instead works with the circumstances they currently have and explores what value they can create from that. “Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means” (ibid., p. 245), instead of taking the end-goal as given imperative for the means. Essentially, using an effectuation process involves that the decision-maker can change direction and construct the direction over time instead of knowing it from the beginning, which is arguably applicable to creating outbound change working with current means and needs.

1.2 Thinking in alternative futures: The futures cone

As Futures Studies imply studying more than one possible future, futurists have historically classified different types of futures as a way of differentiating the options (Amara, 1974; Henchey, 1978). The types of futures have been visualised and popularised through a cone shape (Taket, 1993), and as Futures Studies developed, so did the Futures Cone. Following Voros’ (2019) version of the cone, eight types of futures can be identified to describe futures considered to be either highly predictable or open – i.e., more or less alternative visions.

- *Potential* futures describe everything beyond the present moment – i.e., futures in general.

- *Possible* futures include all the futures we can imagine, no matter how unlikely and science fiction like they may seem. In possible futures, you consider *what might happen* based on knowledge not yet possessed.
- In *plausible* futures, possible futures we think *could happen* given the current knowledge of physical laws, social processes etc., are considered.
- Discussing *probable* futures, the futures that are *likely* to happen are in focus. According to Hancock and Bezold (1994), the probable futures can be described as *descriptive forecasting* since these will be made from appraisals of likely trends and future developments therefrom. When analysing the future, this thinking pattern can lead to *blind spots* (MacKay & McKiernan, 2018).
- *Projected* or *predicted* futures are considered the default baseline of the future if *nothing* happens and *business as usual* is being pursued (Voros, 2019).
- *Preposterous* futures are events that are unlikely or impossible to happen. These futures are often judged as “ridicules” or something that will never happen (ibid.).
- *Preferable* futures capture in contrast to the previous classes what we *want* to happen in any of the classes.

In Foresight, most often, scenarios are created to reach the outskirts of the cone and to open one’s *opportunity space*, making it possible to discuss and compare different *alternative futures*. By choosing the most favorable options among the visioned futures, our values become explicit and easier to discuss (Voros, 2019). Thus, it is possible to discuss futures of different kinds which either relates to traditional anticipations of the future or which unfolds countercultural futures. As Howell et al. (2021) argue, the model has limitations due to its embedded notions of linear progress “representing diverse human experiences as a singular point of ‘the present’” (ibid., p. 1). Therefore, they argue that a plurality of perspectives is needed to “engage limitations that depict a diverse unfolding of potential futures” (ibid., p. 2) and that reflection upon ones cultural and professional background and history is needed.

