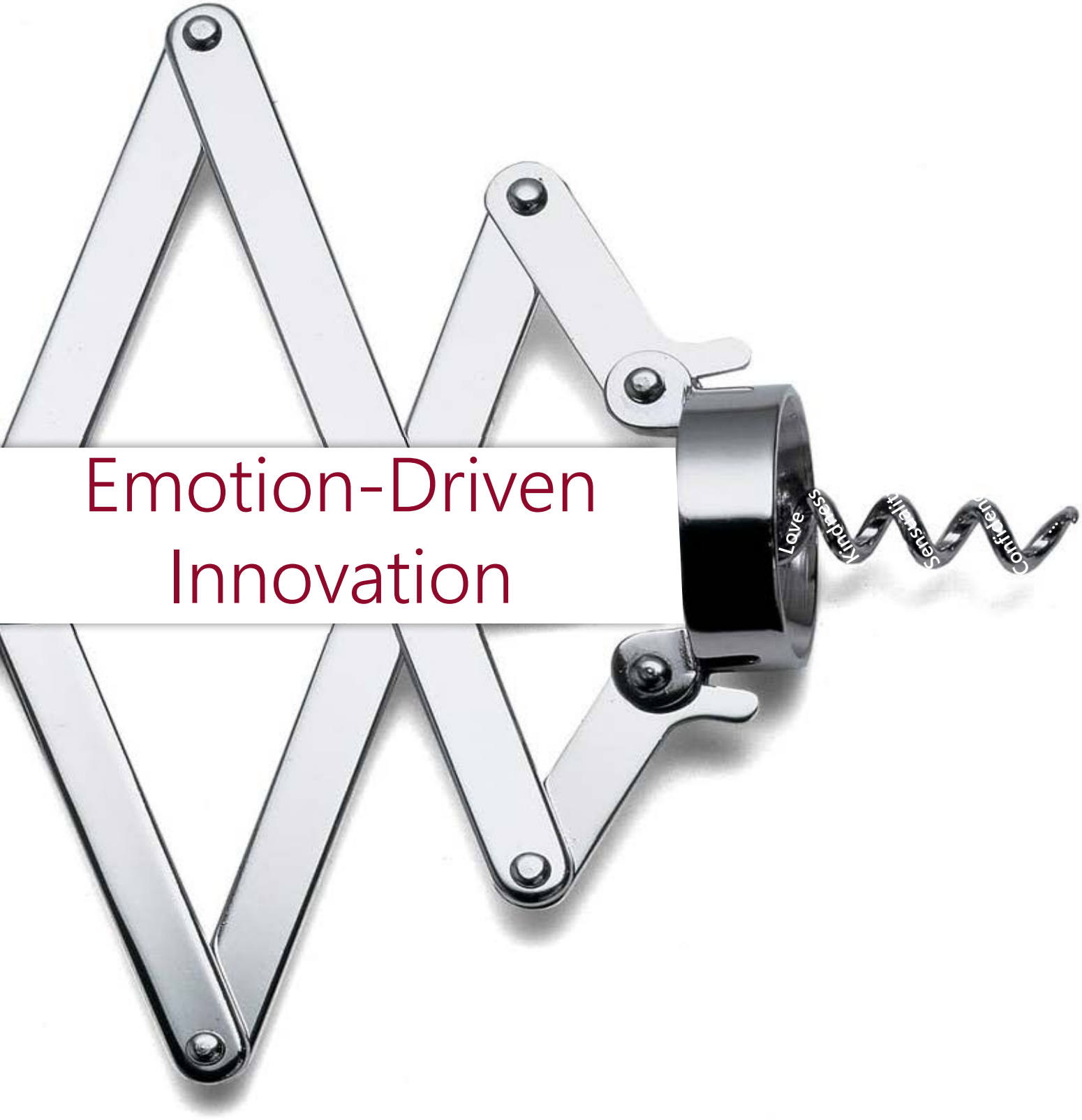
Emotion-Driven Innovation



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Emotion-Driven Innovation:
a process to envision emotion-focused new product ideas

Thesis submitted to the University of Padua
to obtain the doctoral Degree in Management Engineering

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Content

1 Introduction

1.1. Research overview: why emotions are relevant in product innovation

Nowadays, it is widely recognised that the term 'innovation' not only concerns the development of new technologies but also emphasizes the development of new meanings (Hekkert and van Dijk, 2011; Verganti, 2009, 2017). Verganti (2017) distinguished three types of meanings: the utilitarian meaning that refers to the usefulness of an artefact, the symbolic meaning which indicates how people are sending messages to others through actions, and the emotional meaning that concerns the value of an action to people. Among the meanings, the symbolic and emotional meanings of a product play an important role in its success, as these meanings have a strong influence on the reason for buying a product. The usefulness of a product supports the achievement of a certain type of operational activity, whereas the emotional and symbolic meanings of a product satisfy socio-cultural needs of people (Dell'Era and Verganti, 2009, 2010).

This thesis is focused on the emotional dimension of a product from a design perspective: the problem of creating products with the intention of provoking specific emotions (Desmet, Fokkinga, Ozkaramanli, and Yoon, 2016).

It is already known that interaction with a product can be the cause of emotional experiences, as any social interaction between people (Desmet et al., 2016). Emotions establish a person's position in a given situation: negative emotions move us away from products that do not represent a benefit, while positive emotions bring us closer to products that represent a benefit for our well-being (Desmet and Hekkert, 2007). Positive or negative emotions can be triggered by all designed products, services, technologies, and systems (Desmet, 2012).

Emotions can affect human cognition and behaviours: memory, attention, decision making, and actions are guided by emotions. Emotion is defined as an event-focused, fast process composed of two steps: 1) the elicitation of the emotion, which involves mechanisms for evaluating events that may be considered relevant to a person and 2) the emotional response – which could be expressions, automatic reactions, and action tendency (Coppin and Sander, 2016).

In order for an emotion to occur, there must be a relationship with a specific object (the stimulus). The stimulus could be a person, a situation, or an artefact. This condition distinguishes emotions from moods and feelings. Moods and feelings are affective states that do not involve a specific stimulus; moods, for example, do not arouse due to a specific object but, more so, due to the general environment. Emotions are intentional affective states; therefore, emotions are highly relevant in product experience (Desmet, 2002; Desmet and Hekkert, 2002).

The accurate knowledge of the conditions that provoke emotions and the behavioural and experiential manifestations is referred to as emotion knowledge. This type of knowledge can be applied in all kinds of design created for consumers – including product design, graphic design, food design, package design, and service design (Desmet et al., 2016).

The interest in designing products and services with the aim of integrating emotion knowledge has increased, and academics have dedicated efforts to create methods to support the creation of products with emotional value. Desmet (2002), for example, introduced PREMO, a method to measure emotional reactions evoked by separate aspects of products or by the usage of the product; ten years later, he presented a framework of 25 positive emotion types representing a general collection of human positive emotions (Desmet, 2012). This framework has been used as the basis for methods such as the positive emotional granularity cards created to support an emotion-focused design process and the emotion rainbow, which is an online database representing the 25 positive emotions and how a product could elicit those emotions (Emotion rainbow, 2017).

Huisman and van Hout (2010) created the LEMtool, which is a web-based self-report method depicting emotions through cartoons of facial expressions and body language; it aims to measure the user's emotional reactions on web interfaces. Sacharin et al. (2012) introduced the geneva emotion wheel: it is a method to assess emotional reactions and their intensity towards objects and situations, applying 20 different positive and negative emotions. Fokkinga (2015) developed a framework of 36 negative emotions (the negative emotion typology) supported by an online database that exposes the definition of every emotion, the conditions to elicit the emotions, a comparison to distinguish emotions, and visual representations of the emotions (clips of movies and comics).

As it will be presented in the systematic literature review (Chapter 3), the existing methods focus on specific phases of the innovation process, reflecting a lack of systemic support in the practice of creating products with intentional emotional value. Despite the methods that have been created and the importance of emotion knowledge in product innovation, the creation of products with emotional values is still a complex challenge.

Professionals responsible for designing and developing new products should be able to *understand* the differences in emotions. It is not enough to understand emotions at a basic level[1] . It is necessary to differentiate between the emotions at a granular level. For example, negative emotions do not always represent a negative situation; by way of illustration, the emotion of fear can positively affect the behaviour of people – when a person experiences fear the adrenaline level in his or her body increases, which makes this person have more energy to perform a certain activity (Fredrickson, 2013; Fokkinga and Desmet, 2014; Fokkinga, 2015). Different positive emotions can stimulate different behaviours for fulfilment, health, or survival; as an example, to feel pride, people are encouraged to achieve significant goals (Fredrickson, 2013).

The perceptions and thinking of consumers and their behaviours can be influenced in a favourable way when the understandings of the nuances of the different emotions are applied strategically (Norman, 2003). In particular, positive emotions stimulate purchase intentions, and products that provoke positive emotions are bought more often and are more enjoyable to use (Desmet, 2012). In the design process, the knowledge of emotions can play an important role: emotions influence how human minds solve problems, stimulate creativity, help to define design goals, and support communication between design team members (Norman, 2003; Desmet et al., 2016). The application of the knowledge of positive emotions can stimulate lateral thinking, and professionals can deliver non-obvious or unexpected solutions by tackling different positive emotions; this situation can enhance the possibilities of product innovation (Yoon, Pohlmeyer, and Desmet, 2016). In particular, positive emotions stimulate effective learning and creative thinking and encourage curiosity (Norman, 2003).

In order to obtain benefits that the knowledge of emotions can bring when it is integrated into the design process, professionals need to be assisted with approaches to *apply the knowledge of emotions systematically and strategically.*

1.2. Aim of this thesis

The aim of this research project is to create a process to support product development teams to envision emotion-focused new product ideas.

[1] Emotions can be structured into three levels: 1) the superordinate level, which differentiates between pleasant and unpleasant emotions; 2) the basic level, which represents emotion types – such as joy, anxiety, admiration, regret, and so forth; and 3) the subordinate level, which represents the fine distinctions of emotions – for example, eagerness and motivation (for inspiration) (Desmet, 2012).

This thesis is aligned with the objectives of positive design. Positive design stresses that design concerns are focused on creating products not only as a source of pleasure but as elements that improve a person's well-being (Pohlmeyer, 2013). The purpose of positive design is to improve people's well-being by design for pleasure, for virtue, and for personal significance. Design for pleasure stimulates the well-being that comes from the sum of momentary pleasures that a person can have through the interaction with a product, design for virtue refers to the happiness derived from virtuous behaviour stimulated by a product, and design for personal significance stimulates happiness that emerges from products that connect to the goals, values, and ideas that are relevant in a person's life (Desmet and Pohlmeyer, 2013).

1.3. Research outcome

The research project has resulted in a new workshop-based process which has been named 'Emotion-Driven Innovation' (E-DI) (see Figure 1.1). The new process was designed by adopting a process research methodology; this methodology aims to create, develop and validate processes that can be applied in different contexts and for different companies. This methodology encompassed four main phases: 1) state-of-the-art review, 2) process creation, 3) process development, and 4) process validation (Platts, 1993, 2001; Moultrie, Clarkson, and Probert, 2006, 2007) (see Chapter 2).

The state-of-the-art was reached through a systematic literature review (SLR) adopting the approach proposed by Tranfield , Denyer, and Smart (2003). Six steps encompasses this approach: 1) identification of research, 2) selection of studies, 3) study quality assessment, 4) data analysis, 5) data findings and 6) data synthesis.

The creation of the E-DI was achieved by applying iterative focus groups and an exploratory survey as research methods. The iterative focus groups were carried out by a review team in order to validate the feasibility of the process, which concerns creating methods that can be followed and are convenient to apply. The exploratory survey was aimed to validate the understandability of the language to discuss emotions in product innovation. The participants of the survey were part of a design community of an open innovation company focused on design competitions.

The development of the process was performed through four field studies involving novice design students with and without professional experience as product designers. The master design students without any professional experience supported the validation of the understandability of the language of the E-DI process: the design students who at the moment of the study were actively working as professional product designers offered significant feedback regarding the direct benefits of the E-DI process in the product design activities.

In the validation of the process, E-DI was tested by different professionals who represented a product development team involved in real design practice in order to define the E-DI process to be applicable in a consultancy project or design firm.

Two additional studies were carried out after E-DI process was validated. The first study was aimed to compare the relative usefulness of E-DI with a contemporary process; the second study has the objective to explore the relationship between the selection of frequent or infrequent positive emotions in the sample of products currently present on the market (output of Filter Game method in the 2nd phase of E-DI) with the level of novelty of the ideas (output of Translate Game method in the 3rd phase of E-DI).

The development and validation of the process were aimed to explore the feasibility, usability, and utility of the process. The usability criterion addresses the development of unambiguous and clear methods that are easy to learn and easy to use; whereas the utility criterion defines whether the process is achieving its objectives (Platts, 1993, 2001; Moultrie et al., 2006, 2007).

