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Camere, Serena; Schifferstein, Rick; Bordegoni, M

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Materializing experiential visions into sensory properties: The use of the experience map

Serena Camere[1,2]
serena.camere@polimi.it

Hendrik N.J. Schifferstein[1]
h.n.j.schifferstein@tudelft.nl

Monica Bordegoni[2]
monica.bordegoni@polimi.it

[1]Delft University of Technology, the Netherlands

[2]Politecnico di Milano, Italy

Abstract Moving from conceptual design intentions to the materialization in product sensory qualities can be challenging. For Experience-driven designers this transition can be even more difficult, as they need to move from the abstract level of user experience to the concrete level of product features. In this paper, we suggest an approach to progressively deconstruct experiential visions and decrease the level of abstraction. We propose the use of a tool, namely the Experience Map, which describes five steps to develop a well-refined materialization and maintain a solid correlation with the initial intention. To investigate its value and challenge the approach in design practice, we set up four case studies. The analysis of designers' attitudes towards the Experience Map gave insights on its ability to provide a structure for creative thoughts, while suiting different and subjective attitudes of designers. Moreover, the map supports the integration of several different elements and the exploration of alternative design directions to achieve the intended, holistic experience. Some limitations were also highlighted by the case studies, which are discussed in light of future work.

Keywords *Aesthetics, Experience design, Materialization, Multisensory, Experience prototyping*

Introduction

Designers often start the design process with certain conceptual intentions that they want to transform into a product. They might be interested in using these conceptual intentions as guiding principles for their design, to achieve better design outcomes. Or they might have the explicit aim that users can infer their intentions from the final product (Khalaj & Pedgley, 2014; da Silva et al., 2015). However, materializing conceptual ideas into tangible products can be far from easy. The challenge is to come up with meaningful, aesthetically pleasant products that are also original and competitive in today's market. This difficulty partly lies in the nature of design practice, which is concerned with ill-defined problems with no clear boundaries, and for which solutions are never right or wrong, but only better or worse (Buchanan, 1992; Dow et al., 2010; Dorst, 2011). Several solutions are possible and available for the same design question. Furthermore, designers need to manage and integrate together a variety of factors while materializing their ideas. They need to consider marketing-related aspects, such as compliance to the brand's core values and consumers' trends. They must work within technical constraints, minding the product's functionality and feasibility through manufacturing, costs limitations and so on. They also need to take into account the experiential aspects, defining how the product will be appreciated and which role it will serve in users' lives. All these aspects limit the designers' liberty (Crilly et al., 2009) and challenge them in maintaining a correlation to their initial idea, while moving from the conceptual to the tangible, material level of product features.

We propose a tool, namely the Experience Map (ExpMap), which aims at supporting the materialization of conceptual visions of new product experiences. We evaluate the application of the tool in four design cases. In these cases, the map has been challenged in design practice with designers of different levels of expertise. In the section that follows, we will first elaborate on how materializing conceptual intentions can be even more demanding for experience-driven design approaches, and which types of support designers have already at hand to cope with this difficulty.

Materializing experiential visions

In an experience-driven approach, designers usually start out from an understanding of current user experiences and contexts of product use in order to envision a new product that elicits a specific, meaningful and pleasurable user experience (Desmet & Schifferstein 2011; Hekkert & van Dijk, 2011). This experiential vision represents their conceptual standpoint that they need to transform into a tangible, material product. Compared to more conventional approaches, these visions are more difficult to materialize, as they do not concern the artifact itself, but they describe instead subjective user experiences. Experiential visions are statements on how the user might feel when using their product, often in a very conceptual sense. Obviously, designers cannot predict users' responses to their products, as these are mediated by cultural and subjective factors (Desmet & Hekkert, 2007), but they can aim at creating the optimal conditions, through the specific design of the product, for eliciting the intended experience. For

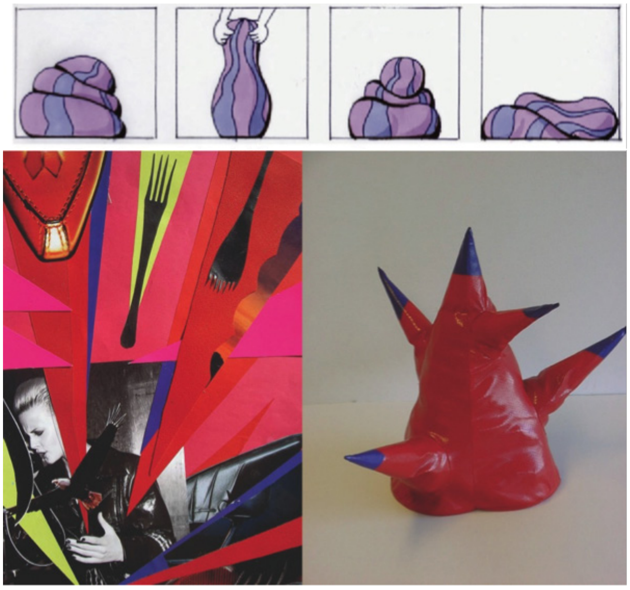

Figure 1. The two concepts of toys expressing sadness (top) and anger (bottom) developed by Weerdesteijn (2011). The sadness concept is depicted through the interaction scenario, while the anger shows the collage created by the designer as a sensory exploration (© Weerdesteijn, reprinted with permission).

