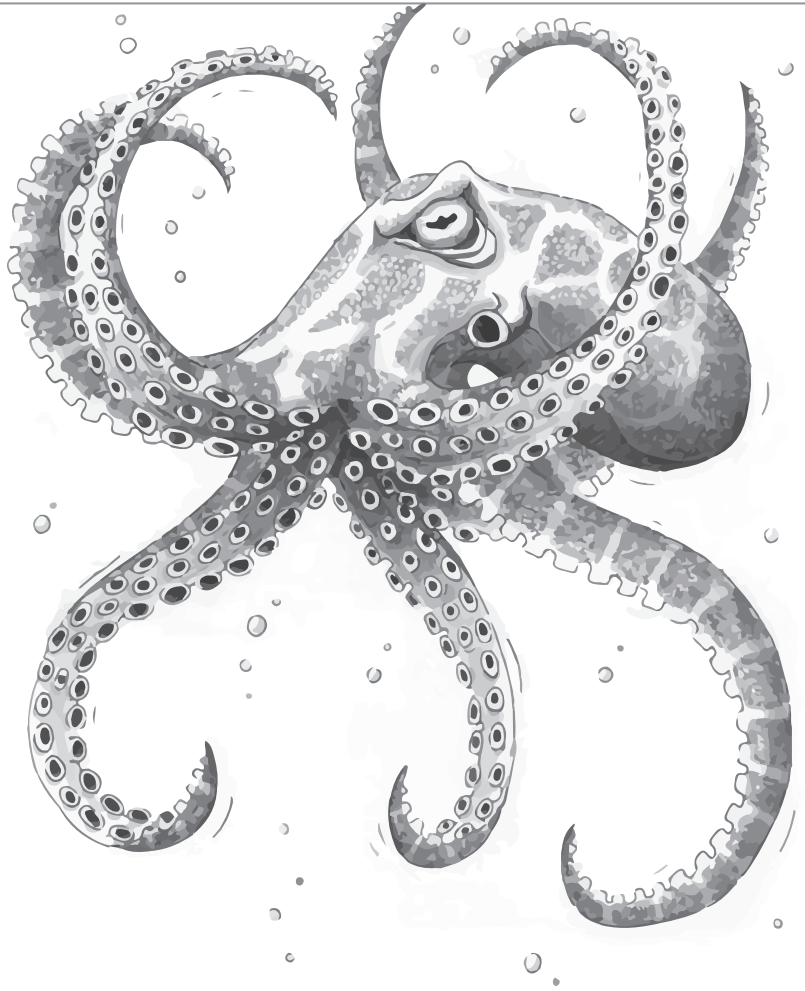




## Discussion



8

## General discussion

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## 8. General discussion

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The aim of this dissertation was to bring the benefits of using design-led futures techniques, such as concept cars from large-scale corporations and critical design and design fiction from scholars, as an approach to supporting innovation in SMEs. We understand now how these techniques are used in practice and, through the development and evaluation of DIVE, explored the potential to apply them within SMEs. In this final chapter, we present a general discussion of the value of our findings, of general limitations, as well as suggestions for further research.

We discuss this value in the three areas of interest to which this dissertation contributes. Initially, Section 8.1 reflects on the theoretical contribution to the confluence of futures studies and design. Subsequently, Section 8.2 takes a look at the practical contribution in which this confluence can serve enterprises. Finally, Section 8.3 discusses the way these theoretical and practical contributions add to design education. Section 8.4 ends this chapter with a summary of the limitations of the studies of this research and some opportunities for further, more detailed research.

### 8.1. Design is a strategic asset that adds to futures studies a practical way to make tangible images of the future

This section reflects on the confluence of *design* and *futures studies*. Initially, as part of the domain of *design –research–*, it discusses design as a strategic asset that connects the present with the future and support this discussion with two instances: concept cars and vision concepts. Finally, on the domain of *futures studies*, it deliberates about the particular values of the design-led futures techniques: a practical approach that produces tangible outcomes that can critically reflect on the future.