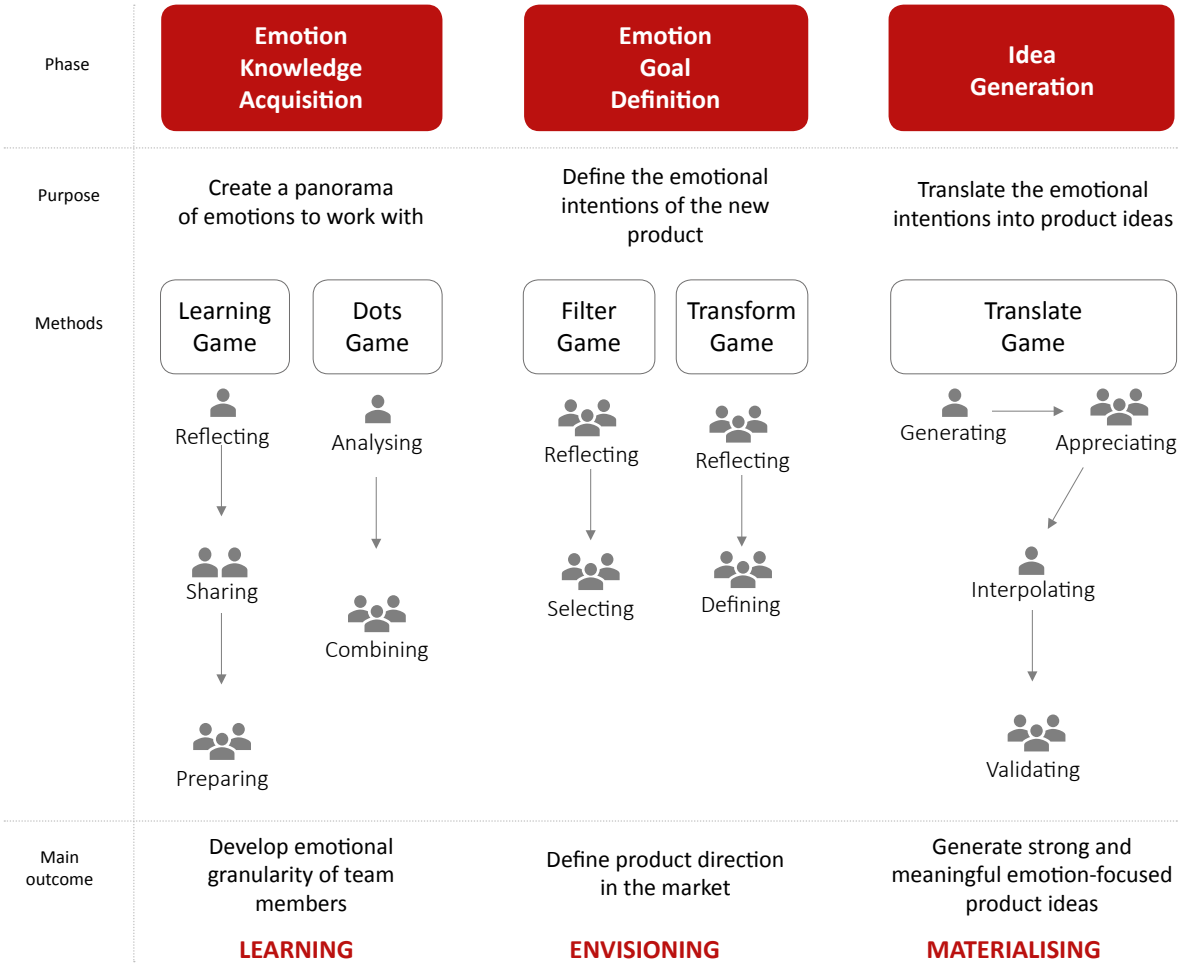


Figure 1.1. Emotion-Driven Innovation process: the structure.

The creation, development, and validation of the E-DI process produced three concrete results. First, the definition of the language to discuss positive emotions in product innovation. The language is composed of three key concepts: the framework of 19 positive emotions that represent general manifestations of positive emotions; the statements of emotional-jobs-to-be-done performed by a product, which define the job that a product must perform in order to provoke the specific emotion; and the human–product emotional interactions, which are defined as the situations in which the appearance of the product (aesthetic interaction), functions of the product (behavioural interaction), and the meanings of the product (symbolic interaction) elicit emotions in people.

Second, the development of a series of methods to strategically and systemically apply the knowledge of the 19 positive emotions at the early phases of the design process: 1) the 'Dots Game' method is a method to uncover the emotional profile of a product on the market (the 'panorama of emotions'[2]); 2) the 'Filter Game' is a method to define a short list of positive emotions to design a new product; this method correlates the panorama of emotions with categories of innovation; 3) The 'Transform Game' is a method that itemises the short list of emotions in a product design brief; this method applies the human–product emotional interactions to specify the emotional intentions of the new product.

Third, the development of a method to trigger divergent thinking and focus on creative thinking to generate new product ideas to target specific emotions: the 'Translate Game' method. This method is focused on stimulating people's imagination to target the emotional intentions that have been previously defined and subsequently synthesise the inspirations in a new emotion-focused product idea (thick idea[3]).

1.4. Outline of the thesis

The body of the thesis is structured into seven chapters that have been written sequentially (see Figure 1.2). The aim of this chapter is to present the overall objective of the research project. The subsequent chapters are explained below.

Chapter 2 presents the research approach adopted in this thesis. The research approach is based on Crotty's knowledge framework, because it provides hierarchical principles of planning research (Crotty, 1998; Fest and Melles, 2010). Crotty's knowledge framework is composed of four elements: epistemology, theoretical perspective, methodology, and methods (see Figure 1.2).

The coming chapters present the results of every phase of the adopted methodology – the process research methodology (Platts, 1993, 2001; Moultrie et al., 2006, 2007). Chapter 3 presents the state-of-

[2] The panorama of emotions is the shared view of how the 19 positive emotions are experienced in a selected sample of the products in the market.

[3] The concept of the thick idea is used here to refer to product holistic ideas that contain enough characteristics based upon a deep reflection on the meaning of specific emotions to achieve specific emotional effects.

the-art review, Chapter 4 explains the process creation, Chapter 5 exposes the process development, and Chapter 6 concludes with validation of the process.

Chapter 3 presents the systematic literature review of methods aimed to support the creation of products with emotional values. The analysis of the usefulness of the identified methods was performed by applying an innovation process model. The results of the systematic literature review helped to formulate the following research questions.

Research question 1
How can product development teams develop the competence of emotional granularity?

Research question 2
How can product development teams be strategically supported in defining the emotional intentions of the new product?

Research question 3
How can product development teams be guided to generate strong and meaningful emotion-focused product ideas (thick ideas)?

Chapter 4 explains the creation of the process (E-DI) that addresses the three research questions. The creation of the process was carried out with three activities: 1) the definition of the objectives and structure of the process, 2) the formulation of the language to discuss emotions in product innovation, and 3) the design of the methods to meet the objectives of the process.

Chapter 5 presents the development of E-DI. It presents four field studies to explore the usability, utility, and feasibility of the process. The field studies were carried out in collaboration with novice design students with and without professional experience as product designers.

Chapter 6 concerns the validation presenting three field studies involving people who represent a product development team in real design practice; three field studies were aimed at defining the E-DI to be applicable in a consultancy project or design firm. As well two additional studies are presented: 1) to compare E-DI process with a contemporary process in order to understand the relative usability and utility of E-DI; and 2) to explore the relationship of the outputs of the 2nd and 3rd phases of E-DI process.

Chapter 7 reviews the findings of the thesis and discusses the implication of the findings and possible further developments.

Chapter 1

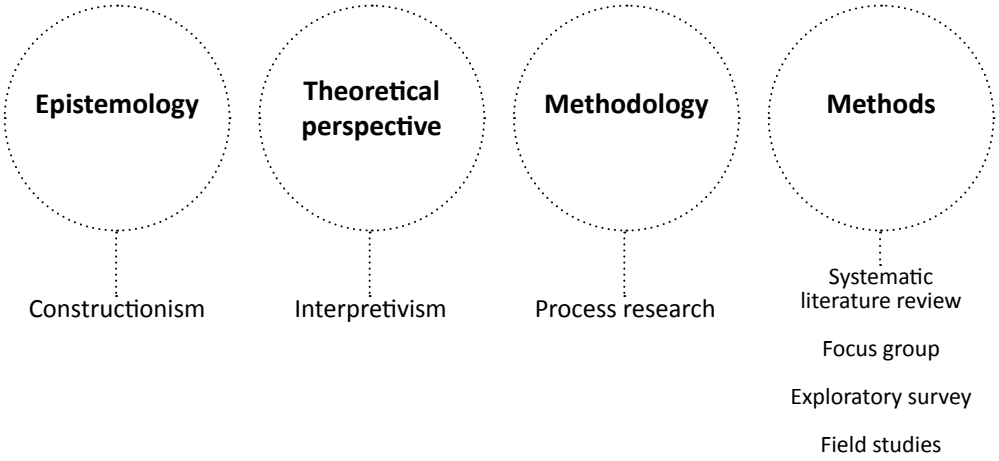
Research objective

Create a process to support product development teams to envision emotion-focused new product ideas

Chapter 2

Research approach

Crotty's knowledge framework



Chapter 3

The challenges of developing emotion-focused product ideas: a systematic literature review

Research method: systematic literature review of methods aimed to support the creation of products with emotional value

Research questions

- How can product development teams develop the competence of emotional granularity?
- How can product development teams be strategically supported in defining the emotional intentions of the new product?
- How can product development teams be guided to generate strong and meaningful emotion-focused product ideas (thick ideas)?

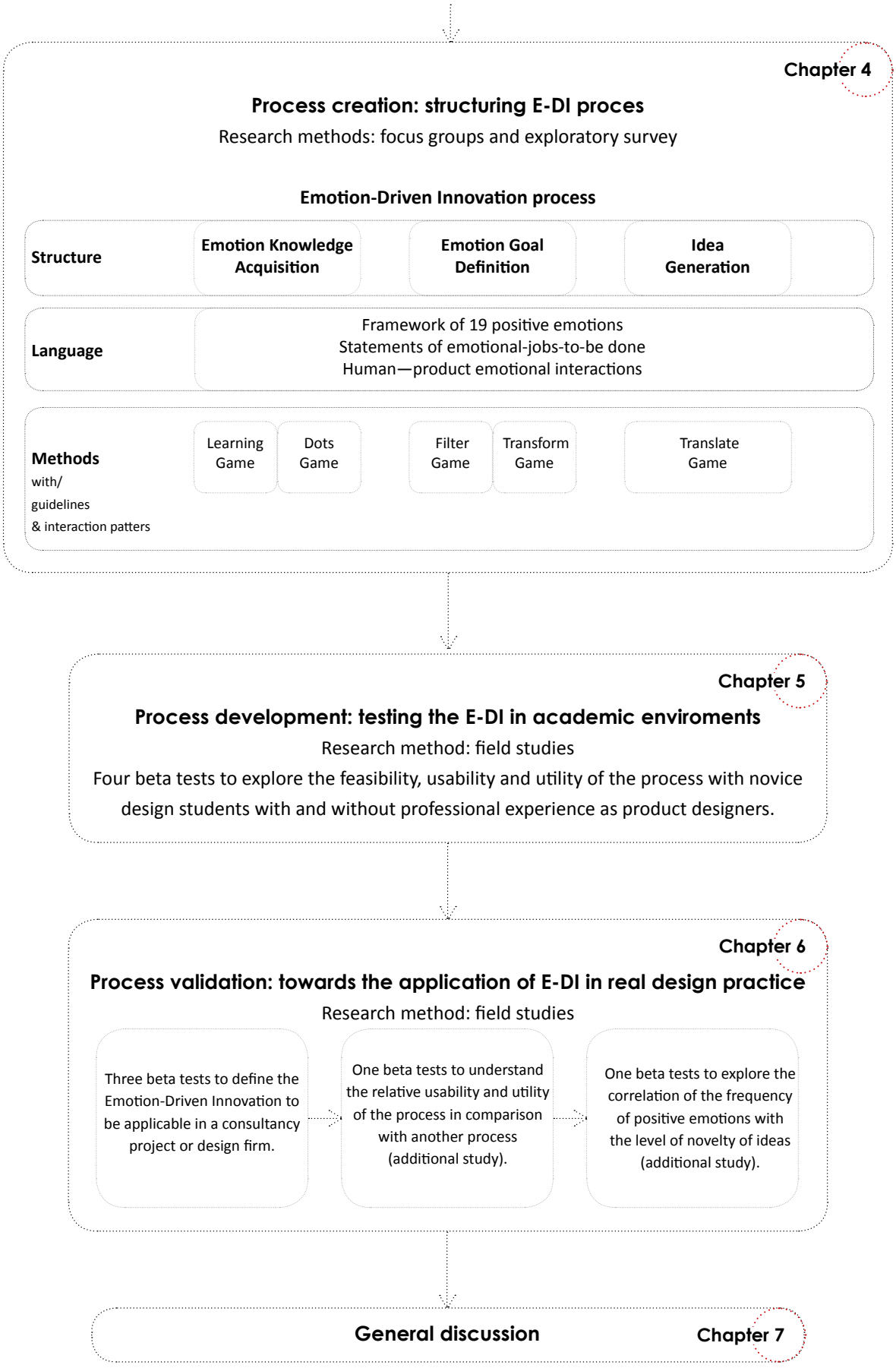


Figure 1.2. Thesis outline

Research approach

In order to characterize the research approach of this thesis project, it is useful to refer to Crotty's knowledge framework since it provides hierarchical principles of planning research (Crotty, 1998; Fest and Melles, 2010). Crotty's knowledge framework is composed of four elements, and according to him, each element is defined as follows.