instance, Weerdesteijn (2011) wanted to create toys that "aid children to express emotions physically" (Figure 1). However, this statement gave her little information on how to materialize the object. In the end, she designed six different objects for physical education, each expressing an emotion in both static appearance and dynamic movement. Figure 1 depicts the two concepts expressing 'anger' and 'sadness'. We could imagine several alternative embodiments for this design goal, but how to decide which materialization is more appropriate, if not relying on sole intuition?

Experience-driven designers can find several resources explaining the theoretical underpinnings of product experiences (Desmet & Hekkert, 2007; Schifferstein & Hekkert, 2008), and methodologies to define visions of new user experiences (Hekkert & van Dijk, 2011). Surprisingly, it is difficult to trace approaches that bridge the conceptual to the product level, thus lacking support in the transformation of experiential visions. Nevertheless, we argue that it is essential for designers to carefully shape the product across the different senses, so that it will express the intended experience at its best. All product features contribute to users' holistic appreciation, and although products will be experienced as a whole (Schifferstein, 2006), it is important for designers to fine-tune every detail. The materialization of their experiential vision will be what actually brings the experience to life (Hassenzahl et al., 2015). For these reasons, moving from conceptual intentions to tangible qualities is a delicate moment of transformation, in which every decision matters, and on which the final success of the product depends.

At the same time, it is important for experience-driven design to maintain the connection between the conceptual vision and the final design outcome, for the extensive investment of time and effort required to understand current user experiences and develop a solid, interesting experiential vision. To bridge the conceptual level of vision to the tangible level of product qualities, we suggest a progressive deconstruction of the experiential vision, "moving back and forth from wholeness to details" (Schon, 1983). Specifically, we identify as a valuable, in-between moment the definition of the product character (Hassenzahl, 2005). The product character, also called product expression, is a qualitative description of what kind of personality the product will express. Examples of product expressions are elegant, natural, lazy, arrogant, wise, playful, etc. The product character can be explored and defined not only by keywords, but also through explorative references, pictures, or metaphors. By means of the product character, designers are able to pinpoint how they would like to manifest the experiential vision in terms of qualities that give information on the future artifact. Shaping the product character across the diversity of senses, without dismissing design opportunities coming from less usual sensory modalities, can help achieving unexpected and sensorially stimulating materializations of conceptual intentions.

The experience map

The tool we developed, namely the ExpMap, is meant to provide further support in bridging the conceptual level of experiential vision to the perceptual level of tangible properties, integrating several aspects in a unique materialization. The tool is grounded in two basic frameworks, the Vision in Product design approach (ViP, Hekkert & van Dijk, 2011) and the Multi Sensory Design approach (MSD, Schifferstein, 2011). The two frameworks offer a description of activities that designers can carry out to design for new product experiences. Specifically, the tool couples the underlying theoretical framework of ViP with the specific focus on multi-sensory characterization proposed by MSD.

The ExpMap is composed of five levels, across which designers are supported in progressively decreasing the level of abstraction of their ideas, up until the materialization in product's sensory qualities. Each level suggests a specific activity to explore designers' ideas, first conceptually, then by envisioning the product character, and finally in terms of sensory properties (Figure 2). At the core of the tool, there is the selection and definition of expressive product qualities, which describe the experience in a more concrete and detailed manner from the perspective of the product that elicits the experience. Two moments of exploration (Step 2 and 4) address the collection of inspirational references, through which designers can start materializing the experiential vision. In Step 4 and 5, the tool suggests designers to consider the product characterization across the different sensory modalities, including sensory categories for both static and dynamic behavior. The categories cluster suggestions of possible sensory qualities relevant to the product. The list of sensory qualities was developed through a review of related literature resources. For a detailed description of the ExpMap,

Figure 2. A portion of the Experience Map, depicting its five levels. The map shown describes the Pulse Concept for Whirlpool by Deepdesign (Camere et al., 2015).

we refer to Camere et al. (2015).

The ExpMap has been developed through several iterative steps with designers, and has been tested in a design education setting under relatively controlled conditions (Camere et al., 2015). In this paper, we describe four cases from design practice, in which designers used the tool to move from the conceptual level of experiential visions to tangible sensory qualities.