#### 8.1.1. Design is the strategy that connects the present with the future

Design used to be seen as an operational tool to support private companies solving current issues. For the majority of the large, medium and small-sized enterprises, design was an exercise that, among others, improves the efficiency and appearance of their products. Examples are industrial and graphic design, such as the design of structural packaging and its labels or the design of an electronic gadget and its instructions. In both cases, the packaging and the electronic gadget are an integral part of the current product portfolio. More recently design is seen as a particular way of thinking, doing, and making, that could help private, third sector (solidarity), and public organizations make strategic decisions. The transition between the design of a



thing made, such as a product or an image, to the design of an idea, such as a strategy or service, becomes evident in the business environment with the boom of designers in more strategic levels and consulting firms' buying of design agencies. Although design has managed to expand to various organizations, scale in its structure, and address the intangible, it is still tied to the present. In accordance with this situation, most of the literature on strategic design moves around *design -thinking-*, as a creative way to solve the current problems, leaving aside the fact that a strategy that does not contemplate the future is useless.

In view of this gap in the literature, this dissertation considers design as a strategic asset only when it is able to support organizations solving current problems and critically explore the possibilities of the future, therefore when truly making use of the capabilities of design. While clarifying the tension between *design thinking* and *design-led futures techniques*, this inquiry adds to the research of authors such as Verganti (2009) and Calabretta, Gemser, and Karpen (2016), who study design from a strategic perspective.

This dissertation shows that design-led futures techniques complements design thinking techniques to advance the strategic relevance of designers' roles by offering them ways to transition from the operational to the strategic levels of organizations. The findings of our studies suggest that design-led futures techniques help designers move from the bottom of the company to a position that transversely links the top with the bottom. In all the design-led futures techniques we investigated, from concept cars to design fiction, designers look at the speculative future, from the world as it is, to set a *vision* and look at the world as it is, from the speculative future, to make *decisions* to get to that world. The *innovation strategy*, which covers what happens between those two ends, maps up the different time frames: for the speculative future, a *vision*, a dream based on company's values; for the near future, a *plan*, in which the opportunities and risks are considered; and for the world as it is, a set of *decisions* including new ideas based on the reality. It seems as if the ideas part of this innovation strategy affects different levels of the organization, from the company's strategy to its products.

This dissertation shows that at the corporate level, the vision of the future strengthens the company's vision with a new perspective that focuses more on the users and the intersection of their values and the values of the company. The cases discussed also demonstrate that these futures explorations also open a space of discussion in which the core values of the enterprise could be reinvigorated, defining a clearer mission and set of strategic goals and objectives.

Although both, design thinking and design-led futures techniques, use a human-centered perspective, design-led futures techniques are much more holistic. Along the futures exploration, design-led futures techniques include the political, economic, socio-cultural and technological context factors and their intertwined nature to build plausible ideas of the future. Our findings suggest that, at the business level, these design-led futures techniques support companies in discovering strengths,

weaknesses, opportunities, and threats that allow companies to reinforce their existing business or even create new ones. At the functional level, these speculative design explorations allow companies to gather ideas of new products, services, or processes. These ideas, inspired by the vision, are plotted along the time frames. In sum, it became clear that design is an effective approach to lead companies –from large-scale corporations to small and medium-sized enterprises– and other organizations to reflect on their future allowing them to make more educated decisions about the present.

As part of this contribution, this thesis investigates the case of *concept cars* that exemplifies the strategic value of design in the automotive sector and subsequently *vision concepts* in other economic sectors.

### ***Concept cars are strategic 'vehicles' to innovate and share innovation with a large audience***

Although concept cars are broadly recognized as an interesting phenomenon, it has seen little academic interest. This dissertation illustrates that concept cars have long been successfully applied in the automotive industry as a speculative design practice to envisioning the future, thus building on the work of Backman and Börjesson, and other authors who worked with them (2005; 2006; 2007) in the field of strategic design and innovation.

This dissertation identified the way automotive corporations use concept cars as 'vehicles' to innovate and share this innovation with a large audience. It also distinguished between using concept cars as an end and as a means for driving innovation. As an *end*, concept cars are experimental artifacts of the future, unrestricted by constraints imposed by the present conditions, such as production capabilities and market regulations. They can be envisioned for different time frames, from the world as it is, in which they propose modifications for existing vehicles, to the speculative future, in which they define new ways of transporting people. In view of the design perspective, this dissertation found that concept cars incorporate avant-garde style and cutting-edge technology, proposing new interactions between users and vehicles, different users, and vehicles and their context. We also observed that these fictional vehicles are embodied by refined –even fully working– prototypes, which allow people to experience the concept car as close to reality as possible, and sophisticated videos, which complement the experience and integrate users and future context. As a *means*, concept cars follow a hands-on process that uses visual synthesis and prototyping to explore and communicate images of the future. During this process, companies can learn-by-doing about different context factors, including among others changes in the behavior of –potential– users, new technologies, and relevant political shifts. This process also helps organizations collect insights about future's directions and its potential impact on technology and the environment.