1. Epistemology: the theory that defines what kind of knowledge is possible, adequate, and legitimate.
2. Theoretical perspective: the philosophical stance that provides a context for the methodology and grounds its logic and criteria.
3. Methodology: the research strategy or approach that informs how specific methods are chosen.
4. Methods: the specific techniques used to obtain and analyse the data related to the research objective.

The next section presents the structure of this research project, based on Crotty's knowledge framework.

2.1. Research approach: epistemological position and theoretical perspective

Feast and Melles (2010) assert that design theories are grounded on three main epistemological positions:

1. The subjectivism position sustains that all practice is research and formalizing knowledge is not a necessary activity since the knowledge can be found in the artefacts.
2. The objectivism position emphasizes the construction of theories based on empirical facts.
3. The constructionism position is focused on the knowledge that can be built by reflecting on the design process.

According to Cross, constructionism position has three main sources of knowledge: people, processes, and products. Each source represents a design knowledge domain (Archer, 1995; Cross, 1999; Feast and Melles, 2010)

1. People (design epistemology domain): the creation of knowledge based on the investigation of people's design skills (how people learn and enhance their design abilities).
2. Processes (design praxeology domain): the knowledge that emerges from the creation, development, and application of methodologies that support the design practices.
3. Products (design phenomenology domain): the study of the morphology of a product (its form and configuration) and the relation between products and contexts.

This research project builds knowledge under the lens of constructionism, as its aims are concerned directly with the activity of design driven by emotion knowledge (the epistemology and praxeology domains) and the outcome of this activity (the phenomenology domain).

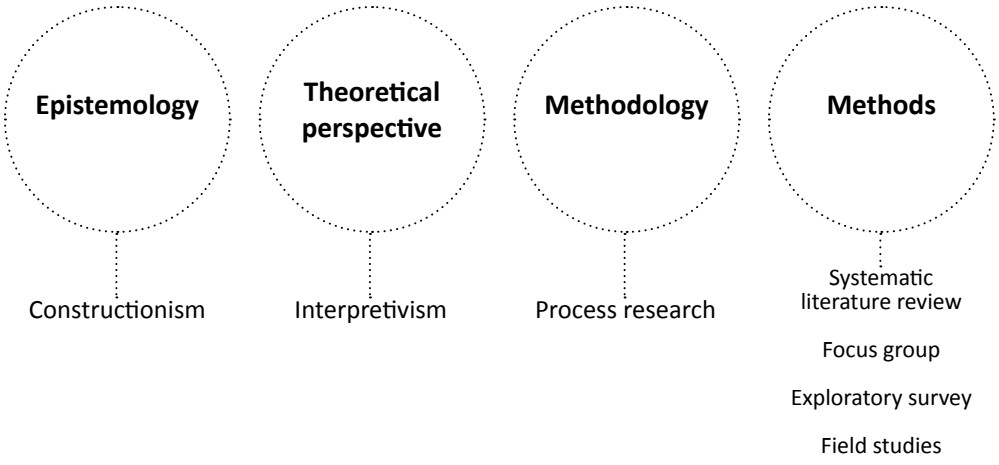


Figure 2.1. Project research methodology adapted from Crotty`s hierarchical knowledge framework.

Emotion knowledge is the explicit knowledge of emotions, including the circumstances that provoke the emotions and how the emotions are manifested. Emotions exist in the relationship between a person (the subject) experiencing the emotion and the stimulus (the object) provoking the emotion. Products are among the vast range of stimuli that can provoke emotions within people. Emotions are individually oriented; different persons can experience different emotions towards the same object (Desmet, 2002, 2004). The theoretical perspective of this research is grounded in interpretivism, as it is aimed at creating new design process knowledge that takes into account individual and subjective interpretations of the world (Crotty, 1998; Gray, 2013).

2.2. Research approach: methodology and methods

Design is an interdisciplinary phenomenon that many specialists participate in; it deals with situations, artefacts, and human interactions (Moultrie, Clarkson, and Probert, 2007; Swann, 2002). Design research pursues an understanding of the phenomenon of design and boosts opportunities to design and develop successful products through the creation and validation of new tools (Blessing, 1995). In a manufacturing context, design requires the generation of knowledge to deliver direct benefits to the people or entities involved.

The process research methodology proposed by Platts (1993) opens opportunities to generate knowledge and provides practical support through the creation, development, and validation of processes. Moultrie, Clarkson, and Probert (2007) defined the process research methodology as "procedural action research" (PAR).

Very frequently, managers confront the necessity of providing answers to crucial questions regarding the management of their companies; these questions can be categorized as 'what?' 'why?' or 'how to?'. Different knowledge is needed to answer these type of questions; content knowledge created by scientific disciplines predominates in 'what?' or 'why?' questions. 'How to?' questions are addressed by process knowledge created by engineering disciplines (Platts, 1993). The present research project is facing 'how to?' questions; this type of questions are aimed at creating, articulating, and communicating advanced knowledge through practical approaches that contribute to the design and development of products and systems (Archer, 1995; Cross, 1999; Eckert, Clarkson, and Stacey, 2003; Platts, 2001).

The process research methodology has been adopted to support the development of useful tools applicable to the industry. This includes a design audit tool used to improve design practices; the tool is presented in an applicable form to companies and employs good design principles. The process research methodology has also been implemented to develop a tool aimed at evaluating the design processes and identifying improvements made by design teams in workshop settings (Moultrie, Clarkson, and Probert, 2006, 2007).

The present research project has been conducted by adopting a process research methodology; it is an applied research methodology for creating, developing, testing, and refining processes. The major aim of this approach is to develop processes that can be adopted in different contexts and by different

companies. This methodology encompasses four main phases: 1) state-of-the-art review, 2) process creation, 3) process development and 4) process validation (Platts, 1993, 2001; Moultrie, Clarkson, and Probert, 2006, 2007).

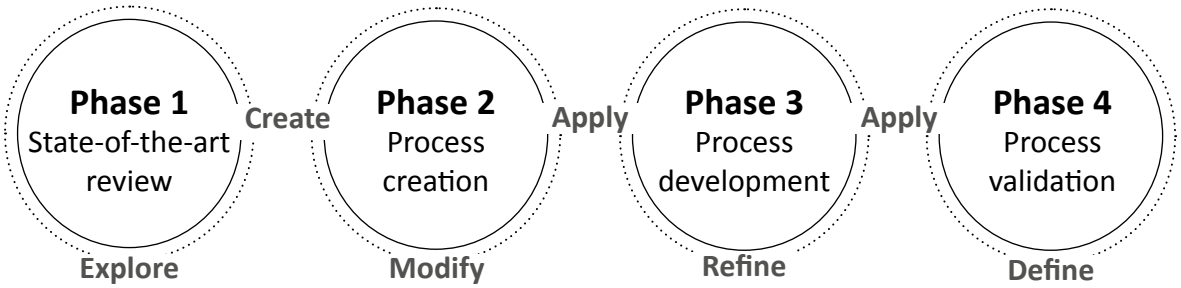


Figure 2.2. Process research methodology. the four phases.

Phase 1

This phase aims to ensure that the process is grounded in existing theory and practice, through a state-of-the-art review of methods aimed at supporting the design and development of products with emotional value. The state-of-the-art review has been conducted through a systematic literature review method; it supports the creation of a process based on relevant practices and existing theories. It has been adopted the approach proposed by Tranfield, Denyer, and Smart (2003), following six main steps: 1) identification of research, 2) selection of studies, 3) study quality assessment, 4) data analysis, 5) data findings and 6) data synthesis. The results of every step are described in detail in Chapter 3.

Phase 2

The purpose of this phase is to create a prototype of the process. The prototype must address the challenges that have emerged from the systematic literature review. The intention of phase two is to evaluate the feasibility of the process; it concerns the creation of methods and techniques that can be followed and are convenient to apply (Platts, 1993, 2001; Moultrie, Clarkson, and Probert, 2007). An iterative focus group and an exploratory survey are the methods that have been applied to achieve the objectives of phase 2.

Focus group is a method used in research; it is a group of people led by a trained moderator who meets for 90 minutes to 2 hours to exchange ideas, information, experiences of a specific topic to address an objective (Cooper and Schindler, 2013). Additionally, to better understand the relationship between products and emotion knowledge, an exploratory survey has been conducted in collaboration with a design community (Gray, 2013). The outcome of phase 2 is presented in detail in Chapter 4.

Phase 3

The major goal of this phase is to test and refine the prototype of the process created in the previous phase. The development of the process has been carried out applying field studies. The main criteria used to validate the process are its feasibility, usability, and utility. In phase 3, the intervention of the researcher takes place under an action research mode. Action research facilitates dynamic participation of researchers, the researcher is not simply observing when events happen, but rather, actively participates in making those events happen (Coughlan and Coghlan, 2002). The role of the researcher is to be a 'facilitator' who guides and structures the process. Details of phase 3 are presented in Chapter 5.

The evaluation of the feasibility criterion concerns to prove that the process can be executed and finished. The usability criterion concerns the appropriate structure of the process; it aims to develop unambiguous and clear methods that can be followed without clarification. The assessment of usability considers errors for omission or commission and how the process is presented. The influence of the facilitator is evaluated with direct feedback from participants and, whenever possible, with the support of a different facilitator. The utility criterion defines whether the process is achieving its objectives; it involves assessing the objectives of the process and the direct benefits to the participants (Platts, 1993; Moultrie, Clarkson, and Probert, 2007).

Phase 4

The objective of this phase is to consolidate the process evaluating the methods with a wider audience, in order to define a process that can be applied and deliver benefits in real design practices. Phase 4 is aimed at consolidating the evaluation of the usability and utility of the process through field studies. Phase 4 involves refinement and consolidation through direct observation of the process's performance and participants' feedback regarding the usability and effectiveness of the process and its direct outputs (worksheets). In Chapter 6 the results of phase 4 are given.

The field studies were carried out by conducting beta tests. A field study facilitates testing processes in their natural setting (Cooper and Schindler, 2013). A beta test is a type of test with a series of consecutive steps, in which a group of potential users 'try out' a product, in this case, the product is the process to be tested (Chiesa, Coughlan, and Voss, 1996).

The field studies of phase 3 and 4 of the process research methodology were centred around half-day intensive workshops as an approach of testing, refining, and consolidating the created process. A workshop method was applied since participants can effectively contribute to the development of methods and tools (e.g., Yoon, Desmet, and Pohlmeyer, 2016). It is important to underline that, in general, a workshop is considered to be an appropriate approach for observing design practices in a reasonably comparable time (Blessing and Chakrabarti, 2009).

The challenges of developing emotion-focused product ideas: a systematic literature review

A product can provoke emotions by its appearance, by the way it performs its function, by the values of the brand, and the symbolic meaning of the product[4] (Eisenman, 2013; Jordan, 1999; Kamp and Desmet, 2014; Norman, 2004 and Rampino, 2011). Assuming these facts, some questions emerge: do the companies are aware of the importance of emotion knowledge in their consumer products? If yes, what are the methods supporting companies to design and develop consumer products with emotional value? And, what are the difficulties that companies are addressing at designing and developing those consumer products?

As the objective of the research is to create a process to support product development teams to envision emotion-focused new product ideas, it was decided to investigate the state-of-the-art of methods aimed to support the design and development of products with emotional value. The exploration of the state-of-the-art has been done through a systematic literature review (SLR) method; the SLR adopted the approach proposed by Tranfield, Denyer, and Smart, (2003).

[4] The concept of 'symbolic meaning' is used here to refer to the set of beliefs associated to a specific product; it is created by the tangible, and intangible elements like material, price, advertising, product history, product's designer, etcetera

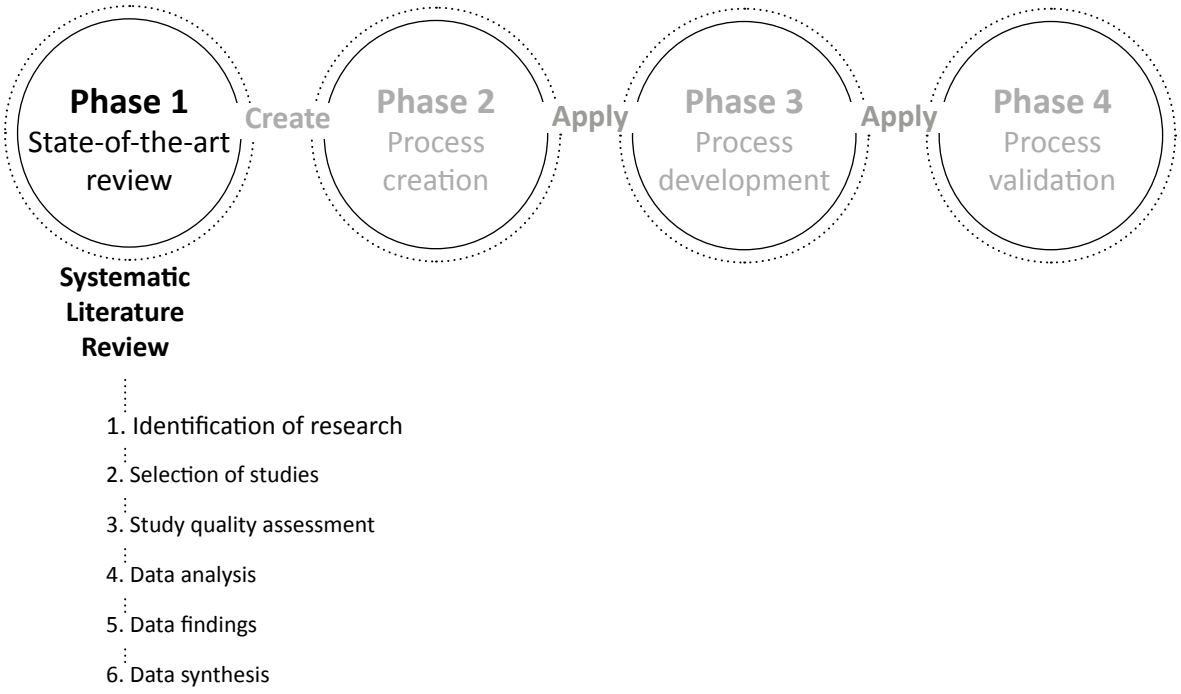


Figure 3.1. Process research methodology, phase 1 - State-of-the-art review.