Case studies

The scope of these case studies was to observe designers' interactions with the ExpMap in a context as close as possible to everyday design practice. Through the cases, we describe the application of the tool, its benefits and limitations and how it can support the materialization of experiential visions. We set up four different design cases and we analyzed participants' practices. Participants were recruited on the basis of voluntary participation. The timespan, the subject, and the type of design project were decided according to designers' preferences and availability. Participants were provided with a package containing the map, a vocabulary, and step-by-step explanation of the tool. In order to interfere as little as possible with the normal design flow, we did not perform a direct observation or record their activities on camera. Instead, we planned meetings with designers, during which we collected documents related to the project, i.e. sketches, drawings, notes and state of progress in the ExpMap. Document collection as the main source of data can be an effective method to study the information flow in design projects (Blessing & Chakrabarti 2009). During review meetings, questions were asked to explain noticeable facts in the documents collected, or to check for any upcoming issue in using the ExpMap. Participants were formally interviewed at the beginning and at the end of the study. The documents collected, the final maps, the design outcomes and the interviews were then analyzed in relation to each other, as presented hereafter.

Case 1 – EACO

The first design case involved a team of three novice designers (age: 23-26, nationality: Turkish, Indian), former MSc students of the School of Design of Politecnico di Milano. They invested a total of four weeks in the development of the project. Their project dealt with designing a product to educate pre-adolescents about nutrition, an eating companion (EACO) for kids with nutritional problems, such as diabetes. They aimed at creating a device that would not feel as a medical device, thus avoiding the negative perception of being 'excluded' or 'different'. Their conceptual intention was to design *"an emotionally durable buddy"* to which the kids could become attached and which could follow them during their growth.

Figure 3 shows the design concept at the end of the project. It describes a modular and customisable product, with different masks that can be mounted on a fixed interactive body. The device gives interactive feedback according to food intake. A mobile application, associated to the product, analyses the kids' nutrition and their daily needs, and allows children and parents to share this information. The application supplies information to the device, it rewards children when they attend to a healthy nutrition scheme by providing stimulating positive or negative face-like expressions.

In Step 2, designers explored their conceptual intention of 'creating an emotionally durable eating companion', reflecting on the concept of 'buddy' and conducting a visual research on related aesthetics. Step 3 helped them to characterise the product as light, friendly and playful. They also described it as 'vibrant', not directly an element of product expression, but a characteristic of the general appearance. In Step 4 and 5, while exploring and defining the product qualities, designers came up with the idea of the interchangeable masks. These were designed in several variants, some of which were less childish and more suitable for adolescents, so that children could ideally continue to use the device while growing, adapting its appearance to their changing taste and style. Furthermore, in these last two steps designers gave special attention to the type of interactive feedback generated by the product. They decided to combine a face-like display with alert sounds, which would alert users about notifications from the system, such as eating time, specific nutritional needs, and feedbacks about eating behaviour. Furthermore, they were triggered by the idea of providing vibration feedback, to allow product usage in silent modality.

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Figure 3. A visualization of the final concept for the EACO case study and the associated ExpMap.

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In the interviews, designers reported that the ExpMap was *"excellent in allowing us to be broad and open, yet specific at the same time"*. They perceived it as very flexible, providing a stimulating structure that makes the designer integrate different sensory aspects in a holistic and integrated user experience. They described Step 3 as important *"to convert intangible values of the vision statement into physical qualities of the final product"*. About the last level of the ExpMap, the designers stated that their *"design instinct inhibited further progress in the experience map"*, as they perceived it as too analytic: *"it forced us to think parametrically and quantitatively"*. However, they recognised the potential of this stage for prototyping, *"whereby designers can develop prototypes to test different sensory patterns (…) following a methodological and modular approach"*.

Case 2 – Cloud

The second team was composed of three novice designers (age: 22-23; nationality: Italian, Chinese and Indonesian). They worked on their project for a period of four weeks. Their goal was to design an interactive weather station for the office. At the start of the process, designers defined their starting point as the *"reflection of the constantly evolving, dynamic qualities of the room ecosystem"*. The designers developed three alternative materializations (Figure 4), which differed in terms of product features. Concept A was developed by seeking a high sensory congruence, with a very symmetric and edgy shape. In this case, sudden changes in the surrounding environment would be represented by a change in the visual appearance, shifting from transparent to foggy. In Concept B, on the other hand, the designers aimed at eliciting perceptual incongruities between the senses. This led to the choice of an asymmetric shape and the inclusion of one side made of soft material in the top, contrasting with the edgy and rigid appearance. The soft side was meant as the interface to activate the product. The sensory incongruence of the soft material compared to its surroundings was designed as an implicit tactual affordance, reminding users where to activate the product. The last concept C was characterised by a dissimilar shape, rounded and symmetrical, to express calmness. The dynamic changes of the surrounding environment are in this case represented by the production of fog in the transparent part.