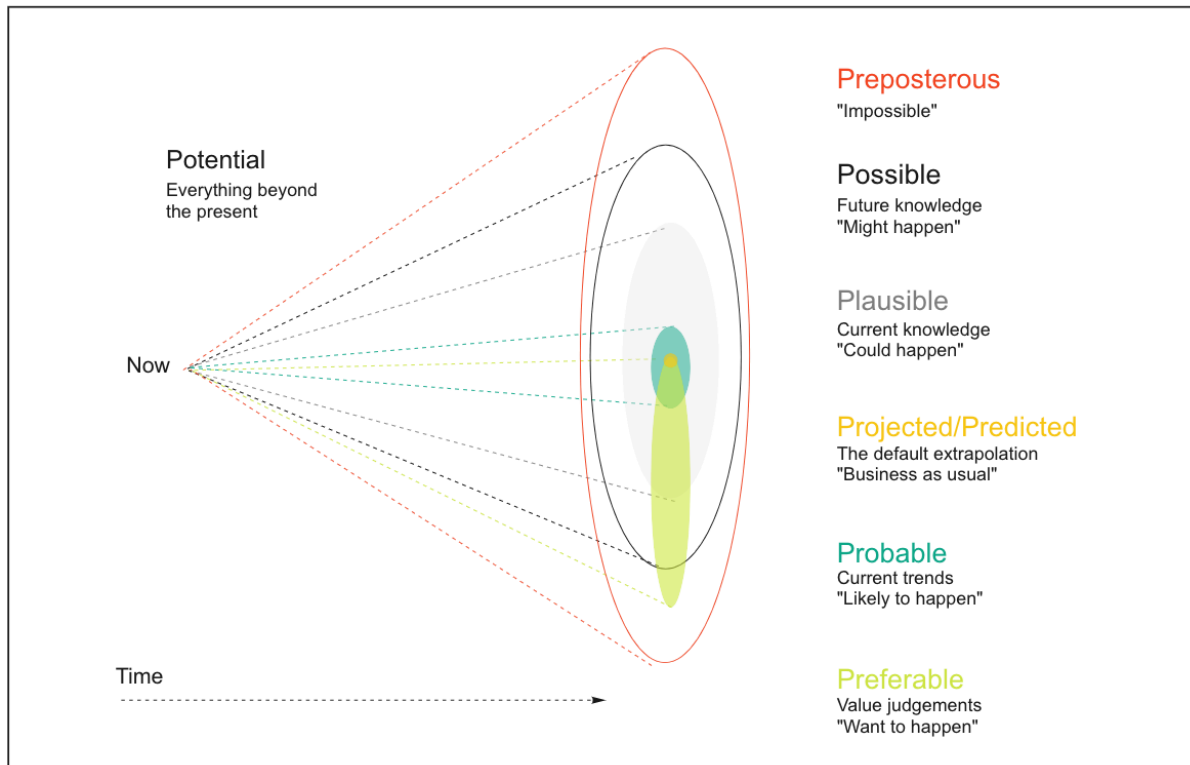


Figure 1. The Futures Cone (adapted from Voros, 2009)

1.3 Process and outcome of foresight

Even though foresight is winning inroads in the business world, the discussion of the value created from a foresight process is vague. As scholars discuss the value of foresight in different ways, Rohrbeck and Schwartz (2013) argue that foresight can bring value in multiple ways, and that profit is only one component of the potential value creation pool. Through an enhanced capacity to perceive, interpret, and respond to change, through influencing other actors, and through an improved capacity for organizational learning, companies can create value such as new insights on potential changes and disruptions in the environment, integration of stakeholders in strategy formation, improved coordination of business objectives and understanding of market, and facilitated organizational learning (ibid).

To organize foresight work, Voros (2003) has suggested a generic framework that illustrates the placement of foresight in planning. In the generic framework, Voros suggest four key phases in a foresight process: *Input*, *Foresight*, *Output*, and *Strategy*. In the *Input* phase, information is gathered and scanned. In the phase of *Foresight*, analysis and interpretation of the input are made. Through prospection, methods such as scenarios and visioning are used to create a forward view for the insights and to explore how different types of futures might play out. Thus, the foresight phase will end up by questioning *what might happen?* (ibid.). In the *Output* phase, both tangible and intangible outputs are possible. A tangible output could be actual options for the organization to pursue, while an intangible output could be a change in “mindset” about a given subject. In the last phase, outputs feed into *Strategy*,

which should be used by decision-makers for their considerations of what to do. For a strategy process to succeed, actions need to feed into inputs in an iterative loop of reassessment.

1.4 Purpose and aim of the study

Even though future-oriented design practice is described by many, theoretically we know little about how companies engage with foresight driven design in combination, how they reason in the process of thinking about the future, and how they subsequently seek to integrate the results of their reasoning into strategic decisions. The purpose of this study is to explore, understand and unfold practical implications for the growing relationship between foresight and design and thus contribute to the knowledge base of the two fields combined. The central research question is how manufacturing companies engage with design combined with foresight at a strategic level to become more future-oriented in their process and to be better prepared for taking long-term action in the present, with a special focus on what outcome the companies reach and their intentions to implement their insights.

2. Methodology

Our interest in futures pertained to 1) how companies *think* about futures, 2) how they *act* in the present - and 3) what they *intend to do* in the future - based on these thoughts.