Figure 3.2 presents the main actions of the six steps of the SLR. The documents used were extracted from the Scopus database. The type of documents used were conference papers, articles, book chapters, conference reviews, books and articles in press.

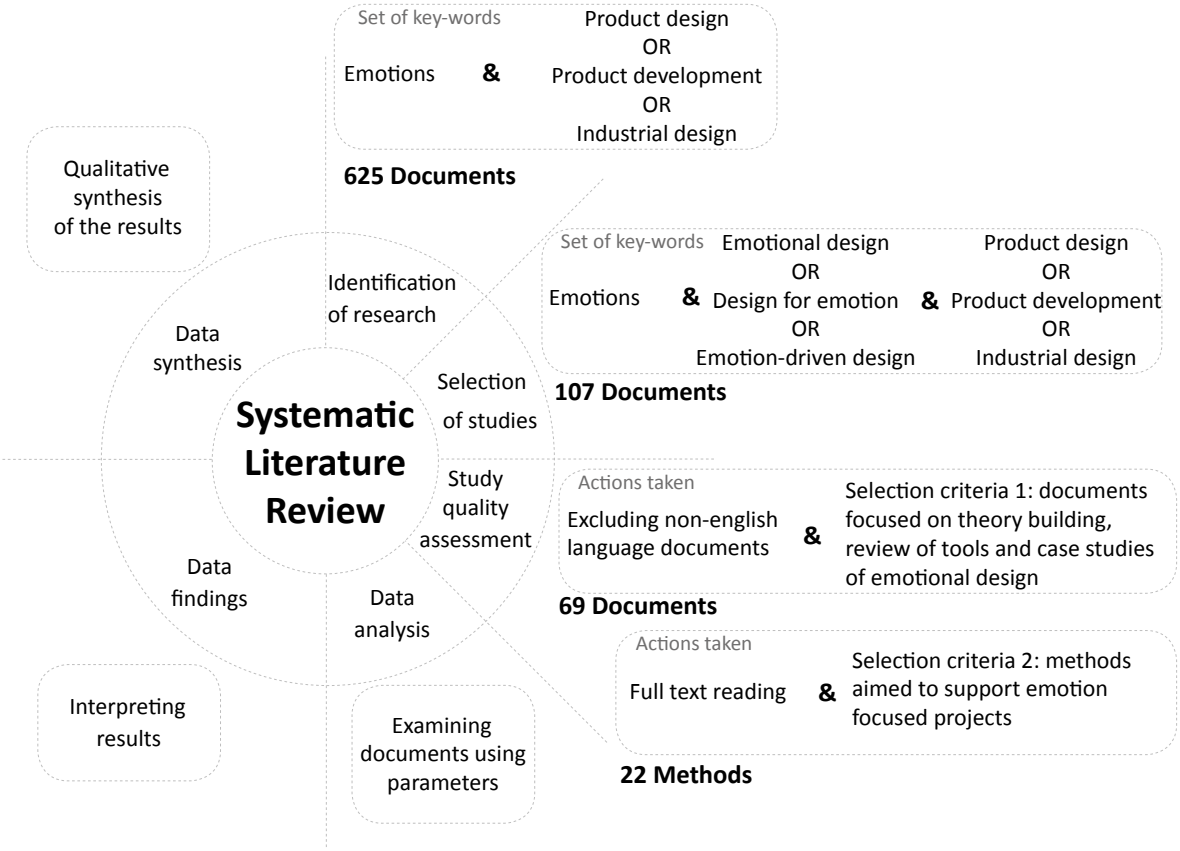


Figure 3.2. Systematic literature review process proposed by Tranfield, Denyer, and Smart, (2003).

3.1. Identification of research, selection of studies, and study quality assessment

The identification of research started applying two sets of keywords: (emotions) and (product design OR product development OR industrial design) in the title or in the abstract. The search resulted in 625 documents coming from very different areas. The selection of the relevant documents was made by adding another set of keywords (emotional design OR design for emotion OR emotion-driven design). These additional set of keywords was necessary in order to focus the attention on research outputs linked to the practice of design products with the explicit intention to provoke predefined emotions. The search resulted in 107 documents.

The analysis of the 107 documents obtained in the previous step, was made with two actions. First, after reading the abstract, documents that were not related to theory building, review of methods and case studies on emotional design, were eliminated. After this selection, 67 documents remained.

Second, by full-text reading, 22 methods aimed to support the creation of new products with emotional value were identified. Table 3.1 presents the list of methods.

No.	Name of the method
1	Software Usability Measurement Inventory (SUMI) (Kirakowski and Corbett, 1993)
2	The Self-Assessment Manikin (SAM) (Bradley and Lang, 1994)
3	Pleasure-Arousal-Dominance (PAD) Emotion Scales (Mehrabian, 1995)
4	2DES (Schubert, 1999)
5	Multi-Dimensional Scaling (MDS) Interactive (Stappers and Pasman, 2000)
6	Feel-Trace (Cowie, et al., 2000)
7	PrEmo (Desmet, 2000) (Laurans and Desmet, 2012)
8	EmoCards (Desmet and Overbeeke, 2001)
9	The [product & emotion] Navigator (Desmet, 2002) (Desmet and Hekkert, 2002)
10	FaceReader (Zaman and Shrimpton-Smith, 2006)
11	The User Compass Chart (UCC) (Sperling, Kristav, Olander, Eriksson, and Hans, 2006)
12	RealPeople (Porter, Porter, and Chhibber, 2007)
13	EmoTools (Bustillo, 2007)
14	Product Attachment Scale (Mugge, Schifferstein, and Schoormans, 2005; Schifferstein and Zwartkruis-Pelgrim, 2008)
15	LEMtool (Huisman and van Hout, 2010)
16	The emotion slider (Laurans, Desmet, and Hekkert, 2009)
17	Geneva Emotion Wheel (Sacharin, Schlegel, and Scherer, 2012)
18	Emotion Rainbow (Desmet, 2012)
19	Emotion Capture Cards (ECC) (Okaramanli, Fokkinga, Desment, Balkan, and Eapen, 2013)
20	Positive Emotional Granularity (PEG) Cards (Desmet, 2012)
21	Negative Emotion Typology (Fokkinga, 2015)
22	Pick-A-Mood (Desmet, Vastenburg, and Romero, 2016)

Table 3.1. List of 22 methods aimed at supporting the creation of new products with emotional value.

3.2. Data analysis

In order to evaluate the impact of the identified methods in the practices of designing and developing new products, an innovation process model was adopted as a reference framework for the analysis.

According to a large body of literature the innovation process consists of a range of activities that can be grouped in two main classes (Eppinger and Ulrich, 2015; Koen, et al., 2001; Terwiesch and Ulrich, 2009): the front-end of innovation (FEI) focusing on creating new product ideas (opportunity generation process) and the back-end of innovation (BEI), aimed at transforming ideas in products ready for the market (product development process). The two groups of activities are characterized by different objectives: the overarching goal of the FEI is to explore the innovation opportunities through the generation of a large number of ideas in order to find the exceptional ones; in the BEI, the main task is to transform the selected ideas and preliminary concepts in an engineered and production ready product.

Different models of FEI have been proposed by academics and practitioners in the last 20 years (Gaubinger and Rabl, 2014; Khurana and Rosenthal, 1998; Koen, et al., 2001; Murphy and Kumar, 1997; Russell and Donald, 2008). Despite the differences of the articulation of the FEI process and its graphical representations, it is possible to identify three fundamental components of the opportunity generation efforts: knowledge acquisition on the evolution of the markets and technologies; goal definition to define the "problem to solve" and select the search area; and idea generation to identify exceptional innovation opportunities.

As far as BEI is concerned, literature converges to represent the product development process as a combination of two fundamental phases (Eppinger and Ulrich, 2015; Iansiti, 1995; Verganti, 2009) a concept definition phase (also defined as concept development), where alternative product concepts are generated and selected for further development and testing; and an implementation phase, where product and process engineering take place. Figure 3.3 provides a graphical representation of the innovation process framework.

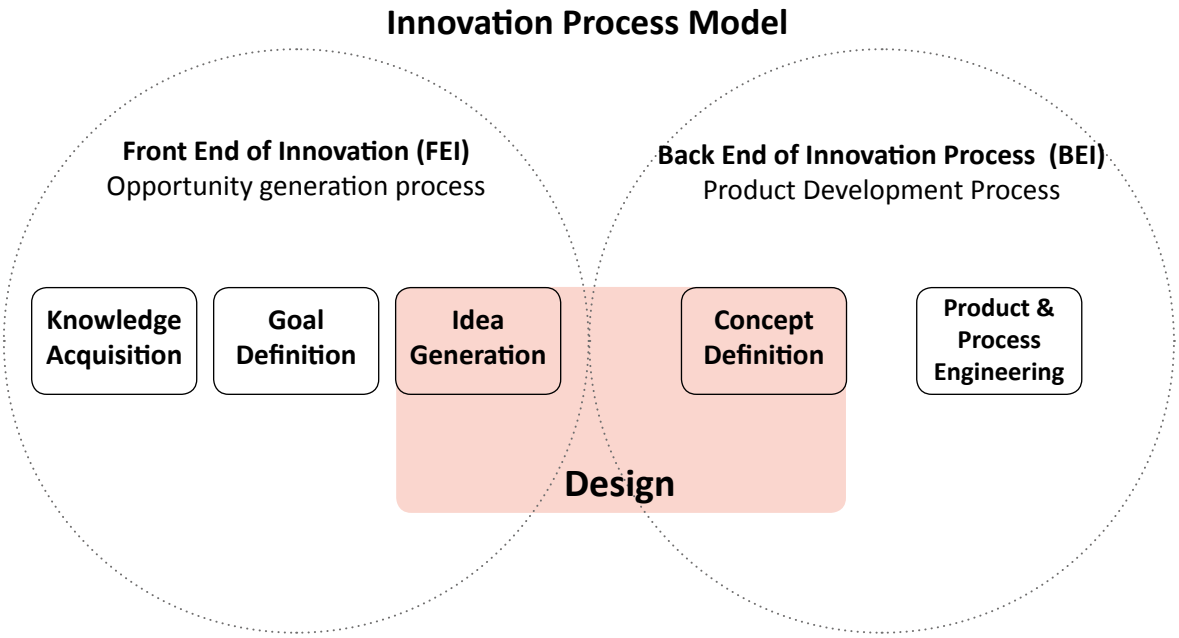


Figure 3.3. The innovation process model.

The specific location of 'Design' activities is underlined in accordance with the meaning of the word Design that we adopt in this thesis: 'Design' is the activity to conceive and give form to products that solve problems (Ulrich, 2011) where the word 'Form' is defined as the "characteristic of a product that brings utilitarian, hedonic, and semiotic benefits to the user" (Bloch, 2011).

It has been analysed the usefulness of the identified methods in the different phases of the innovation process model. A three-level qualitative scale was adopted (*** strong, **medium, *weak). The objective of the method and the guidelines to use the method were key elements in the analysis. The guidelines to use the method were essential information in order to understand if the method is capable

to achieve the intended objective. Due to the methods were created in different years and have different representations, the methods have been categorized into five main classes.

1. A self-report method is verbal or nonverbal guide use to self-report the reactions of people towards different stimuli (example, product, event, sounds, etc.).
2. A Software method is a program performed by a computer using a specific device.
3. A card-based method is a collection of cards.
4. A database method is an organized collection of information available online or in a storage device.
5. Questionnaire method is a series of questions or other prompts to get information from respondents.

The analysis of every method has been documented in a "method summary page". The format contains: the name of the method, the reference of the document, web reference, the declared objective of the method, a brief description, the approach to the emotion knowledge, the guidelines to use the method, the usefulness of the method in the innovation process, the category of the method, and a picture of the method. Figure 3.4 presents an example of a summary page; the rest of the summary pages are presented in Appendix A. Table 3.3. presents the outcome of the analysis. Below a synthesis of every method is presented.

Software Usability Measurement Inventory (SUMI)

SUMI is an online questionnaire aimed to measure the usability of software through the user's perception. SUMI works with hierarchical layers: layer 1, global usability reading; layer 2, users' perception of the qualities of the software; layer 3, consensual analysis. The method uses concepts like affect, efficiency, learnability, helpfulness, and control in the different layers (Kirakowski and Corbett, 1993). SUMI can compare different versions of the same product and products from competitors. This feature represents an advantage to software developers to be able to compare its mock-ups with a competitor's software; they can identify and apply relevant improvements to the concept of the software before it is prototyped. SUMI also can support the product and process engineering phase, but the upgrades can be minors due the software has been developed.