In sum, within the domain of –strategic– design, concept cars represent one of the



design-led futures techniques that materialize the visions of the future in tangible prototypes and narratives which call the attention of many people. These allow automakers to share their vision of the future internally and externally which improve the perception of the brand and embrace people to feel aligned with the – future– values of the company.

An important insight from our research was that the term concept cars is also used outside the automotive sector, regardless whether it is applied to the software or technology industry. It refers to an experimental approach that generate concepts of new products or services in the form of prototypes, instead of concrete ideas that give directions on the future of the business.

### ***Vision concepts explore material scenarios, in which people interact with futuristic product service system***

We grouped together concept cars, products, and services, defining them as *vision concepts*. Although the notion of vision concepts was developed by Keinonen and Takala (2005; 2006), the insights of the empirical studies in this dissertation went a step further by describing in a more precise way the purpose, process, and outcomes of these techniques that serve businesses. The perspective on futures studies and the focus on the technique makes the contribution of this dissertation to their work more valuable.

We identified that while concept cars focus on just the car, vision concepts explore material scenarios, in which people interact with futuristic product service system, to see the way in which these systems and interactions affect the business. Both concept cars and vision concepts present the vision of the future through prototypes of the product –service system– and videos of the interaction between people with innovation team players, and specialized and general public. As process, making a vision concept is an exploration, which is guided by a research question, that yields a conceptual outcome, instead of a practical solution, and has a strong focus on communication.

This inquiry, which involved a more pragmatic aim, also contributed to the research of Bleecker (2009), Auger (2012), and Dunne and Raby (2013), comparing the more practical futures explorations –vision concepts– with the more academic ones –critical design and design fiction–. Considering that vision concepts, critical design, and design fiction are design research practices, guided by research questions and ending in concepts, the comparison of these business- and non-business-oriented design-led futures techniques also gave us the opportunity to map them into the landscape of design research proposed by Sanders (2006). As part of this landscape, the speculative design practices hold a spot where design explores different time frames, from the world as it is to the speculative future, to find a mid-way between engaging and provoking people to unlock imagination, escape the constraints of the market, and gain a fresh perspective on reality.



## **8.1.2. Design produces tangible outcomes that can critically anticipate the future**

With regards to the domain of *futures studies*, this dissertation fills a gap in the literature adding to the research of authors such as Voros (2001, 2003, 2007), van der Duin (2006, 2007), and Popper (2008), who study different techniques to envision the future. As part of this contribution, we positioned design-led futures techniques as a valuable way to anticipate the possible and probable and map the preferable –future– helping companies be aware of change and thus make informed decisions about the present to guide its innovation strategy. We included design practices as an integral part of the inventory of futures techniques in addition to management-led futures techniques, which are traditionally considered as proper ways to explore the future. Beyond extending the inventory of futures techniques, this dissertation identifies the particular values of the design-led futures techniques: a practical approach that produces tangible outcomes and critically reflect on the future.

### ***Designers use a visual, hands-on and human-centered approach to make the images of the future visual and tangible***

Our findings show that where managers use a data-driven and textual approach to produce verbal and abstract outcomes, designers use an intuitive, experiential way that results in visual and tangible futures. The insights of this inquiry on the difference between analytical and inspirational approaches contributes to the discourse of Candy (2016) adding details on the benefits of transiting from the use of words, images, and artifacts when exploring the future.

With regards to the *approach*, designers analyze context factors using secondary and primary sources, iterate different ideas of the future by prototyping and storytelling, and then share these images of the future through generative workshops. In each activity, designers make use of their capabilities, such as empathetic analysis, visual synthesis, making prototypes and stories for evaluation and communication, and creative facilitation. When collecting context factors within a specific domain, designers do not only study reports with past, current, and future trends, but also observe people and contexts with empathy, to collect impressions on how the context might or might not change during a particular time frame. In some cases, designers even conduct compressed ethnographies, describing the culture of a society to uncover emerging trends. These professionals also synthesize the context factors in a more visual-oriented way, using timelines, collages, cards, and Venn diagrams, among others. Additionally, in each iteration, they make diverse prototypes, such as sketches, diagrams, illustrations, pictures, or mockups, to get ideas out of their heads and make them visual and tangible, and also create stories in the form of storyboards, scrips, and videos, to give their ideas a context. Throughout these iterations, the definition of the ideas increases in accordance with the level of resolution and fidelity of the prototypes and visual narratives. When concluding these explorations,



designers make use of their skills to facilitate conversations about the future and the present. Along these conversations, they use prototypes and narratives, supported by key questions, and diverse techniques to collect the insights of these talks.