The three concepts highly resonate with the visual references included in Step 2 and 4 of the map. Each of the expressive qualities listed in Step 3 is directly related to the design outcomes. In Step 5, the designers added some descriptors, e.g. polygonal and asymmetrical in the shaping category. Interestingly, they developed two tables (Figure 5) in which they summarised their design decisions, listing all the important qualities to characterize each concept. At the end of their conceptual process, the designers also developed parametric, mixed media prototypes, coupling interactive animations with physical tokens. The scope of this prototyping activity was *"to explore which dynamic behaviour would better embody the*

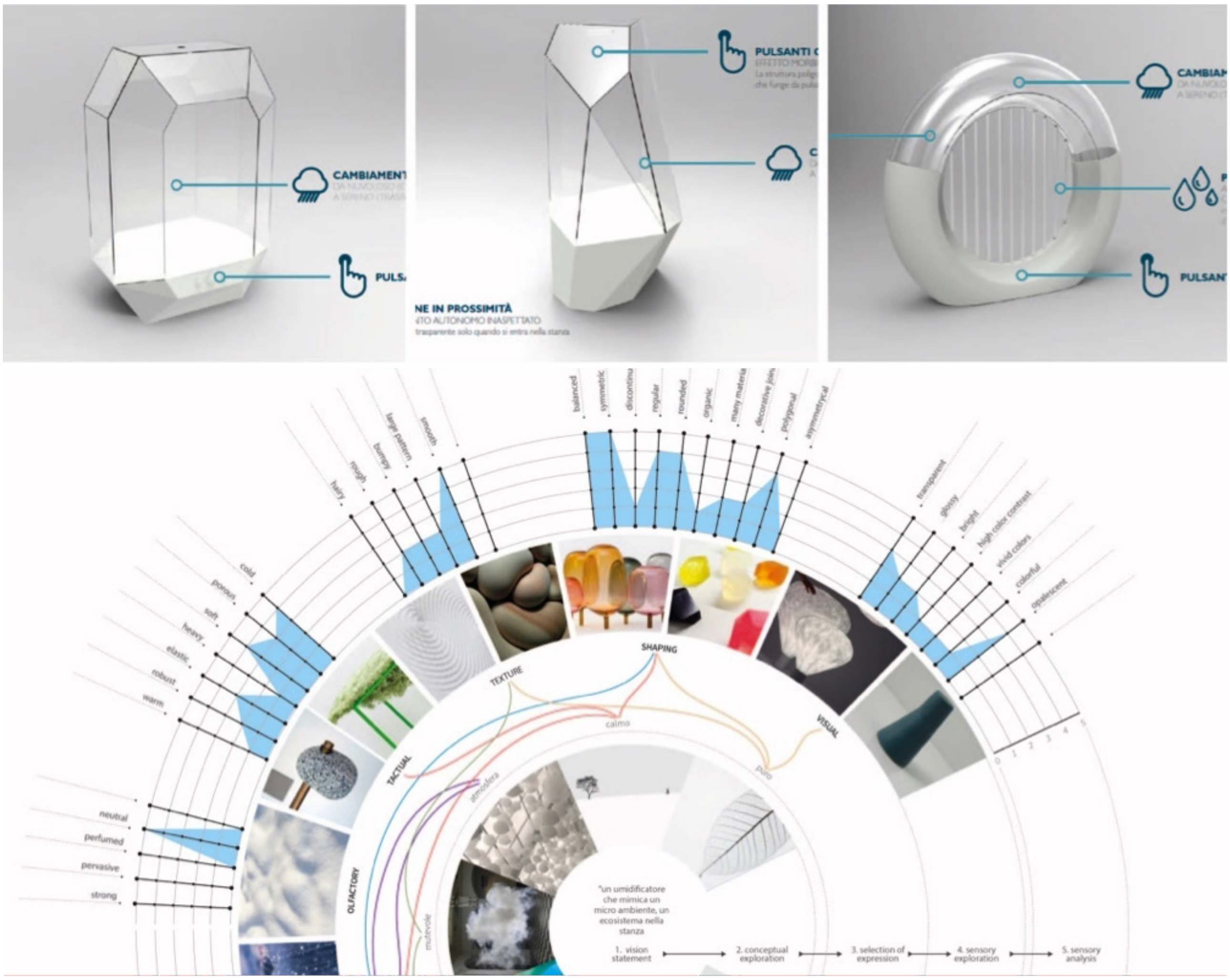

Figure 4. Renderings of the three alternative materializations for the Cloud case study and its relative ExpMap.

desired interaction with the product".