The Self-Assessment Manikin (SAM)

SAM is a non-verbal self-report picture-oriented method. It measures affective reactions of a person towards objects or events. SAM works with six positive emotions (happy, pleased, satisfied, contented, helpful and relaxed) and six negative emotions (unhappy, annoyed, unsatisfied, melancholic, despairing and bored) using pleasure, arousal and dominance dimensions.

The dimension of pleasure helps to people to express positive or negative emotions. The arousal dimension is related to the level of excitement that a person could experience towards the stimulus. Dominance describes how much a person feels in control of a situation (Bradley and Lang, 1994). The

valuations of affective responses on concepts of products in the concept definition phase (BAE) has been considered a major benefit of SAM in the innovation process. Even though SAM can be used in the product and process engineering, it was not considered beneficial due in this phase the products are manufactured.

Name	The Self-Assessment Manikin (SAM)					
Reference	Bradley, M., & Lang, P. J. (1994). Measuring emotion: the self-assessment manikin and the semantic differential. Journal of Behaviour Therapy and Experimental Psychiatry, pp. 49-59.					
Web reference	http://www.qu.tu-berlin.de/menue/forschung/laufende_projekte/joyofuse/joy_of_use/joy_of_use/measurement_methods/sam/					
Objective	It measures the placer, arousal and dominance dimensions associated with the affective reaction of persons towards objects and events.					
Brief description	It is non-verbal self-report picture-oriented method with 18 bipolar adjective pairs (i.e. unhappy-happy)					
Approach to the emotion knowledge						
pleasure, arousal and dominance dimensions						
Framework of emotions						
Positive	happy	pleased	satisfied	contented	hopeful	relaxed
Negative	unhappy	annoyed	unsatisfied	melancholic	despairing	bored
Guidelines						
Step 1	It is presented a stimuli to the participants					
Step 2	Participants have to look the stimuli for 6 seconds					
Step 3	Participants must rate their emotional states choosing one picture from the 18 pairs					
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	Medium	**
					Weak	*
-	-	-	***	-		
Category	Self-report method					

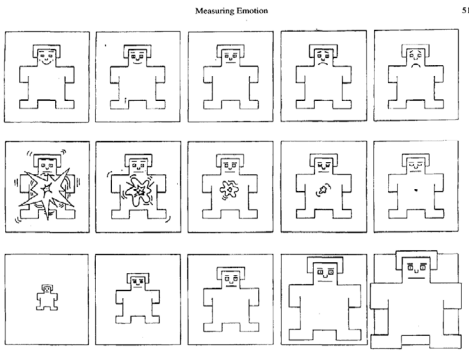


Figure 3.4. The summary page the Self-assessment manikin (SAM) method.

Pleasure-Arousal-Dominance (PAD) Emotion Scales

PAD is a questionnaire method aimed to measuring consumer emotional reactions about services, products, or combinations of products and services (Mehrabian, 1995). PAD evaluates product and services using 47 positive and negative emotions, categorized by the combination of three dimensions:

1. Pleased and unpleased
2. Aroused and unaroused
3. Dominant and submissive

The selection of concepts (products or services) through its emotional evaluation has been considered the major benefit of PAD in the innovation process model. Also, PAD can be applicable in the process and product engineering, but the information can be useful to future product developments.

Dimensions	Emotions					
Pleased, Aroused, Dominant	admired	boldly	carefree	excited	mighty	triumphant
Pleased, Aroused, Submissive	amazed	fascinate	grateful	impressed	loved	respectful
Pleased, Unaroused, Dominant	at ease	comfortable	relaxed	satisfied	secure	unperturbed
Pleased, Unaroused, Submissive	consoled	docile	protected	reverent	sleepy	tranquilized
Displeased, Aroused, Dominant	angry	catty	defiant	hostile	insolent	nasty
Displeased, Aroused, Submissive	aghast	bewildered	distressed	in pain	insecure	upset
Displeased, Unaroused, Dominant	disdainful	indifferent	selfish-uninterested	uncaring	unconcerned	
Displeased, Unaroused, Submissive	bored	despairing	fatigued	lonely	sad	subdued

Table 3.2. PAD method – the framework of positive and negative emotions.

Two-Dimensional Emotion-Space (2DES)

2DES measures the emotions that people experienced towards a variety of stimuli. 2DES works with two bipolar dimensions: the valence (happy-sad) and the arousal (aroused-sleepy). The interface of 2DES consists of a square board with the dimensions aligned as perpendicular axes: the valence dimension is presented in the -x-axis and the arousal dimension in the -y-axis, see figure 3.5. The stimulus can be static (text or pictures) displayed in the same space of the interface, or it can be sounds. Participants express their feelings by selecting the quadrant that corresponds to the emotion that they are experiencing (Schubert, 1999). It was considered that 2DES can provide significant benefits at evaluating product concepts in the concept definition phase.

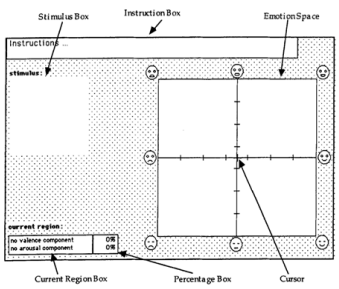


Figure 3.5. Two-Dimensional Emotion-Space interface.

Multi-Dimensional Scaling (MDS) Interactive

MDS is a database with a visual interface to create clusters of products. In order to create the groups, the user must apply subjective judgments (like the personal taste) to the product (Stappers and Pasman, 2000). MDS is aligned with the aims of the front-end of the innovation area, it supports the acquisition of knowledge by categorizing products either by market success, technology approach or any other category.

Feel-Trace

Feeltrace examines the emotional dynamics of a speech; by tracking the emotional content of a stimulus perceived over-time. FeelTrace is software with colour coding. The interface is based on two main axes. The horizontal axis represents the activation of the emotion (very active to very passive). The vertical axis represents the evaluation of the emotion (very positive to very negative) (Cowie, et al., 2000). FeelTrace works with a framework of 19 positive and negative emotions distributed in the quadrants of the interface. The value of FeelTrace is supporting the definition of product concepts at evaluating voice interactions, like voice commands.

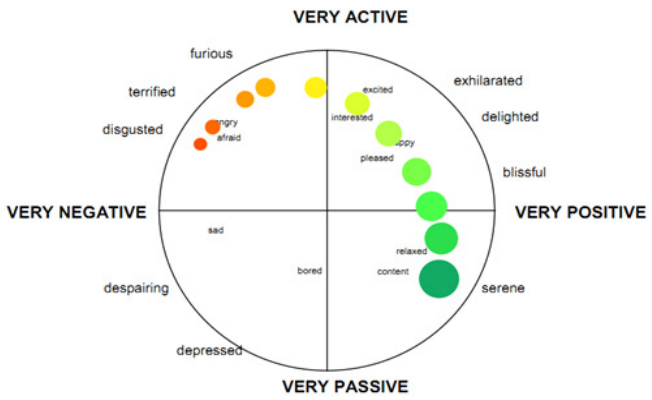


Figure 3.6. FeelTrace interface.

PrEmo

Premo is a non-verbal self-report web-based method. It measures the emotions evoked by separate aspects of products or by the usage of the product. Premo works with a specific set of emotions, seven positive (satisfaction, fascination, joy, admiration, attraction, pride, and hope) and seven negative emotions (disgust, contempt, dissatisfaction, boredom, shame, fear, and sadness) (Desmet, 2002; Laurans and Desmet, 2012). The greatest benefit of Premo is the support on the definition of product concepts; if the evaluation of the product concept is made with mock-ups the upgrades can be more significant in the process development.

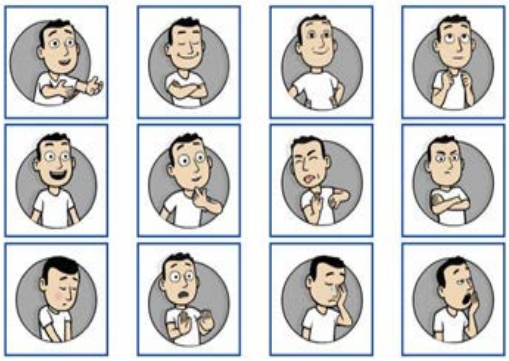


Figure 3.7. Animated cartoons of PrEmo.

Emocards

Emocards is a set of 16 cards that depict cartoon faces with eight distinct emotional expressions, eight male and eight female. Emocards aims to measure emotional responses using eight categories of emotions: excited neutral, excited pleasant, average pleasant, calm pleasant, calm neutral, calm unpleasant, average unpleasant, and excited unpleasant (Desmet and Overbeeke, 2001). Three steps were designed to use the Emocards:

1. Exploring emotional responses. Step one permits to generate knowledge about emotional responses.
2. Getting to grips with concerns. This step pursues to define the intentions of the product by expressing impressions of the results of step one in a collage.
3. Translating concerns into visuals. The last step facilitates the generation of ideas by collage created before

It is clear that step one and three are useful in the front-end of the innovation process. Step two, however, was not considered useful in the FEI, since there are no clear guidelines about how to translate acutely the impressions in the visual format. It has been considered that Emocards also can be useful in the BEI to evaluate product concepts by applying indications of step one; but it is important to consider that, due to the fact that the evaluation is performed by interacting with a real product, the results of the evaluation will depend on how advanced the development of the product is.

The [product & emotion] Navigator

The navigator is an anecdotal database of 250 photos of products that elicit emotions. It pursues to support designers at developing personal design vision that incorporates the users' emotional concerns. The database works with product emotion types: product as an object, product as an agent, and product as an event (Desmet, 2002; Desmet and Hekkert, 2002). The navigator is considered as a great source of knowledge that can stimulate the imagination of people at generating new ideas, or it can improve the knowledge of people involved in the design of the new product.

Facereader

Facereader is a non-verbal instrument to register how fun can be to the usage of an 'app'. It is used to measure emotional responses at conducting usability evaluations (Zaman and Shrimpton-Smith, 2006). Facereader can bring benefits to evaluate the usefulness of 'apps' in the concept definition phase; evaluating mock-ups and implementing relevant improvements before the app is developed.

The User Compass Chart (UCC)

UCC is a verbal self-report method, it was designed to evaluate sketches and models. It is not specified the approach to emotion knowledge on which the method is working; however, there is an insinuation that the method is an emotional design method (Sperling, Kristav, Olander, Eriksson, and Hans, 2006). The evaluation of models and sketches can be part of the concept definition phase.

Realpeople

Realpeople is a database method that contains information from a survey of 682 persons about people attitudes towards functionality, usability, product pleasure, and product preferences. Its main intention is to help designers to be aware of the specific characteristics of products that give pleasure to the people who own them (Porter, Porter, and Chhibber, 2007). The information related to product preferences based on pleasurable approach was considered important knowledge in the front-end of the innovation process.

Emotools

Emotools is software aimed to collect emotional information during a test or tasks in human-computer interactions. It was created to identify the divergence between what users 'say they do with what 'they actually do'. It is not specified the approach to emotion knowledge on which the methods are working, but there is the indication that the method serves to collect emotional data (Bustillo, 2007). Emotools can generate accurate emotional data to evaluate and select software concepts for further developments.

Product Attachment Scale

Product attachment scale is a questionnaire aimed to identify and measure seven possible causes of consumer-product attachment:

1. Enjoyment
2. Memories to persons, places, and events
3. Support of self-identity
4. Life vision
5. Utility
6. Reliability
7. Market value

A consumer-product attachment is described as an emotional bond between the consumer and

a durable product (Mugge, Schifferstein, and Schoormans, 2005; Schifferstein and Zwartkruis-Pelgrim, 2008). The application of product attachment scale method was considered valuable to measure concepts of products that embody similar features to the products that are currently on the market.

LEMtool

LEMtool it is a web-based self-report method depicting emotions through cartoons of facial expressions and body language; it aims to measure user`s emotional reactions on web interfaces. LEMtool works with a set of 4 positive emotions (desire, joy, fascination, and satisfaction) and 4 negative emotions (sadness, disgust, boredom, and dissatisfaction) (Huisman and van Hout, 2010). LEMtool allows the user to select the area of the interface that wants to evaluate and subsequently to select one of the eight characters that expresses its emotional experience. LEMtool can bring valuable inputs at measuring emotions in the final prototypes of web interfaces; intentions regarding product and process engineering phase.

The emotion slider

The emotion slider is a device made with an elongated box with a metal plating on the top and a rounded handle. It was designed to collect affective reactions through movements. To collect the affective responses the device is connected to a computer; the screen of the computer is used to present the stimulus that must be evaluated (Laurans, Desmet, and Hekkert, 2009). To report positive feelings, participants must pull the handled; to report negative emotions, users must push the handled. Due to the fact that the stimulus is presented in the screen of a computer, it was considered a limitation in the evaluation of prototypes of products; but, the application of the emotion slider can be valuable to identify affective reactions towards graphic design concepts.

Geneva Emotion Wheel

Geneva emotion wheel is a verbal self-report method, it assesses emotional reactions and their intensity towards objects and situations. The method consists of a picture with 20 different positive and negative emotions arranged in a circular way (Sacharin, Schlegel, and Scherer, 2012). People can express their emotional responses by selecting the emotion that represents the best feeling experienced and indicating the intensity of the experience. Geneva emotion wheel is an intuitive method that can be used to evaluate product concepts in a very short time.