2.1 Qualitative case study based on protocol analysis and interviews

With a desire to create in-depth knowledge about practical implications of companies' engagement with foresight-driven design in a real-world context, a qualitative case study was conducted of the program Future Now facilitated by the Danish Design Center. Two anonymous participating companies (A and B) in Future Now, one from the composite industry and one from the housing industry, were selected based on their availability and representativeness and were followed throughout the 10 weeks program. The program included three workshops lasting two days each (5 hours each day). Participating companies were assigned a mentor. Company A was from the conservative composite industry facing problems of exploiting modern technology and sustainable measures. Company B was from the housing industry aiming at exploring their business opportunities in relevant and sustainable ways.

In workshop 1 (involving inspiration and discovery), the companies engaged with future scenarios of the year 2050 presented as auditory experiences in the form of fictional personal stories pre-recorded by actors describing their life in 2050. From listening to the stories, the company representatives and their mentors were to broaden their opportunity by imagining alternative futures related to the 2050 scenarios through brainstorming activities. While Company A participated with both managers and technical workers, Company B participated only with managerial staff. Afterwards, the companies described their preferred future for 2050 by choosing their favourite new ideas. In workshop 2 (involving defining and ideation), the companies should select a single design challenge within their preferred future from

which they were to conceptualise and create prototypes. In workshop 3, the companies *backcasted* their preferred future and imagine the steps needed to reach it. They then used these imaginations to discover and design new opportunities to pursue and challenges to plan for (Dansk Design Center, 2021).

With the aim of examining how the companies engaged with futures in thought and action, in situ *observation* recorded through video was one of the primary methods for data collection. Video observation makes it possible to investigate peoples' behavior in specific contexts and how people interact with the social and material environments (Miles et al., 2014), and allows for subsequent analysis of thought processes through verbalizations. In total, 13 hours of observation of company activities during their participation in the program were collected, which was reduced through sampling to an analysis of 2 hours and 17 minutes in total of in situ interaction.

Follow-up semi-structured interviews with the general manager of each company were conducted in between the planned workshops to capture considerations that were not available through in situ observations. Three interviews were recorded with each company manager, lasting 23-44 min each, and subsequently transcribed. Interview questions related to the specific activities in the workshops, opinions, and attitudes towards these activities, and to the companies' background, actions, and intentions. Additional case background material was collected from companies' applications for Future Now. Further, written materials produced during recorded workshops (e.g., Miro boards) were collected and used to inform analyses of company decisions and intentions (e.g., *Action plans*).

2.2 Analysis strategy

The analysis was divided into three parts. The first part of the analysis was structured around the companies' abilities to think in alternative futures. Given that the companies were to discuss the futures, thinking about futures was considered an observable action through verbalization. In situ verbalizations by the case companies during the workshops were transcribed, segmented according to turn-taking, and subjected to protocol analysis (Saldaña, 2013, p. 151). The Futures Cone model was used to systematically code for category of futures referenced (e.g., plausible, possible – see Voros, 2019) in each segment by the first-author, and thus used as an analytical tool rather than a model to illustrate futures thinking in general. The coding was quantified to create a descriptive picture of how much the companies engaged with each category of futures. Types of futures references were divided into less alternative futures (predictable, projected, and probable futures) vs more alternative futures (plausible, possible, preposterous).

Further, analyses of what the companies considered as outcomes of the workshop sessions, as well as their intentions to apply these outcomes strategically in the future, were analyzed based on interviews, with reference to the materials produced during the workshops. This allowed for an analysis of whether the companies intended to follow through with the ideas and plans they had made.

3. Results & discussion

The first part of the analysis pertains to how the companies referenced and thought about different categories of futures during their activities, while the second part of the analysis examines the types of design outcomes the companies generated, and what their subsequent strategic intentions were.