With regards to the *outcomes*, designers use their specific knowledge, skills, and expertise to translate the abstraction of the future into the concrete form of prototypes and visual narratives that suspend disbelief about possibilities in the future contexts. In line with Candy (2010; 2016), this dissertation established that these tangible artifacts, which exist in a form that can actually be experienced, allow people to be subjected to a glimpse of the future using their full body instead of only their minds. Therefore, these visual, tangible, and experiential outcomes, which can easily be shared, allow companies to trigger thoughtful discussions with employees, external allies, and –potential– users about the company’s future and present. While managers focus on the strategic level producing pages of text, at best profusely illustrated with histograms, designers center their attention on people and contexts, generating prototypes and narratives, supported by visuals. We argue that while most of the outcomes of the management-led futures techniques can only be shared internally with high-level managers due to their abstract character, the concrete artifacts produced by the design-led futures techniques can involve more people in the discussion about the future. The design outcomes can be shared through workshops and exhibitions at team, in-company, and general public levels. At the team level, participants of these explorations can understand new technologies and trends by making, sharing, and feeling these artifacts of the future, learning-by-doing. At the in-company and the public level, different employees of the company, or the general public, can develop a clear image of the future by seeing and feeling the artifacts. Making the future experiential provides everyone, including employees, users, advisors, and possible allies, among others, a common language that is more intimate and thus easy to understand and remember. A language that allows them to collect ideas, identify opportunities and risks in different time frames, and align agendas for implementing their future ideas.

***By using design, the futures techniques could also be compact, critical, and low- , truly involving people in the making of stories about the speculative future and the world as it is***

In analyzing the design-led futures techniques used in practice, this dissertation understood that *critical design* and *design fiction* can generate more challenging and disruptive future scenarios than those developed by large corporations through vision concepts, addressing issues from different viewpoints not bound by market restrictions. Both critical design and design fiction taught us that there are ways to use less money and time than concept cars, products and services, using a more compact format and collaborative setup, which results in rough prototypes and simple videos. These inexpensive, brief activities, and their straightforward outcomes turned





out to be even more effective in triggering reactions and sparking conversations; creating more radical ideas, which challenge the present situation, and proposing a large change for a broad range of topics, including political, economic, socio-cultural, environmental, and technological issues.

One of the key elements of the design-led futures techniques outside the automotive industry is the use of storytelling. This is a tool that not only helps create an artifact, the key character of the story, but more importantly, a future context in which certain people interact with the artifact. While writing this dissertation, we discovered that designers could help company representatives in the process to detail these futures through making coherent and well-structured stories. Storytelling impacts beyond futures studies and affects more than just SMEs. Entrepreneurs in the early stages of a start-up could also use stories about the future to communicate their aspirations and values; likewise, consolidated companies can use narratives to approach new markets. Currently, narratives are key to approach the right people at the right moment and the capability to create those stories is a critical business skill to endure in time. It seems like design can bring to private companies and public organizations visual memories of the speculative future supported by fluid narratives that guide them when making decisions about the world as it is. These practices move from concept cars made by large-scale automotive corporations to vision concepts applied by SMEs through DIVE. It also includes critical design and design fiction used by independent designers for communities, governments or businesses.

## 8.2. SMEs could apply design futures to navigate towards the future, taking advantage of their resilience and compact architecture to leave a personal legacy

A key aspect to mention about the value this dissertation contributes to the confluence of *design* and *futures studies* is its application in SMEs. While most of the investigations about design have been conducted in the context of large corporations, the use of design in SMEs has not been researched extensively, and even less on issues related to futures studies. This dissertation shows how design, as a strategic asset, can help SMEs in general and in particular in the form of futures speculations. SMEs not only need solutions for current problems, they also need support to move towards the future. This is especially important as these enterprises are responsible for a large majority of the productive sector and thus contribute critically to society's development.