During the interviews, the designers reported that at the beginning of the project, they were doubtful about possible limitations to their creativity coming from the systematic structure of the ExpMap. However, *"the map revealed to be very useful to punctually identify all the sensory and dynamic characteristics, and to manage the complexity of a multisensory process"*. They described some difficulties, for example in retrieving appropriate pictures during Step 2 and 4. They also struggled in specifying and differentiating the alternative patterns, for which purpose they developed the matrix of Figure 5. Their need was to have *"the sensory characteristics ready at hand, easy to compare and distinguish from each other"*. Lastly, they were satisfied by the ExpMap as *"a valuable tool to support the design process, especially to tackle a multisensory approach, because it made us explore our concept more in-depth and from different perspectives"*.

Case 3 – Seaside

In the third design case, a junior Italian designer (3 years of professional experience) worked on a mid-term project for three weeks. The project concerned the design of bathroom ceramic tiles. She aimed at eliciting the experience of *"lying on the sea foreshore"*. The designer developed three alternative materializations (Figure 6). For concept A, she was inspired by the texture of small glass stones. In Concept B, she aimed at stimulating the multi-material tactual sensation of the sea foreshore. In concept C, instead, she wanted to represent the waves of the sea through the tile's shape.

The map shows a high correlation with the final concepts (Figure 6): the pictures included in Step 2 were clearly useful as visual references for the subsequent materialization. In Step 3, she did not connect the expressive qualities to the sensory categories, but she clustered them by three colours. She subsequently used this coding system to differentiate between the alternative patterns in Step 5. She described this moment as especially important for her, because it sparkled one of the three materializations: *"I remember I was rating the sensory qualities and one of them made me suddenly think 'uh, it could be also like this'. And the pictures I've put in the sensory exploration boxes… they were supporting this new idea"*.

Soon at the beginning of the project, she decided to undertake a prototyping activity by using a haptic

	PATTERN 1: congruenza sensoriale DINAMICO	PATTERN 2: congruenza sensoriale CALMO	PATTERN 3: incongruenza sensoriale EMOZIONALE
VISUAL	opalescente	trasparente	poligonale
SHAPING	poligonale	simmetrico/avvolgente	
TEXTURE		liscia	
TACTUAL	rigido	morbido/soft	morbido/elastico
OLFACTORY			
AUDITORY	armonioso/regolare	faded/sfumato	
VISUAL CHANGES	cambi di stato	cambio di opacità/luce	cambi di stato
FORCE		smooth/sottile	dinamico
VIBRATION	puntuale	minima/regolare	puntuale
OLFACTORY	evocativo	neutro	evocativo

Figure 5. The two tables developed by designers to summarize their design choices.

device, the desktop Phantom© by Geomagic. This helped her to engage with her ideas and select among alternative materializations through quick, interactive virtual mock-ups, which could render also the tactual feeling of the tile. For this reason too, she appreciated Step 5, which helped her to select the parameters for the virtual prototypes in a systematic way. As the product did not feature any interactivity, she discarded most of the interactive categories (Figure 6) but she included force-feedback, so that it would help her with the settings of the haptic device. As in Project 2, the designer summarised her choices in a different layout (Figure 7), *"to be more specific and analyse more precisely every single pattern"*.

In the interview, the designer reported that the tool suggested a *"systematic approach to prototyping. I think that selecting a pattern, rather than testing stand-alone features, in relation to the expression I want to convey (…) it makes much more sense from my point of view"*. Another advantage she referred was that the tool helped her to quickly get back into the project: *"it was good to make me remember the point where I left my thinking process – sometimes it isn't easy when you are working on several projects at the same time"*. She reported that the tool *"asked quite a lot of time to complete – this can be a drawback in scarcity of time. Also, sometimes, the rating system was too broad and generic. I could understand that 0 meant 'no' for the quality (…) but sometimes I had difficulties in understanding what is '3' and what is '4'"*.

Case 4 – Designing the structure for a rehabilitation device

The fourth design case was supplied by Design Innovation, a design agency based in Milan. It concerned the redesign of a support structure for a robotic device for the rehabilitation of the lower arm, commissioned by a leading research centre in Italy. The project is currently under development, thus details on the design concepts will be precluded to comply with confidentiality agreements. The interviews were conducted with the senior designer, who supervised the project and took the steering decisions. The observation ran over eight weeks.

In this case, designers were predominantly focusing on the styling and aesthetics of the structure, to provide users with a higher comfort. The intended user experience was identified as the *"feeling of training for personal fitness"*, in contrast to the perception of interacting with a medical device. As designers started using the tool only few weeks after starting the project, and not at the very beginning, they used the map to identify alternative product characters and organise their creative thoughts. Thus, they decided to develop four maps, differentiating them only in the last two levels (Figure 8), according to each product expression. The four product characters that they selected in Step 3 were 'framing', 'sporty', 'natural', 'medical'. As a design studio, they already worked with libraries of inspirational references, including pictures, design cases, material samples, which they normally consult for every project. Their activity in Step 4 focused mainly on selecting, clustering and organising some of the visual references they already had at hand. However, they included several other pictures at the bottom of each map. Step 5 was detailed and different for each specific character (see Figure 8).