3.1 Design reasoning: Exploring more or less alternative futures

Considering a *less* alternative future category of the futures Cone, *probable* futures are described as futures that are *likely to happen*. For Company A, incidents coded with these types of futures accounted for 52% (Figure 2); representing the type of future which their discussions fell under the most. Usually, probable futures are based on current trends and known circumstances (Voros, 2019), and trends and megatrends were exactly what dominated many of Company A's discussions. Taken together, 58% of futures references made by company A were *less alternative* projections of current states (i.e., predictable, probable, or projected futures). Examining when Company A did discuss alternative futures reveals a pattern of sequence. In several incidents, we identified how responses of probable future were followed up by ideas relating to more alternative futures as curious probes of "what if", representing the 42%. However, the more plausible ideas, such as "can this new product eventually undermine our own business?", were often rejected quickly and the discussions returned to its notion of probability.

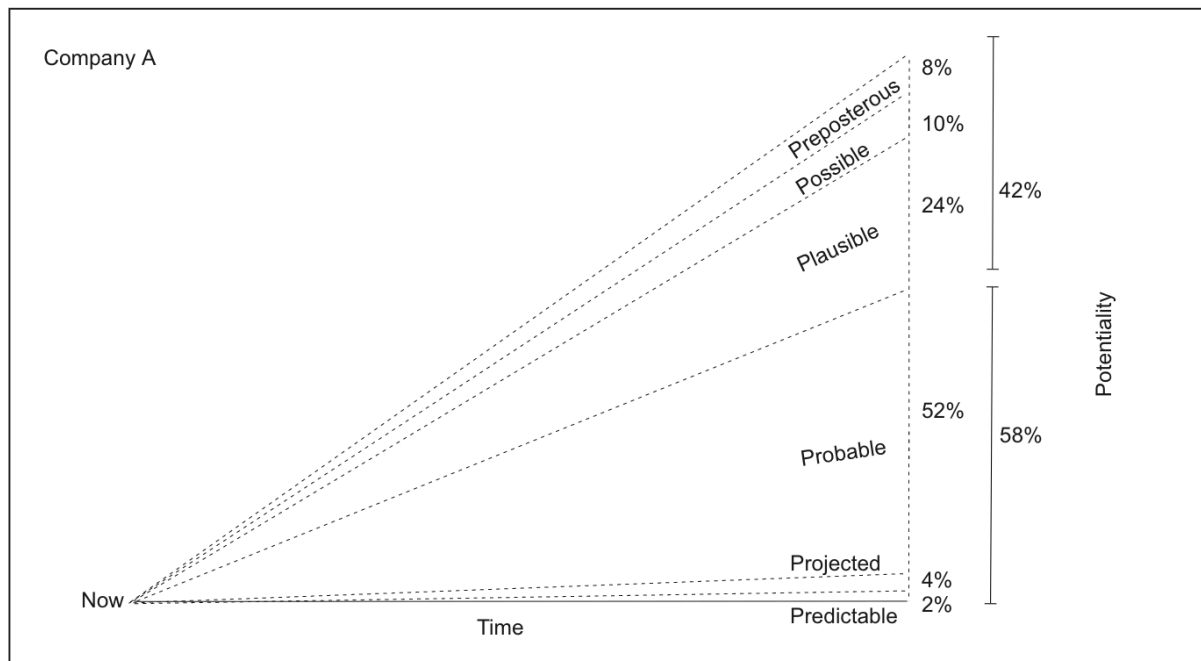


Figure 2. Proportion of Company A's in-situ dialogue in each category of futures. Company A's dialogue was dominated by the category of less alternative, "probable" futures.

In contrast, Company B did not engage as much with *probable* futures. Only 2% of the total codes covered *probable futures*. Instead of extrapolating trends, Company B reasoned by considering current known concepts in relation to something new. As an example, Manager B used an existing type of housing solution, to reflect upon a future concept for Company B. Thus, Manager B considered the consequences of combining their product with something completely different.