During this research, we identified that SMEs navigate towards the future, taking advantage of their resilience and compact architecture to leave a personal legacy. The iterations and cases with SMEs taught us that these enterprises, which are compact, flexible and flat organizations, reflect on the future in a more intimate way. Company



owners and managers blend their concerns about the future of the company with their anxiety about their own future, such as their expected retirement and how they will leave the company for their business partners, family, and community. However, they don't have the appropriate knowledge, resources, and techniques to apply traditional futures techniques. Throughout the development and evaluation of DIVE, a design-led futures technique tailored for them, it became clear that it should not only be compact in terms of time and resources, but above all should suit the characteristics and culture of this particular type of enterprise. In sum, this dissertation clarified how SMEs are not just companies with fewer employees and resources; they think, talk, and behave toward the future in a different way. This dissertation understood this different way along the application of design futures, and the next section reflects on it in two parts: (i) the level of resolution of the future's image for SMEs and (ii) the ethical dilemmas that the future represents for SMEs

### *Although the image of the future may be blurred, it can guide SMEs*

The design-led futures techniques present a single outcome, an image of the future, that works as a case-based analysis. Instead of seeing it as a limitation, the impossibility of seeing the opportunities offered by multiple long-term scenarios, common on the management-led futures techniques, we recognized it as a benefit, the possibility to focus on just one domain. The iterations and cases of this dissertation demonstrate that focusing on just one area of interest and producing just one image of the future decreases the level of uncertainty about the future. This is a positive aspect for SMEs, which often struggle with this fuzziness.

We proposed that the resolution of the images of the future that result from the design-led futures techniques, which are to a certain extent, different among them, is not an impediment to anticipate the future. For each case, the purpose and type of sharing determines the level of detail of the prototypes and visual narratives that provide a more or less vivid image of the future in the mind. On the one hand, you have the showy, glossy, and even fully working prototypes of concept cars, supported by professional commercials, which are both made for motor shows and describe high resolution images of the future of the automotive brands. On the other hand, there are the basic mockups of design fiction in combination with simple videos that focus on the user's experience, which are used at the core of compact workshops, in which entrepreneurs explore opportunities. In view of the SMEs' characteristics, we uncovered that that these enterprises are more prone to use an unfinished image of the future than corporations that share finalized visions. Therefore, we propose that the outcomes' resolution of DIVE should be in between the vivid concept cars and fuzzy design fiction. The different cases developed through this dissertation showed that the low level of resolution of these artefacts and narratives, which seem unfinished, invite participants and other stakeholders to have an informal, lively, and open conversation without imposing views of the future. It seems as if these unfinished images of the future are more coherent with SMEs due to the small difference



between employees, which is related to their more horizontal and participative structure. Consequently, SMEs need down-to-earth artifacts and simple narratives that make it easier for participants to understand and adopt a realistic future vision that fulfills their expectations, rather than just sketches or storyboards. Apparently, large companies require finished visions because the much larger distance between the workers and the highest-level executives in senior management, who are the only ones that have the chance to decide on the further plans.

### ***The ethical dilemmas that the future represents for SMEs***

It is not surprising that DIVE also led to distinguish between uncertainties and ethical dilemmas for SMEs, such as how an advertising company could encourage consumerism in Cases 1 (Vision concepts ‘The Real Experience’ and ‘The Experience Box’ for Solutions Group), or how to make the notion of luxury sustainable in Case 6 (Vision concept ‘Heaven of the seas’ for Oceanco). It seems related to the idea that designers and company representatives used the company’s values to make decisions through the activities; from defining the domain to selecting recommendations. During this process, they incorporated the company’s values into the futuristic artifacts, made decisions about desirable tomorrows, and faced sensitive topics on how preferable one future is compared to others. Designers described the conversations in which these uncertainties and ethical dilemmas emerged as the most difficult. A more humanistic point of view was needed to help designers to get more out of each case and deal with the ethical dilemmas in a more competent way. One factor that could exacerbate this condition is that the research was done at a technical university, at a faculty where these points of view are just starting to be implemented in research projects. In sum, even though artifacts are valuable in contextualizing the debate about the future, designers need strong skills, or even the support of other professionals, to facilitate these sensitive conversations.