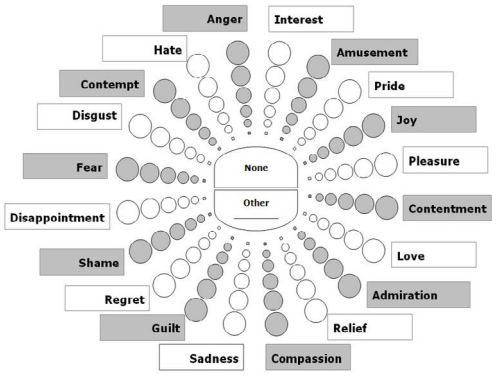


Figure 3.8. Geneva Emotion Wheel.

Emotion Rainbow

Emotion rainbow is an online database representing 25 positive emotions. The 25 emotions are divided into nine categories (assurance, interest, gratification, empathy, affection, aspiration, enjoyment, optimist, and animation). The information of every emotion contents its definition and presents how the product could elicit the emotions: by the product itself, by using the product, by seeing someone using the product by owning the product or by the designer of the product (Desmet, 2012; Emotion rainbow, 2017).

The product is kind when during usage, the product responds in a kind way or if it has a nurturing function and also when the product eases a difficult task.

"The blanket I sleep with at night makes we feel warm and safe. The temperature of the blanket is warm. I feel covered and safe, and it is soft and fuzzy and nurturing. It feels kind to me."

Hope that the consequences o fusing a product will happen or hope for some event in which the product plays a facilitating role.

'Every time when I am cooking or baking a dish, I hope that it willsucceed and that everybody enjoys eating it! Especially dishes that needto go in the oven allow you to really have the hope that it will begood, because you have to wait until the end to see the final outcome.'

The user can love the product if it is beautiful or provides pleasurable sensorial stimulation, but also when he/she has invested time and energy in the product.

"I found this table in a second-hand store. It was broken down, and I repaired it, and I started to love it from that moment."

Figure 3.9. Examples of products on Emotion Rainbow method. Kindness (by using the product) a girl using a blanket. Hope (by the product itself) an apple pie. Love (by the product itself) a man repairing a table. Source of the pictures and information Emotion rainbow, 2017.

The emotion rainbow can help to distinguish different positive emotions; this knowledge can be useful in the knowledge acquisition phase. The examples of products presented in the database can stimulate the generation of ideas. There are not guidelines indicating how to use the information of the database and be effectively applied in these two phases of the front-end of the innovation process (knowledge acquisition and idea generation). Some of the examples presented in the database are emotions that are not directly provoked by the products, but rather by situations where the product is involved. See examples of emotions kindness, hope, and love in figure 3.9.

Emotion Capture Cards (ECC)

ECC is a card-based method; it aims to create a fine understanding of consumers by focusing on their emotions (Okaramanli, Fokkinga, Desment, Balkan, and Eapen, 2013). The ECC method works with a framework of positive and negative emotions. The ECC method is an approach to generate accurate emotional reactions of specific consumers with particular products and situations; the information generated through the ECC method can offer value to the emotion knowledge acquisition phase of the FEI. The ECC method consists of two general steps: in the first step, the participant (the consumer) must report its emotional reactions towards the stimulus presented in a specific situation. The second step the participant must answer three types of questions:

1. A question type 'what' aims to understand what happened to the participant.
2. A question type 'how' seeks to explore how the participant felt during the situation.
3. A question type 'why' pursues discover why the situation was important to the participant.

Positive Emotional Granularity Cards (PEG)

PEG is a card-based method of 25 positive emotion types. PEG cards were created to support the emotion-focused design process. Every PEG card contains the definition of one positive emotion type, the category of the emotion, related words and images of people expressing behavioural manifestations of the corresponding emotion (Desmet, 2012).

Three different techniques were designed to use PEG cards. The first technique is aimed to create an understanding of the nuances of positive emotions; this technique can bring valuable knowledge in the first phase of FEI (knowledge acquisition). The intention of the second technique is to determine the emotional intentions of the new product. Even though the PEG cards are concerned to define the directions of the new product, the outcome of this technique was not considered valuable in the goal definition phase of the FEI. The second technique bases the selection of emotions on the designer's likings rather than pursuing specific objectives or solving specific problems.

The third technique aims to facilitate the generation of ideas through three steps: to select randomly one of the cards, to write down the conditions to elicit the emotions and to generate ideas. The outcome of the third technique is the quantity of ideas; it can be valuable to stimulate the designer`s imagination. However, there is a lack of guidelines to focus the creativity of the designers to achieve specific objectives at designing a new idea of a product.

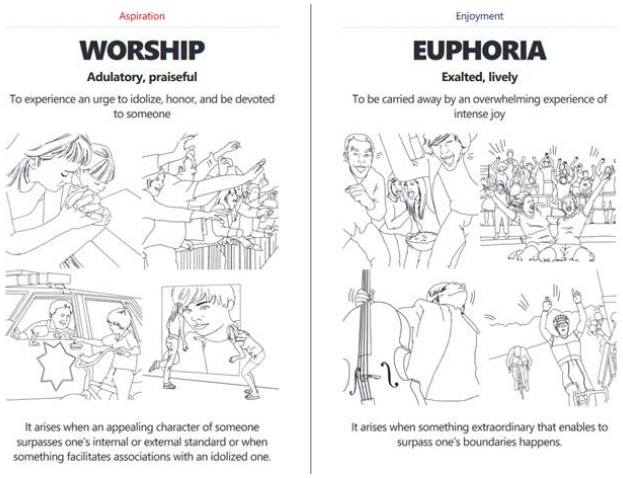


Figure 3.10. Examples of PEG cards. Source (Yoon, Pohlmeyer, and Desmet, 2015).

Negative Emotion Typology

Negative emotion typology is an online database of 36 negative emotions. The database contains the definition of every emotion, the conditions to elicit the emotions, a comparison to distinguish emotions that may seem very close in their cognition, and visual representation of the emotions (clips of movies

and comics) (Fokkinga, 2015 and 2017). The content of the database is a great source of knowledge to distinguish and understand different negative emotions.

Figure 3.11. Negative emotion typology database.

Pick-A-Mood

Pick-A-Mood is a method to report and express moods. The method consists of three different characters expressing eight mood states (Desmet, Vastenburg, & Romero, 2016). Moods and emotions are different states; moods have not a particular stimulus to be elicited; moods emerge because people feel affected by the context in general; while emotions are experienced in response to a specific stimulus (Desmet, 2002).

3.3. Data findings

From the analysis of the usefulness of the identified methods in the innovation process, some critical considerations have been identified.

No method was found supporting an entire area of the innovation process (FEI or BEI) or supporting the entire innovation process. It was found that the majority of the methods are useful in the back end of innovation (14 out of 22). These methods are aimed to measure emotional responses, to report moods or to measure experiences of pleasure towards existing products, separate parts of the product, the usage of a product, reactions to sounds or to other product interactions.

The identified methods have different approaches to emotion knowledge. There are twelve methods with a specific set of emotions (positive and/or negative); the number, the name and the definitions of the emotions differ between the methods.

	Name	Category	Approach to emotion knowledge	Innovation Process Framework				
				Opportunity Generation Process			Product Development	
				Knowledge Acquisition	Goal Definition	Idea Generation	Concept definition	Product & Process Engineering
1	Software Usability Measurement Inventory (SUMI)	Questionnaire	Perception of affect	-	-	-	***	*
2	The Self-Assessment Manikin (SAM)	Self-report method	Framework of positive and negative emotions	-	-	-	***	-
3	Pleasure-Arousal-Dominance (PAD) Emotion Scales	Questionnaire	Framework of positive and negative emotions	-	-	-	***	*
4	2DES	Software	Framework of positive and negative emotions	-	-	-	***	-
5	Multi-Dimensional Scaling (MDS) Interactive	Data base	Perception of taste	***	-	-	-	-
6	Feel-Trace	Software	Framework of positive and negative emotions	-	-	-	***	-
7	PrEmo	Self-report	Framework of positive and negative emotions	-	-	-	***	**
8	EmoCards	Card-based	8 emotion categories	***	-	**	*	-
9	The [product & emotion] Navigator	Data base	Product emotion types	***	-	***	-	-
10	FaceReader	Software	Framework of positive and negative emotions	-	-	-	***	-
11	The User Compass Chart (UCC)	Self-report	It is not specified	-	-	-	***	-
12	RealPeople	Data base	Concept of pleasure	***	-	-	-	-
13	EmoTools	Software	It is not specified	-	-	-	***	-
14	Product Attachment Scale	Questionnaire	It is not specified	-	-	-	***	-
15	LEMtool	Self-report method	Framework of positive and negative emotions	-	-	-	-	***
16	The emotion slider	Self-report method	Valence of an experience	-	-	-	***	-
17	Geneva Emotion Wheel	Self-report method	Framework of positive and negative emotions	-	-	-	***	-
18	Emotion Rainbow	Data base	Framework of positive emotions	***	-	**	-	-
19	Emotion Capture Cards (ECC)	Card-based method	Framework of positive and negative emotions	***	-	-	-	-
20	Positive Emotional Granularity (PEG) Cards	Card-based method	Framework of positive emotions	***	-	***	-	-
22	Negative Emotion Typology	Data base	Framework of negative emotions	***	-	-	-	-
21	Pick-A-Mood	Self-report method	Categories of moods	-	-	–	***	-
			Three-level qualitative scale	Strong	Medium	Weak		
				***	**	*		

Table 3.3. Innovation process model - applicability of methods.

From the methods with a specific set of emotions, only four of these methods are useful in the front-end of the innovation process; two of these methods have the same framework of positive emotions (PEG cards and Emotion rainbow). The rest of the methods use different languages, adopting concepts like emotion categories, affect and pleasure.

The methods with a well-defined set of emotions can better pursue the development of the competence of emotional granularity and therefore the objectives of the knowledge acquisition phase. Emotional granularity competence is the ability in which an individual can interpret and articulate her/his own and others emotional states (Yoon, Pohlmeyer, and Desmet, 2016).

Even though there are two methods that declared the objective of defining the emotional intentions of the new product (Emocards and PEG cards) these methods are not integrated with clear guidelines to pursue this objective. In particular, Emocards method lacks guidelines to help designers at translating the information gathered in analysing existing products into the emotional intentions of the new product. Similarly, there are no indications on how to use PEG cards to identify specific emotional objectives.

Regarding the idea generation phase of FEI, we identified four methods with medium or strong usefulness. As we have seen in the previous section the [product & emotion] navigator and emotion rainbow are sort of databases that work as a source of inspiration; both methods can stimulate the imagination of people at generating ideas. The guidelines to use emocards in the idea generation phase suggest an iterative process, which is composed of the development of a mock-up, the emotional evaluation of the mock-ups, and the refinement of the mock-up. However, the guidelines are not clear about how the designer should 'match' the user concerns into mock-ups. PEG cards methods in the idea generation phase have the role of a creativity stimulus; the objective is the generation of a considerable number of product ideas through the random selection of a large number of specific emotional cards. Those methods are similar to many other techniques to stimulate divergence and generate a considerable quantity of ideas; those techniques are useful to generate spontaneous solutions for simple problems but unrealistic to achieve specific complex targets (Osborn, 1953). Figure 3.12 depicts the main findings.

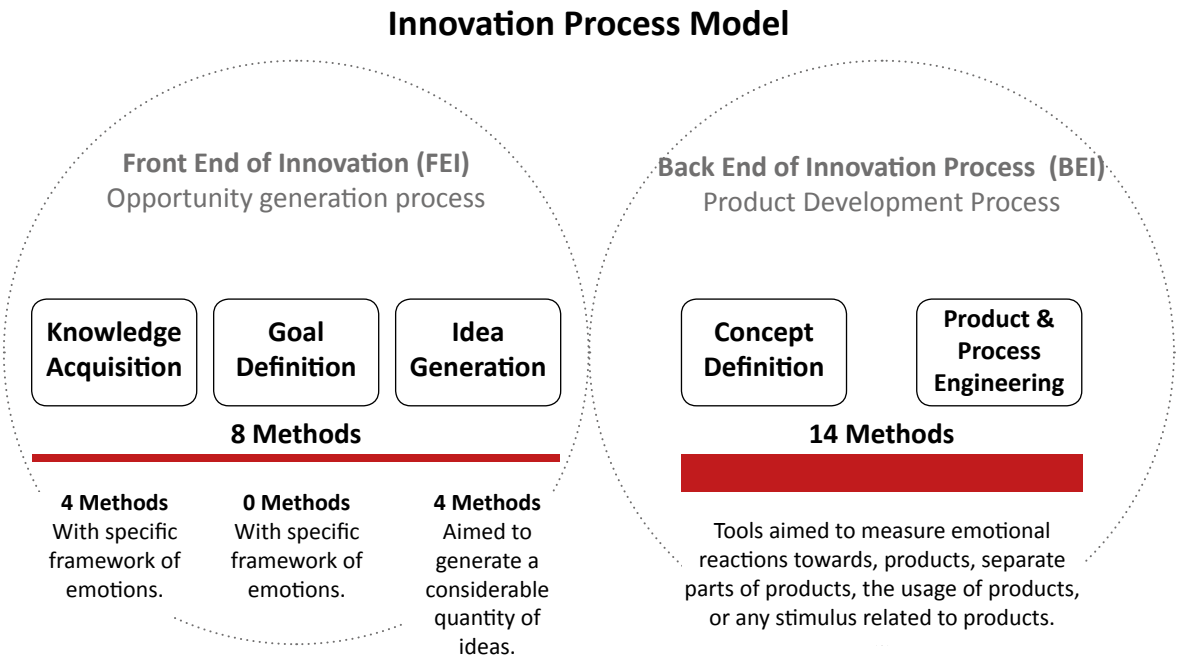


Figure 3.12. Main findings of the systematic literature review.