Company B spent more time discussing alternative futures – *what might happen*. Covering collectively 85% of the codes assigned to Company B's discussions, *plausible*, *possible*, and *preposterous* futures were considered the dominating futures in their discussions (Figure 3). In a typical example, Manager B imagined a *plausible* future in which their company has expanded its business and product in an extreme way, entering a whole new market. Typically, Company B would first suggest an idea of an alternative, plausible future and afterwards, briefly, discuss more practical and probable parameters. This movement from “wild” ideas to practical implications was dominating Company B's discussions and can be seen as an opposite movement to Company A's way of discussing futures. Taken together, only 15% of futures references made by company B.

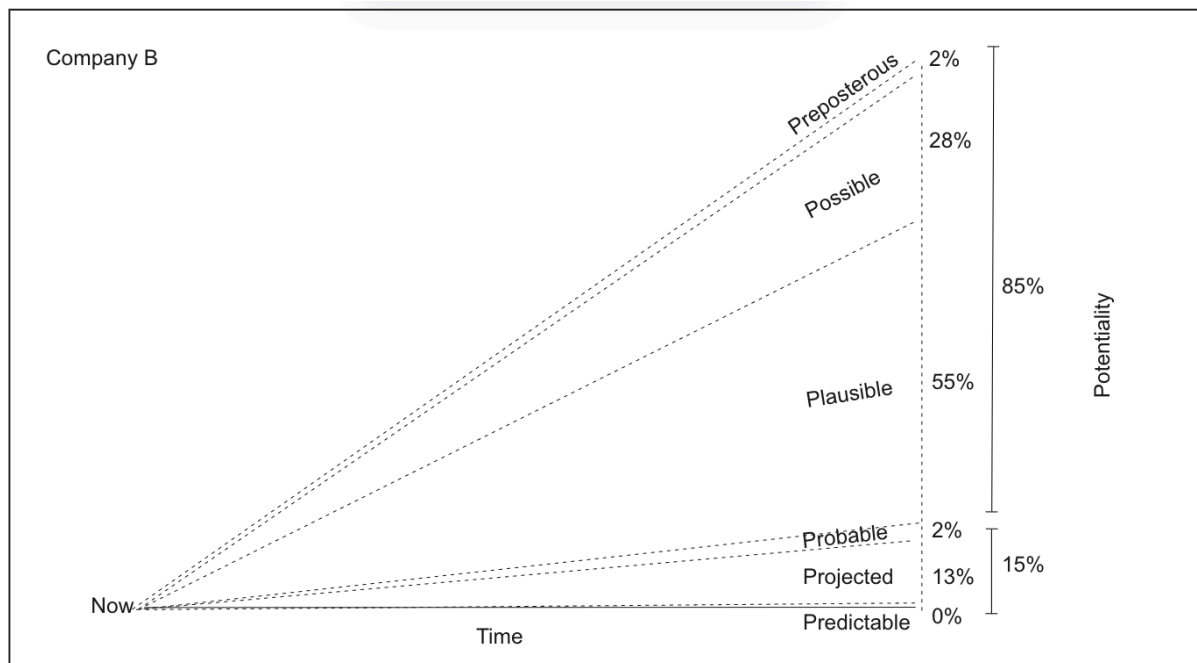


Figure 3. Proportion of Company B's in-situ dialogue in each category of futures. Company B's dialogue was dominated by the category of more alternative, “plausible” and “possible” futures

3.2 Design outcomes and intentions for implementation

The two companies differed significantly in how they opted to set a strategic direction, create change, and generate ideas for the future during Future Now.

In analyzing the types of strategic outcomes that the companies generated, both companies questioned their existing systems and generated new ideas of what to target. How to gain knowledge differently, i.e., creating partnerships to inform their employment and processes, was a core topic for Company A, while how to become relevant in a new market, i.e., offering specific finance models and solutions, was essential to Company B's discussions. The two companies displayed markedly different foci pertaining to the types of change (*inbound vs outbound*) that they considered in their solutions. However, Company A was focused on future opportunities for their existing parameters and lines of business, such as their current employment and waste disposal, indicating a focus on creating *outbound* change. Their consistent focus on probable and current events seemed to keep them from incorporating a long-term future orientation in their design work. Conversely, Company B tended to work on existing systems as they focused on *transforming* a new market rather than simply *improving* it. In contrast to Company A, Company B both focused on how they could make changes in new markets with their current product, (i.e., *outbound* change), but also considered how the conditions of their future market could form them, (i.e., *inbound* change). In that sense, Company B to a larger extent incorporated foresight into their design discussions and ideas.