In this case, the ExpMap was used with lower engagement by the design team. However the interviews provided meaningful designers' feedback, especially as they show a design expert's account of the tool. In the interview before starting the project, the senior designer explained that *"the map seems a bit over-structured to me… actually I think that my thinking process is lighter. (…) When I see the image of a Nike Air, I know intuitively the direction I want my design to go towards… If I take the picture, and I write 'sporty', my fellow and I already know what we are referring to. We know that all the textile part will be made of 3D textiles, that the part next to it will be of soft foam and that the structure will be a frame wrapped in a membrane. Then it becomes only a matter of detailing"*. During the review meetings, the designers explained that they had difficulties understanding how to use the ExpMap for complex products, such as the support structure they design, which is composed of several parts. They then decided to use it as a general guide, commenting that: *"otherwise, we could have gone on endlessly. We can move from the general to the infinitesimal part, from the shell to the joystick to the button… It would*

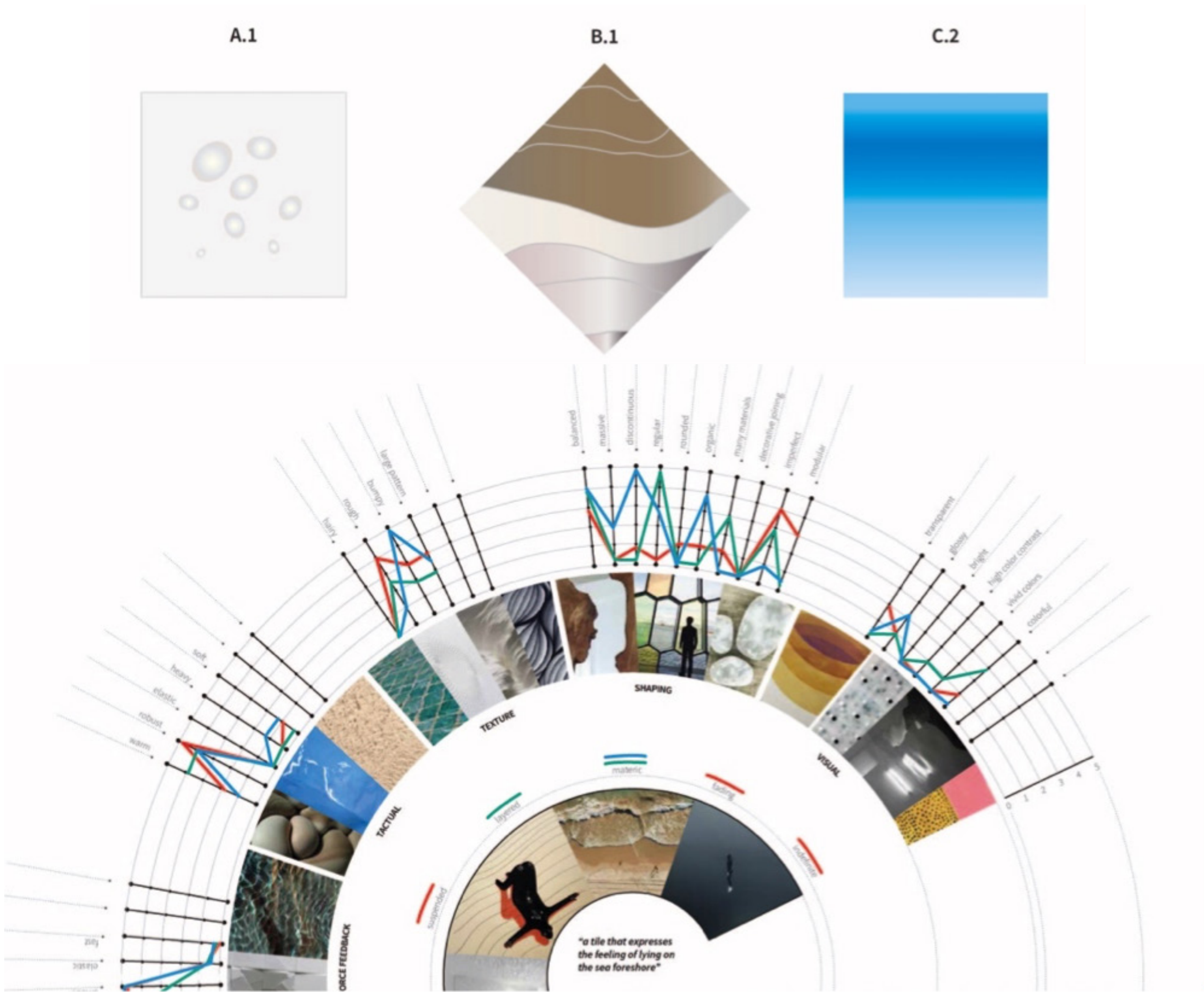

Figure 6. Provisional visualizations of the three alternatives for the project Seaside and the corresponding ExpMap.