3.4. Data Synthesis

The following statements synthesize the findings of the literature review.

Statement 1: There is no method that systematically supports an entire area of the innovation process (FEI or BEI) or the entire innovation process.

Statement 2: The majority of the methods are focused only on the back end of the innovation process (14 out of 22).

The literature analysis, therefore, reveals a major challenge: none of the tools analysed is capable to fully support in an integrated way all the fundamental components of the front-end of innovation: this is a serious concern as the quality of FEI outputs has a profound impact on the whole innovation process (see Murphy & Kumar, 1997; Koen, et al., 2001; Russell & Donald, 2008).

Statement 3: On the front end of innovation only four methods work with a well-defined framework of emotions.

The presence of a well-defined framework is very important to pursue the competence of emotional granularity. This competence is an advantage in design activities (Yoon, Pohlmeyer, and Desmet, 2016) it can also enrich the vocabulary between designers and managers, which can encourage product innovation (Dell'Era, Buganza, Fecchio, and Verganti, 2011). The third statement had helped to formulate the first research question.

Research question 1: How can product development teams develop the competence of emotional granularity?

Statement 4: None of the methods analysed to support the goal definition phase.

As it has been stated before the goal definition phase is a very critical phase in a creative process. The problem to be solved has to be defined before entering the divergent activities of idea generation.

The innovation process model of Buijs and Valkenburg (2003) stated that before the idea generation phase, must be presented the strategy formulation phase; where the team searches the strategic innovation trajectory. In the structure of innovation process proposed by Roozenburg and Eekels (1995), it is pointed out the importance of defining the company objectives for the new product, before the idea generation activities; Roozenburg and Eekels (1995) called this goal-definition phase 'policy formulation'. Despite the differences in the vocabulary for goal definition phase these two examples of innovation process model highlight the importance of defining the major aims for the new product before starting with the formulation of ideas. Considering the null existence of methods supporting this phase, the second research question emerges.

Research question 2: How can product development teams be strategically supported in defining the emotional intentions of the new product?

Statement 5: The four methods that have been identified as useful in the idea generation phase, do not give any specific guidelines in the process of idea generation, as they work only as 'creativity stimulus'.

There is an opportunity to create guidelines to simplify the complex problem of generating new product ideas with emotional value. The four tools that are useful in the idea generation activities share the same characteristic: they have the objective to generate a large number of product ideas, similar to the classic creativity techniques which are focused on fostering divergent thinking (Michalko, 2010). Those techniques are useful to generate spontaneous solutions for simple problems but unrealistic to achieve specific complex targets (Osborn, 1953; Brown, 2009).

Research question 3: How can product development teams be guided to generate strong and meaningful emotion-focused product ideas (thick ideas)?

The concept of the thick idea is used here to refer to product holistic ideas that contain enough characteristics based upon a deep reflection on the meaning of specific emotions to achieve specific emotional effects.

The objective of this research project is to address the three research questions with the design of a new front end model to generate emotion-focused new product ideas.

This state-of-the-art review is the first phase of the process research methodology. The three research questions are the direct input to the second phase of the methodology (process creation) which is the focus of the following chapter.

4

Process creation: structuring E-DI process

The challenges raised in the systematic literature review are addressed in the process creation phase of the process research methodology (see Figure 4.1). This methodology supports the development and evaluation of processes (Platts, 1993). The ambition is to create a practical and industrially relevant process that can support companies in envisioning new emotion-focused product ideas at the front end of the innovation process (Koen et al., 2001); it has been named 'Emotion-Driven Innovatio' (E-DI) process. The creation of the aforementioned process encompassed three main activities:

1. The definition of the main objectives to be achieved by the process and its structure.
2. The elaboration of key concepts to define the language for discussing emotions in product innovation.
3. The design of methods to achieve the main objectives of the process.

The three activities were conducted in collaboration with a review team through five focus groups. The review team was composed of the following professionals: a business consultant who is an expert in innovation and creativity; a manager of an open innovation company focused on design competitions; an R&D manager of a company specialised in products for organising indoor and outdoor living space and

a professor of management at the University of Padova. The objectives, key concepts and methods were defined taking into account the professionals' feedback. As was clarified in Chapter 2, the feasibility of the process was the focus of this phase and has been considered through the entire phase of process creation.

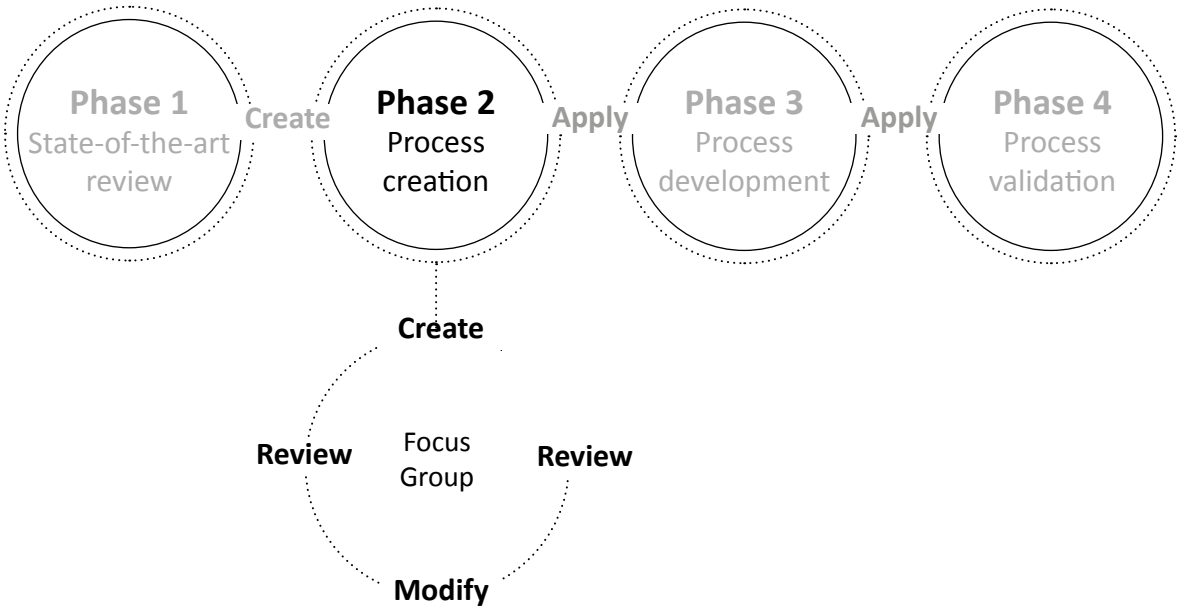
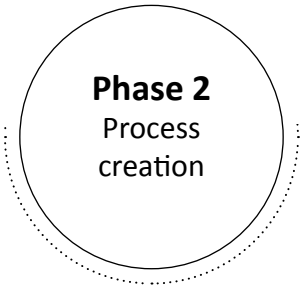


Figure 4.1. Process research methodology, phase 2 - Process creation.



Method: focus group with a review team.

Review team members

Business consultant expert in innovation and creativity

Manager of open innovation company focused on design competitions

R&D manager of company specialised in products for organising indoor and outdoor living space

Professor of management at the University of Padova

Main discussions of the five focus groups	Parallel activities
Focus group session 1 • Introduction to the research project (challenges and objectives) • Presentation of the structure of the process • Discussion of challenges that emerged from the systematic literature review and the corresponding objectives of Emotion-Driven Innovation process.	
Focus group session 2 • Presentation of the three key concepts to define the language for discussing emotions in product innovation Human-product emotional interactions Framework of positive emotions Emotional-jobs-to-be-done	Online launch of an exploratory survey to explore the understandability and usability of the three key-concepts.
Focus group session 3 • Definition of the language for discussing emotions in product innovation	Analysis of the exploratory survey.
Focus group session 4 • Presentation, discussion and definition of the methods (including their time of execution and the language of their guidelines)	
Focus group session 5 • Presentation, discussion and definition of the visual design of the tools corresponding to every method of the process	

Figure 4.2. Main discussions of the five focus group sessions.

Emotion-Driven Innovation process aims to envision new emotion-focused product ideas. The process is created to support multidisciplinary teams in the design and development of new products. The process pursues the integration of different professionals involved in the design and development of new products in order to stimulate fruitful environments for creativity and to generate solid decisions. The final structure of Emotion-Driven Innovation process is presented in Figure 4.3.

In this research project it is understood as a 'process' as way of achieving an outcome and it can be characterized by four main elements (see Platts, 1994).

1. Procedure. The steps or phases to go through,
2. Purpose and outcome of each phase,
3. Methods, which encopased tools and guidelines (techniques) that define the modus operandi and guide people in accomplishing specific outcomes,
4. Participants, the people involved in the process and their patterns of interaction.

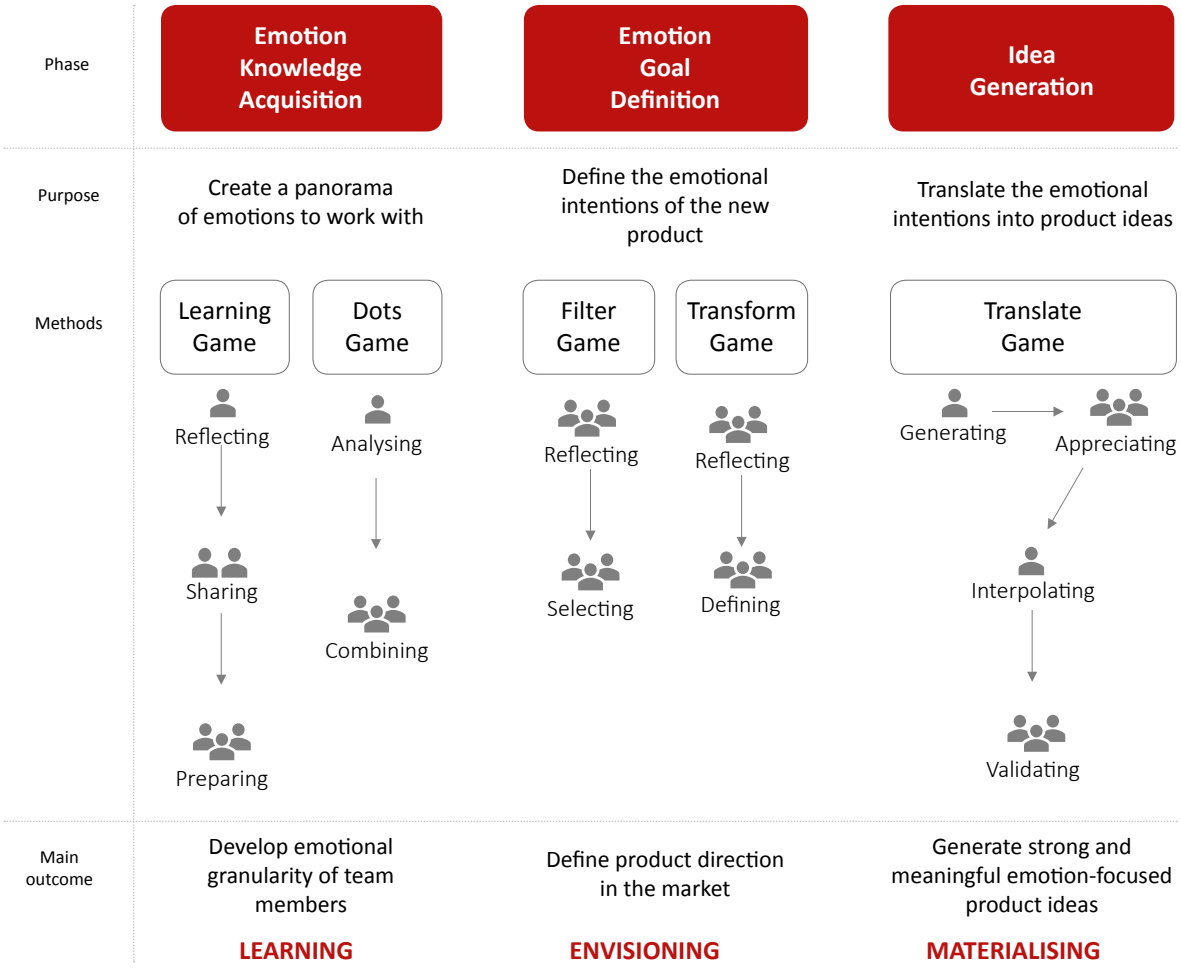


Figure 4.3. Structure of Emotion-Driven Innovation process.

Taking into account the results of the systematic literature review Emotion-Driven Innovation process was defined. Having regard to the fact that the front end of innovation is the area that can generate the greatest number of opportunities with positive impact on the entire innovation process (Koen, et al., 2001) and that the results of the systematic literature review uncover main gaps in this area, the Emotion-Driven Innovation process is designed to be applicable in the FEI.

The E-DI process follows the structure of FEI model which has been identified in the systematic literature review (see Chapter 3). The EDI process is organized in three phases, each of which addresses the three research questions.

Phase 1 Emotion Knowledge acquisition (addresses RQ1)

The first research question is addresses in the first phase of E-DI process "Emotion Knowledge Acquisition". The phase is aimed to develop the competence of emotional granularity by introducing a vocabulary of positive emotions to analyse products currently present on the market. The emotional analysis of products uncovers the panorama of emotions that later will be the main input on the strategy definition in the second phase of E-DI process.