Considering all Company A's discussed ideas throughout the program, it is hard to identify one single idea that was continuously elaborated and documented. Rather, Company A unfolded a variety of areas, such as strategic partnerships, digitalization, and optimization of production, seemingly unconnected by a joint strategy or business model, illustrating that they did not decide on a specific focus for a future directionality. Eventually, Company A designed an industrial PhD position targeting both competence development, partnerships, and waste reduction, but also followed another apparently disjointed lead of contacting painting companies to investigate the possibility of using their waste as a fill product. Therefore, Company A's outcome of Future Now can be seen as a *portfolio of new ideas* stretching into the future in a variety of directions but anchored in their current means. In a follow-up interview, Manager A stated that he did not see a connection between the scenarios and their final ideas: "I don't think it [the scenarios] has had a direct effect on what we ended up with, beyond thinking differently", which indicates exploring multiple divergent future possibilities as opposed to the setting of a strategic direction. In contrast, Company B early in Future Now decided upon a core, long-term focus and pursued this path throughout the program, which resulted in the formulation of a new mission statement, moving their focal business area to a new market, and a new focal value offering (moving from refugee camps to general low-cost housing cities). In a follow-up interview, Manager B expressed that "The way I look at the business now is markedly different than it was half a year ago" and explained how their objectives had become clearer in the process. Further, Manager B stated that, participating in Future Now had been about "connecting the dots", which indicates a process of creating a common thread leading towards a new end-goal anchored in the future.

Taken together, our analysis suggests that company A and B approached their participation in Future Now in two markedly different ways. This resulted in different outcomes and, overall, different processes (see table 1). It is noticeable how company B opted to focus on creating a specific *preferred* future and worked towards this as an end-goal. By contrast, the focus of company A varied throughout as they created several independent and disjointed ideas mainly related to sub-divisions or specific areas of their business as opposed to pertaining to their overall strategy or business model. In that regard, company A's disjointed ideas seemed to arise from considering aspects of the future scenarios, but without setting a new coherent strategic direction for the company.

The two different approaches resemble somewhat closely with what has been termed *effectuation* vs. *causation* reasoning in the entrepreneurship literature (Sarasvathy, 2001). Company A engaged in reasoning processes anchored in their current means, internal structures and offering while creating a portfolio of new ways in which they might create value for some new future context through outbound change. This approach is highly similar to what is termed *effectual* reasoning, as carried out by entrepreneurial companies. Conversely, Company B quickly set a new strategic direction and vision statement anchored in the future, and subsequently pursued roads towards this new end through a mixture of in- and outbound change. Their process of aligning a new future with their current structures and processes has strong elements of what is called *causation* reasoning: a focus on identifying the means needed towards a pre-set end-goal.

However, despite the clear linkages to the entrepreneurship literature, it is theoretically interesting to note that Company A discuss *less* alternative futures using *effectual* reasoning, while company B engage with *more* alternative futures using *causal* reasoning. This is theoretically surprising, since effectual reasoning is usually associated with highly dynamic and uncertain contexts. But here the company (company B) engaging with the more alternative and uncertain futures, is also the company setting clear new goals and anchors in a distant future to pursue causally and strategically. These results help inform the entrepreneurship literature: Effectual reasoning appears not to be the only way a company can engage with a highly uncertain distant future environment. Company B illustrates an approach where current means and future ends can be brought to align and converge in setting strategic directions. As such, the present study illustrates that foresight-driven design can be one way toward setting strategic goals in a distant and uncertain future.