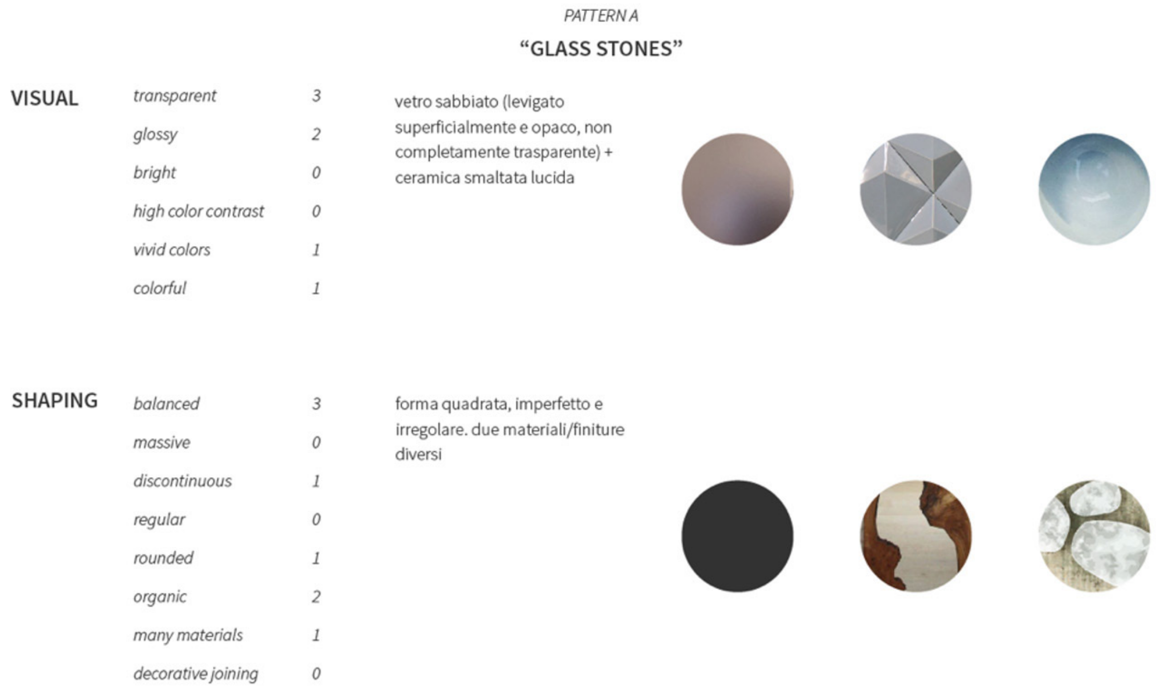

Figure 7. A portion of the table summarizing the designers' choices for concept A.

Figure 8. Two of the four maps developed by designers for Case 4: the one associated to the character 'framing' (left) and the one associated to 'medical' (right).

become a hypertrophic explosion, and when do I stop? I could find myself designing the screw".

General discussion

The four cases showed that the ExpMap helped designers in pursuing the materialization of their conceptual intentions with a deliberate approach. In almost all the cases, the map was flexible enough to adapt to the diversity of participants' design flows and attitudes. In Cases 1-3, designers were highly satisfied by the tool, as they identified several benefits. The cases show that the ExpMap has a *descriptive* nature, rather than a *prescriptive* one. Hence, it did not tell designers *what* to design starting from an experiential vision, but rather *how* they can do it. It suggested a sequence of activities, but designers acted creatively within these suggestions. This is evident, for example, in the different ways of approaching Step 3, the selection of expression. For example, the designer of Case 3 worked through Step 2 and 3 simultaneously.

Another evident benefit of the ExpMap was the ability to support the integration of different sensory clues in a holistic experience. In Cases 2 and 3, for example, designers achieved very diverse design alternatives by selecting different patterns of sensory qualities. The design outcomes were developed in all cases with a direct relation between initial vision and the outcome. The ExpMap helped designers in seeking this correlation, even if they are not necessarily aiming at making users infer their intentions. The purpose of maintaining a correlation can be to facilitate the materialization and to bridge the gap between the abstract, conceptual level of ideas and the tangible level of products. Moreover, the ExpMap allowed the breakdown of the same experiential vision into alternative design directions, while visually showing designers' thinking process. As it appears from their feedback, the tool has a unique strength in providing a structure to organize creative thoughts altogether and generate purposeful relationships among them. Furthermore, once completed, the map is highly stimulating, rich in the variety of inspirations, and holistically integrated.