In regard to the use of design in SMEs, the design-led futures techniques allow, thanks to the intuitive, visual, and trial and error approach, a creative look at the future that opens fictional worlds, which would not be discovered otherwise. In this dissertation, we argue that this creative look, which creates fictions distant to the reality of the world as it is, focuses on the human and context perspective. This perspective understands the user as part of a context in which it is possible to develop innovation strategies driven by the integration of people’s needs, desires and expectations, and political, economic, socio-cultural and technological context factors. According to this dissertation, only if these factors are incorporated, the speculations about the future can result in feasible plans to develop new products, services, and businesses closer to the users. Incorporating this human and context-centered perspective along the innovation strategy helps companies fill the gap between the organization and its users. This action is particularly important in SMEs that normally do not have a clear understanding of their users, clients, and business context.

In addition to this reflection, with this dissertation, we help design practitioners by offering them: (i) DIVE, a design-led futures technique specially developed for SMEs, and (ii) an overview of different design-led futures techniques for other problem owners.

The main value that this dissertation brings to the design practice is DIVE, the design-led futures technique for SMEs, which can be seen as one of the few *design-erly* (design-led) tools to develop a strategy. DIVE, which is fully guided by design's principles, helps SMEs make a plan of actions over a period of time to achieve the strategic position that they want, improving their location in the business context. Currently, the technique is part of the service portfolio of my entrepreneurship *rrebrand* (<https://rrebrand.com/en/>), a strategic design consultancy that helps organizations innovate in a meaningful way, in which it is made available for testing by other designers and SMEs. DIVE transfers the benefits that this study identified on design practices from large corporations and academia, such as concept cars, vision concepts, critical design, and design fiction, to supporting innovation in SMEs. As a design-led futures technique, DIVE suits the SME's preferences and idiosyncrasies due to its compact and inexpensive activities which emphasize visual synthesis, making and storytelling. Although the results of these activities might be less flashy than concept cars and other design-led futures technique used by large corporations, these simple prototypes and videos help SMEs internalize and share a clear image of a preferable future, a vision. Developing DIVE thus helped us explore how design can support SMEs in envisioning the future in the context of innovation. Chapter 7 has extensively discussed the recommendations for the design practitioners in view of the way to plan, conduct –including activities and outcomes–, and evaluate DIVE.

This dissertation also includes a detailed description of different business-oriented and non-business-oriented design-led futures techniques that can be applied in different circumstances. Examples of the former are vision concepts –concept cars, products and services– that can be used to explore the future of large corporations (Chapter 3 and 4), and DIVE, the design-led futures technique developed along with this dissertation, that can be used for SMEs (Chapter 5 and 6). It also sketched two techniques of the latter category, critical design and design fiction, which can be useful when approaching projects that need a design-led futures technique but have open briefs, including ill-defined problems and projects without problem owners (Chapter 4). In view of these techniques, design practitioners can select the most appropriate way to explore the future, from concept cars for business-oriented challenges in large corporations to critical design for non-business-oriented assignments.



### 8.3. Teaching designers design-led futures techniques will give them non-existent added value in -traditional-business consulting

Even though the aim of this dissertation is not explicitly related to design education, we found that DIVE, as well as other design-led futures techniques, could be used as an effective way to educate design students and update professional designers about strategic design.

Developing the cases discussed in this dissertation, we worked with students at bachelor and master level. What we found is that students should acquire, to a certain extent, knowledge on futures studies, more specifically, skills on design-led futures techniques. In general, most of the -strategic- design programs teach students diverse management-led futures techniques, such as scenario thinking and trend analysis. The findings of this dissertation suggest that these techniques are far removed from how design students learn -think and make- and are thus difficult for them to internalize. Although the design-led futures techniques described in this dissertation are closer to design students' way of working, they are not covered by academic design programs. This dissertation introduced a set of design-led futures techniques that could be part of the -strategic- design programs and used when teaching design students topics related to futures studies and strategic design. Here, too, DIVE can be used as a technique for compact workshops in which design students can learn about strategic design, particularly speculative design, along with exercises with SMEs. These exercises should also teach students about how to deal with this type of enterprises. A demonstration of the value of teaching design futures is the contribution of this inquiry to the content and structure of the courses: Design Driven Innovation, part of the Bachelor of Industrial Design Engineering, and Design Roadmapping, part of the Strategic Product Design master program, both at Delft University of Technology. Currently, this investigation is also the main input to support a permanent workshop and an elective course, both part of the curriculum of the Master of Design at University of Los Andes in Bogotá, Colombia.