Table 1. Two Approaches to Foresight-Driven Design

	Company A	Company B
Opportunity Space	Discussed highly probable futures depending on global and current trends and <i>what is likely to happen</i> .	Discussed highly plausible futures unfolding with <i>what could happen</i> in more alternative futures.
Inbound/ Outbound Change	Primarily focused on how the company itself could influence the world with new initiatives, i.e., outbound change.	Focused both on how the company could handle changes coming to the company from the world, i.e., inbound change, and how the company could influence the world, i.e., outbound change.
Causation/ Effectuation	Used mainly current means to reflect upon possible ideas and actions in the present.	Decided on a strategic anchor in the future before discussing the means towards reaching it.

3.3 Strategic timing and resources as factors moderating the companies' choice of approach

The purpose of Future Now was for the companies to use foresight-driven design to create strategic change. Yet the two companies differed in their approach to this task. What might explain this difference in approach? In exploring possible moderators, our analysis highlights the importance of strategic timing and company resources.

The foresight-driven approach should create capabilities for companies to be more prepared for changes – yet the foresight literature tends to not focus on how companies can prepare for foresight. Scholars of organizational change management have discussed *readiness* in relation to organizational change management (Weiner, 2009), but literature on readiness and timing regarding foresight remains scarce. Further, as Wiener et al. (2017) stresses, foresight can be limited by a company's internal structures and resources and can also be restricted by existing mental models. Our analysis seems in support of both strategic timing, and company internal structures, serving as important moderators of the approach taken in a foresight-driven design context. Company A's focus on their current structures, available resources, and the lack of a current strategy process seemed to serve as barriers for creating an overarching new strategic direction and change for the company in Future

Now. Even though they did take-away a portfolio of new ideas, Manager A explained how they had returned to their everyday procedure after Future Now. Consequently, Company A did not align their ideas into a strategic direction and did not show a high degree of motivation to follow through with their ideas even though they did create an Action Plan. In contrast, Manager B *integrated* Company B's participation in Future Now with an already ongoing strategy process which made it possible for Manager B to use the already assigned resources in the further implementation, while avoiding having multiple potentially conflicting changes simultaneously. As Manager B expressed at the beginning of Future Now, he was already involved in the task of redefining company B's strategy when he engaged in the program Future Now, allowing him to integrate Future Now into an ensuing strategy process: "[i]n all the months I participated in Future Now, I made it fit synchronically into the challenges one is facing when changing a strategy" (Manager B).

4. Conclusion

Foresight-driven design is an emerging design approach that combines elements of foresight and design in strategic work. Research on the company effects of entering foresight-driven design is scarce, and we aimed to rectify this by tracing two companies involved with the development program Future Now throughout their participation. Our analysis strongly suggests that company A and B approached their participation in Future Now in two markedly different ways. This resulted in different outcomes and, overall, different processes. While Company B created a specific *preferred* future and worked towards this as an end-goal, Company A's focus varied as they created several independent ideas, leading to a portfolio of new ideas without a coherent strategic direction. Company A engaged in reasoning processes anchored in their current means while creating new ways in which they might create value for some new future context through outbound change, similarly to what has been termed 'effectual' reasoning. Conversely, Company B quickly set a new mission statement anchored in the future, and then pursued roads towards this new end through both in- and outbound change, similarly to 'causation' reasoning. Two factors were found to moderate the choice between these two approaches: the timing of entering the program related to the company readiness to engage in strategic change, and an initial company focus on internal structures (means) led to a less strategic and future oriented goal-setting. As this case study is limited to the longitudinal tracing of two manufacturing companies, further research is needed to establish the generalizability of the present findings in foresight-driven design programs like Future Now.

As to implications for further practice, designers as managers should consider when and how they integrate future visioning in their strategic processes and that the outcome probably relates to the intentions for participating. Therefore, facilitation with a focus on individualization of the process is thus needed in a program like this to make companies consider especially inbound change. The foresight act does not come natural for everyone and requires a maturation of companies' imagination.

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