Some remarks should concern designers' lower engagement in Case 4. It seems that in this project, the ExpMap did not contribute significantly to the normal flow of designers. We interpret this result in light of few contextual factors. First of all, due to logistic reasons, the usage of the tool started when the conceptual stages were already advanced. This limited the tool's utility, as the stepwise progression is at the core of the ExpMap. Secondly, participants of this case belonged to a design studio with a solid and well-defined methodology, which is part of the studio's DNA. Because the ExpMap strongly encourages designers to explore alternative practices, we can observe some reluctance in using the map, since it interfered with their established way of working, their everyday habits and thinking modality. It is possible to speculate then that the ExpMap may be more interesting for novice designers, who are instead in need of guidance and support for decision-making. Further studies aimed at investigating this aspect would be needed to confirm this hypothesis.

A noticeable occurrence in the case studies is that designers started with very different types of vision statements. Most of them did not achieve a well-defined description of the experience they intended to elicit with a user. Some statements referred to product characteristics (Case 2), interaction qualities, or used a metaphor (Case 3) instead of pinpointing the intended feelings of targeted users. This indicates somehow that they struggle in developing a clear statement and in distinguishing between the different stages in the tool. Designers should be supported in reflecting on their conceptual intention in order to develop an understanding of whether they are concerned with the experience, the interaction or the product level (Hekkert & van Dijk, 2011). Implementing this aspect, we expect designers to have a greater awareness of their starting point, and consequently of how to use the map.

From these cases, we could also observe that the ExpMap offers a limited space compared to designers' needs. This was evident in the explorative stages (Step 2 and 4), for which designers gathered a wider collection of pictures than the ones included in the map, and in Step 3 and 5, for which some participants created table-like summaries (Cases 2 and 3). We interpret these attitudes as a manifestation of the tool's ability to stimulate a free exploration, not confined in its boundaries. At the same time, it asks designers to purposefully select what to keep in the map, in relation to the other elements that are already present. Hence, it prompts an alternation of divergent and convergent thinking modalities, which is a favourable dichotomy for conceptual design process (Ulrich & Eppinger, 1995; Csikszentmihalyi, 1996). Developing an interactive software application could enhance this aspect, providing the possibility to dive into each specific step, and then come back at the general outlook offered by the ExpMap.

Lastly, the results supply meaningful matter to fuel a discussion on Experience Prototyping (Buchenau & Fulton-Suri, 2000). With this term, we refer to the practice of prototyping for an experience-driven design process. The focus of this process is not necessarily on creating a 'first-of-a-kind' artefact, simulating the design concept as realistically as possible. Instead, Experience Prototyping can focus on the context of product use, on the interaction with it, or on how users might perceive the product. Hence, it often involves rough, quick mock-ups that are useful in the conceptual stages of the design process. Experience Prototyping might be conducted even without a physical artefact, but with scenarios, sketches, or any other means (Buxton, 2007; Buchenau & Fulton-Suri, 2000). Although the debate over the concepts of Prototyping and Experience Prototyping seems vivid (Yang, 2005; Lim et al., 2008; Gerber & Carroll, 2012; Jensen et al. 2015) the fundamental question on how (and if) designers can prototype the user experience remains largely open. In some of the cases narrated in this paper, the designers engaged in activities similar to Experience Prototyping. They developed alternative design directions throughout the levels of the map, and built prototypes based on the decisions taken in Step 5. These prototypes are parametric, since they can be described in terms of the variables composing them, but they are also a direct manifestation of specific experience scenario and a product character. Participants of these case studies especially appreciated the support given by the map in this activity. By offering a solid connection between the experiential vision and the materialization, the Experience Map can help designers to think simultaneously at the micro-level of sensory qualities and at the macro-level of integrated user experience. This would, ultimately, foster an understanding on how the conceptual, experiential vision can be materialized in terms of tangible product features.

Conclusions

In this paper, we addressed the problem of materializing an experiential vision. Moving from the conceptual level of ideas towards the selection of tangible qualities can be challenging for designers, because of the diversity of aspects to consider. We suggested that a progressive deconstruction could help coping with this delicate step, which ultimately determines the product success. The ExpMap is a tool to support this stepwise decrease of abstraction, organizing creative thoughts and maintaining a correlation between conceptual intentions and materialization. In the four design cases presented, we observed that designers were able to achieve a detailed materialization and identify several facets of their conceptual intention. The tool supported the consideration of different elements, to elicit an integrated, holistic experience. Lastly, it suggested the exploration of alternative design directions, and consequently fostered a systematic approach to prototyping. Some limitations were identified in the tool usage, such as the difficulty for designers in defining precisely their starting point, which we plan to address with future work. Nevertheless, we conclude that the ExpMap contains a large potential in supporting the materialization of experiential visions into tangible products.

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