Similar to the case of the students, DIVE can also be used to update professional designers in topics as strategic and speculative design. Professionals with strong emphasis on product or graphic design could receive new skills and knowledge on how to position themselves in a strategic role by using DIVE along with a practical exercise with an SME. DIVE can teach them how design is not just a problem-solving approach, and how this discipline could be a way to anticipate the future. An important example of this type of benefit is the case of the Master Class in Strategic Forecast offered by the Faculty of Administration at University of Los Andes to the middle managers of Ecopetrol, the largest and primary petroleum company in Colombia. The final module on design futures of this master class is entirely based on this inquiry.



The technique is also being incorporated as part of the portfolio of strategic design courses for senior managers of my entrepreneurship *rrebrand*.

Concluding, in working with students and professional designers, we learned that, instead of futures techniques from other disciplines, which can be better applied by other professionals, design-led futures techniques could benefit from design students and professional designers. Design-led futures techniques offer an approach to explore the future that is closer to the discipline, which gives a different way of working on strategic assignments.

As mentioned earlier, the companies that incorporate design applied it initially as an operational asset and finally as a strategic value. This is even more critical in SMEs, as not all of them recognize design as a driver of innovation. They can learn about the strategic value of design by using this design-led futures technique. DIVE uses a hands-on approach in which company representatives can learn –by doing– about the way design can help them understand the current situation of the company by applying an analogy; how designers investigate with an empathetical approach; and how this discipline makes artifacts to support making strategic decisions. This practical knowledge does not pretend to turn entrepreneurs into designers; instead it tries to give them an overview of the way these professionals works. It is useful to open up further opportunities for designers as external or in-house strategic advisors.

## 8.4 General limitations and further research

This section discusses some limitations of the research and ends with an inventory of planned inquiries.

With regards to the research approach, we used a *research through design* approach, which turned out to be appropriate to gain new understandings for the confluence of futures studies with design and transfers this knowledge to SMEs in the form of a design-led futures technique, a useful solution for the design practice. The core of this approach is to make iterations of the technique to improve it and to develop new knowledge. To a certain extend, this approach can be seen as an agile method that results in a technique and that can be applied to other –business– projects. Considering the limited time and resources of this dissertation, we made DIVE 1.0, a beta version of the technique with potential to be a final product and collect a comprehensive list of benefits and limitations for SMEs.

Concerning the research method used to build a theoretical framework, the set of studies on futures techniques, concept cars, and related design practices outside the automotive industry were enough and suitable to collect the ingredients to develop a design-led futures technique for SMEs. However, considering the fact that this dissertation is the only one that study concept cars as a design-led futures technique, other explorations are desirable to understand this subject more thoroughly. An example could be the development of an in-depth case study along with the making and sharing of several concept cars –of different brands– if more particular findings

are expected, such as details on how the team makes decisions or what the role of the prototypes within the design process is.

In view of the restricted budget and length of this inquiry, the two iterations and six cases used to develop and evaluate DIVE 0.1 and then debug it until DIVE 1.0 were (i) sufficient and (ii) appropriate.

These studies were sufficient in number because in the collection of findings, the final cases reached a point of saturation in which they only confirmed the initial findings without adding new ones.

These iterations and cases were also appropriate, while the companies represented a reasonable mix of enterprises. Since the beginning of the development of DIVE, we involved SMEs that allowed us to tune this technique to practice in view of the real needs of these companies and consolidate a set of activities and the preliminary forms to collect the information along the exploration. The seven SMEs that were part of the studies represent a well-balanced number of small-sized enterprises and medium-sized enterprises, three and four respectively. These companies cover a wide variety of products and services. Some of these products are developed for end-users, such as superyachts, dairy products, and hair care products, others for businesses, including steam boilers, hot water and heat exchangers, and point-of-purchase-material. End-users include wealthy and poor people, and businesses cover services, production of goods and basic production. Services also include services for end-users, such as engineering projects, and services for businesses, which is the case of software. The former is offered to maritime and security corporations and the latter to financial institutions. Even though this sample, which corresponded to the opportunities of the author and the supervisory team, covers a large variety of companies, it could be more diverse to acquire a broader perspective of the benefits of DIVE. An example is the fact that this dissertation does not study enterprises in a very specialized economic sector, such as the primary sector including energy or mining, which could have a different behavior with regards to futures explorations. In general, this research part of the fact that, most of the public, third sector (solidarity), and private organizations need to think systematically about the future.

Adding to this limitation and also related to the opportunities of the author and the supervisory team, all the companies' part of the studies had previous experience with applying design. In some cases, such as Campo Real and Ethos, as an operational tool and in other cases, such as Solutions Group, Ci2 and Oceanco, as a strategic asset. These enterprises already knew how design works, either from the operational or the strategic level, therefore their level of resistance to the application of the design is minimal. Even though it is not possible to know the behavior of an SME that has not had contact with the design prior to the implementation of DIVE, it is possible to assume that DIVE can be applied to most SMEs. And in the case that those enterprises are not familiar with design, as mentioned earlier, DIVE can be used to teach them the strategic value of this discipline.





With regard to the research method, observations, interviews, and questionnaires were conducted during the evaluation. Combining these methods allowed us to collect both qualitative and quantitative data, thus enriching our findings. Although the quantitative data was not conclusive, due to its small sample size, its use was meaningful considering the selection of participants –companies and designers– and external innovation experts. Another limitation of these cases could be the duration of each study. This research could include longer and simultaneous cases, which provide the opportunity to spend more time in the follow-up of the cases, in the hope of findings that measure the impact in a more precise way. Considering this limitation, further projects must study the implications and impact of these exercises more carefully.

A final note about the main goal of this dissertation. It showed how speculative design practices used in large corporations can be scaled down to boost the capabilities of SMEs to think ahead, which is especially important due to the relevance of SMEs as actors that can change our society. While people can use design to identify opportunities and risks when envisioning the company's future, special consideration is needed when it comes to SMEs: designers need to push boundaries to face the urgency of the present and reconnect enterprises with their values. Even though a design-led futures technique such as DIVE can guide these enterprises, which have an explicit commitment to their families and communities when thinking about the future, designers need to be aware that these companies may be short-sighted when making decisions. SMEs have constraints that determine their vision of the future, associated with the ambition of technical predictability that can lead to a paralysis when it comes to making riskier future bets. Given this limitation, DIVE led to ideas for long- and short-term challenges, their timing, and the potential alliances and allies to develop them.

## Further research

With regards to further research and in line with the purpose to democratize these speculative design practices, two possible next steps are: (i) to scale down these practices to support even smaller players, and (ii) to scale up these design-led futures techniques to assist even bigger players, such as local or national governments.

First, a new stage of this investigation could gather the benefits and limitations of applying vision concepts for individuals in key moments of their lives. Examples of these individuals and moments move from self-employed workers planning their retirement to patients making decisions about medical treatments. Presumably, these people, who have a different scale than the businesses and distinctive characteristics, do not have a structured way to plan ahead. Therefore, the application of DIVE, or an adapted version of it, could provide them with a more long-term-oriented vision to support them in making more effective decisions about their everyday lives. This advanced investigation can contribute to the understanding of the differences and similarities between individuals and organizations, such as SMEs, in regard to their





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expectations and attitude about the future. An investigation like this could follow a similar –research through design– approach in which the author or other researchers could develop different cases that contribute to the understanding of the benefits of this technique at a more personal scale and the variation of the technique to the needs of these users.

Second, moving from the private to the public sector is a way to contribute to local, regional, or national governments, which have a profound effect on the life of the majority of people. Their decisions affect thousands or even millions of citizens, thus they need to have well-defined instruments to look at the future. In my experience working with public and third sector (solidarity) institutions, they extensively apply management-led futures techniques, and thus face the same problems as large corporations when dealing with the implementation of the abstract outcomes. In these cases, the problem of communicating these visions of the future are even bigger due to the size and diversity of the audience. While companies deal with different segments of thousand or million users, governments approach millions of diverse citizens, who are –arguably– more heterogynous than users. We assume that this investigation can contribute to the development of a more collaborative form to create concrete images of the future that help governors to calibrate their plans and socialize them.

Along these scaling down and up, these new studies could extend the preliminary findings of this dissertation on how sensitive topics emerge when thinking about the future. As mentioned before, these explorations of the future can uncover critical issues, where an ethics advisor would be key along most of the cases. In view of this reflection, further investigations should include a co-researcher with expertise in ethics. These investigations could focus on the way in which individuals or different stakeholders of the government deal with these ethical dilemmas along the discussion about the future, and the role designers and ethics experts play in these moments of the discussions. This focus on the sensitive topics could bring a new dimension to these inquiries, one that can contribute to the nascent research area in design ethics.