Phase 2 Emotion Goal Definition (addresses RQ2)

The second phase of E-DI process "Emotion Goal Definition" responds to this question. Emotion Goal Definition provides methods that, first, correlate the results of the emotional analysis of products with categories of innovation to define the emotional intentions to be used when designing the new product; second the emotional intentions are itemised in a design brief which is used as main input in the third phase of the E-DI process.

Phase 3 Idea Generation (addresses RQ3)

The "Idea Generation" phase is the third phase of the E-DI process, it aims to translate the emotional intentions into new emotion-focused product ideas. The third phase provides a method aimed foster the generation of ideas and focus people's creative thinking towards the defined emotional intentions.

In the next section, the key concepts, which have been elaborated as the basis of every discussion and all the teamwork in the three phases of the process, are presented. Afterwards, the main objectives and the corresponding methods of every phase are defined.

4.1. Key concepts: defining the language for discussing emotions in product innovation

In order to address the challenges raised in the systematic literature review, it is fundamental to define the language used to discuss emotions, which is the specific approach to emotion knowledge that will be the foundation of Emotion-Driven Innovation.

Emotion knowledge is the accurate knowledge of the phenomenon of emotions, the conditions for

eliciting the emotions and their behavioural manifestations (Desmet, Fokkinga, Ozkaramanli, and Yoon, 2016). Emotions exist between the subject (the person experiencing the emotion) and the stimulus (the object provoking the emotion). Emotions are individual: people can experience different emotions towards the same stimulus (Desmet, 2002), and products are part of the stimuli that provoke emotions in people.

When people need to express an emotional state, it is easy to differentiate a pleasant experience from an unpleasant one. But, when the need is to express an emotional state in a refined way, usually, the vocabulary seems to be limited. Furthermore, people can understand 'emotion' with different connotations and/or can have different understandings of the same emotion. In the activities of designing and developing new products aimed to provoke pre-defined emotions, these circumstances need to be tackled.

The approach to emotion knowledge which constitutes the basis of Emotion-Driven Innovation is the framework of 25 positive emotion types presented by Desmet (2012). The framework was selected after the systematic literature review presented in Chapter 3, as it emerged as the most analytic and as having the most complete set of positive emotions. The framework of 25 positive emotions represents a general collection of human positive emotions, and three stages comprised its elaboration.

The first stage was aimed at creating a list of emotions; the assembly of positive emotions started by collecting words associated with emotions that had been reported in emotion studies, followed by the exclusion of the words not related to emotions and the non-positive emotions. In the second stage, the emotions were clustered into emotion types. The outcome of stage three was the six sources of human product interactions, which evidence that emotions are not only provoked by the product itself, but also by its use and the people involved in the interaction. The six sources are the following:

1. Object-focus, where products are objects that can be perceived by the senses of the human body.
2. Meaning-focus, where emotions are caused by products that symbolise or are linked to another person, event or object.
3. Interaction-focus, where the product is used to achieve specific goals (for example, to make coffee).
4. Activity-focus, where the product is used to facilitate activities.
5. Self-focus, when products facilitate self-expression and facilitate interaction with other people.
6. Other-focus, where the emotional experience is caused by other people.

The framework of 25 positive emotion types has already been the basis of methods such as the Emotion rainbow tool and Positive emotional granularity cards. These methods were analysed in the systematic literature review (see Section 3.2. Data analysis in Chapter 3).

Table 4.1 contains the list of 25 positive emotion types and the corresponding definitions elaborated by Desmet (2012). This framework was the starting point, and it has been modified during the iterative procedure of process creation. The reasons for the modifications and the final list are presented in the next section.

Positive emotion type	Definition
Admiration	Admiration is the experience of an urge to prize or estimate someone (or something) highly. This can be because of their worth, character, or achievement. Admiration is accompanied by feelings of esteem and amazement, and of being impressed. It elevates the object of emotion and creates a distance between this object and the admiring person. It comes with the tendency to praise or applaud the object of admiration, but it does not necessarily involve feelings of warmth or affection.
Amusement	Amusement is the enjoyment of a high-spirited state of playfulness, humour, or entertainment.
Anticipation	Anticipation is the experience of eagerly awaiting a desirable event that is expected to happen. Unlike hope, anticipation does not require uncertainty about the future event. It is the pleasure derived from knowing that something pleasing will take place.
Confidence	Confidence is the experience of faith in oneself or in one's ability to achieve something or to act in the right way. The related feelings are self-assurance, security and certainty, and the related tendencies are control, competence, resolution, determination, and being free from doubt.
Courage	Courage is the experience of the moral or mental strength to persevere and withstand danger, fear, or difficulties. The related emotions are feeling heroic, faith or trust in oneself or one's abilities, and the related tendencies are to persist, face, or endure the situation at hand.
Desire	Desire is the experience of a strong attraction. This can be to own something or to engage in some activity. Desire is similar to lust, but it differs in the sense that the involved attraction is not necessarily erotic or sexual.
Dreaminess	To be dreamy is to enjoy a calm state of introspection and thoughtfulness. This emotion combines being relaxed and stimulated, as it involves undirected cognitive activity.
Enchantment	To be enchanted is to be captivated by something that is experienced as delightful or extraordinary. It is similar to surprise but requires a violation of an expectation or a belief in a manner that is beyond easy comprehension.
Energised	To be energized is to enjoy a high-spirited state of having energy or vitality. It stimulates general energetic thoughts and behaviour.
Euphoria	Euphoria is an emotion that is felt when one is carried away by an overwhelming experience of intense joy.
Fascination	Fascination is the experience of an urge to explore or investigate something. This emotion is driven by an eagerness to increase one's understanding of the object of fascination, and it stimulates focused attention and explorative behaviour.
Hope	Hope is the experience of the belief that something good or wished for can possibly happen. The difference between hope and anticipation is that in the case of hope, there is uncertainty as to whether the good or wished for thing will happen.
Inspiration	Inspiration is the experience of a sudden and overwhelming feeling of creative impulse. This emotion comes with feelings of being motivated, of enthusiasm and eagerness.
Joy	Joy is the experience of being pleased about (or taking pleasure in) something or some desirable event.
Kindness	Kindness is the tendency to protect or to contribute to the well-being of someone (or something). Like sympathy, kindness involves empathy and benevolence, but the difference is that kindness is not related to someone's misfortune. Like love, it involves warmth and affection, but it does not necessarily involve intimacy, attraction, or romantic feelings.
Love	Love is the experience of an urge to be affectionate and to care for someone (or something). This emotion is accompanied by feelings of attraction and affection, and it can include romantic feelings. Love involves an approachable attitude, intimacy and nurturance towards the object of love.
Lust	Lust is the experience of sexual appeal or sexual appetite. It involves an explicitly sexual element, such as erotic or sensual sensations. Related tendencies are to seduce or charm the object of lust.
Pride	Pride is the experience of an enjoyable sense of self-worth or achievement. The unique feature of this emotion is that the object of emotion is oneself. Pride is experienced in response to one's own achievements or qualities. It can be considered self-love or self-admiration.
Relaxation	Relaxation is the experience of enjoying a calm state of being, free from mental or physical tension or concern.
Relief	Relief is the experience of enjoying the recent removal of stress or discomfort. It is similar to feeling relaxed but with the specific antecedent of previous distress that has been taken away.
Respect	Respect is the experience of regarding someone (or something) as worthy, good or valuable. This emotion is accompanied by feelings of acceptance and approval. It comes with the tendency to accept, recognize, and endorse the object of respect.
Satisfaction	Satisfaction is the experience of enjoying the recent fulfilment of a need or desire. The experience of joy is the experience that is specifically caused by this fulfilment.
Surprise	Surprise is experienced in response to a sudden event that was unexpected or is unusual because it violates an expectation or belief. In the case of pleasant surprise, the unexpected event is desirable or pleasurable. Surprise comes with feelings of amazement and the tendency to interrupt current activities.
Sympathy	Sympathy is the experience of an urge to identify with the feelings or state of someone (or something) that is suffering from misfortune or distress. This emotion is accompanied by feelings of compassion and mildness. Sympathy is an altruistic emotion because it involves a genuine concern for the welfare of others.

Table 4.1. The framework of positive emotion types presented by Desmet (2012).

4.1.1. The language of emotions: human–product emotional interactions, emotion types and emotional-jobs-to-be-done

Undeniably, the major aim of defining a language to envision new product ideas influenced by positive emotions is to create an unambiguous, understandable and shared vocabulary. The definitions of the emotions presented in the framework of 25 positive emotions represent general manifestations of the emotions, which can be understood as emotional experiences between people and other persons, situations or objects. In order to enhance understanding of the 25 positive emotions in the practice of designing and developing new products, the concept of emotional-jobs-to-be-done has been adopted.

Emotional jobs define how users want to feel or want to avoid feeling. The emotional job statements are used to help inform decisions that lead to the creation of the value proposition of the design of a new product (Ulwick, 2016). Here is an example: the configuration of a product embodies physical attributes, like colours, sounds, technology, materials, shapes, among others, that all together facilitate the achievement of the job for which the product was designed. For instance, the job of a wireless speaker system is to convert audio signals into corresponding sounds using radiofrequency waves, this type of job is a functional job.

But to arouse an emotion, products must affect in some way the person (Coppin and Sander, 2016). So, with regard to Bang & Olufsen's BeoSound speakers, its physical attributes permit to place the system on the wall of any room, and the shape of the speaker is modular, this attributes facilitate customisation of shapes in the wall and the distribution of the sound in the space. This outstanding configuration can provoke inspiration by stimulating people's creativity, and this type of job is an emotional job.

A product can perform an emotional job through diverse situations. It is acknowledged that a product can provoke emotions by its appearance, the way it performs its function and its symbolic meanings (Eisenman, 2013; Jordan, 1999; Kamp and Desmet, 2014; Norman, 2004; Rampino, 2011). In this research project, the different situations in which a product provokes emotions have been named human–product emotional interactions (H-PEIs).

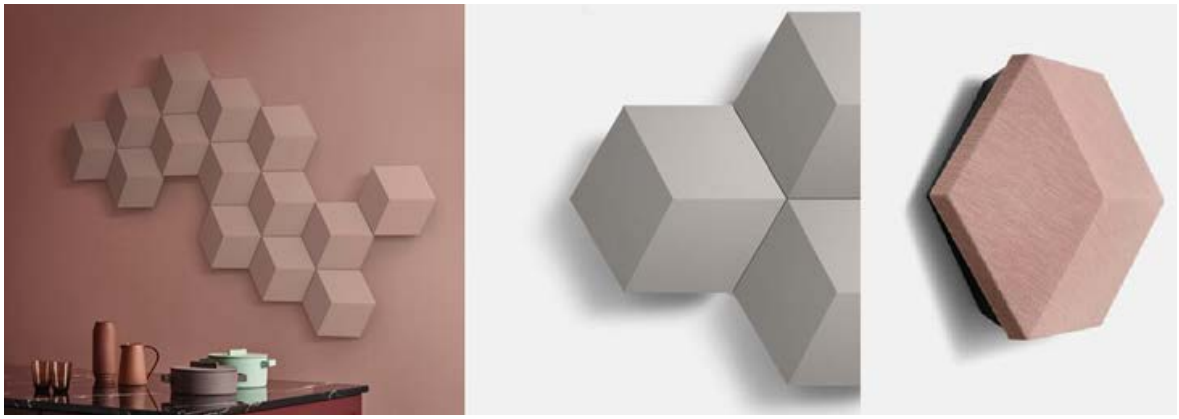


Figure 4.4. Bang & Olufsen's BeoSound wireless speaker system (Source: www.bang-olufsen.com).

Table 4.2. displays the framework of the positive emotions and the corresponding emotional-jobs-to-be-done.

Name of emotion	Emotional job-to-be-done by the product
Admiration	The product should make you feel praised
Amusement	The product should make you feel playful
Anticipation	The product should make you know that something pleasing will happen
Confidence	The product should give you control of the situation
Courage	The product should help you to face uncertainty
Desire	The product should satisfy you through reachable benefits
Dreaminess	The product should make you fantasise
Enchantment	The product should make you feel immersed in a high-pleasure situation
Energised	The product should stimulate you to do physical activity or refresh your mind
Euphoria	The product should exalt your happiness
Fascination	The product should provoke your curiosity
Hope	The product should make you believe that something good will happen
Inspiration	The product should stimulate your creativity
Joy	The product should stimulate you to rejoice the situation
Kindness	The product should facilitate your personal relations
Love	The product should provoke intimacy in you and a nurturing attitude towards the object or person that you love
Lust	The product should provoke your sexual appetite through fantasy
Pride	The product should facilitate your achievements
Relaxation	The product should disconnect you from daily worries
Relief	The product should relieve your physical or mental stress or discomfort
Respect	The product should make you appreciate the objects, persons and events that are important for you
Satisfaction	The product should help you to fulfil your goals
Surprise	The product should make you surpass your expectations
Sympathy	The product should facilitate your interaction with people
Worship	The product should facilitate you during idolisation

Table 4.2. The positive emotion types with the corresponding emotional-jobs-to-be-done by the product.

Human–product emotional interactions are defined as the *situations* in which the appearance of the product (aesthetic interaction), functions of the product (behavioural Interaction), meanings of the product (symbolic interaction – product level) and meanings of the brand (symbolic interaction – brand level) elicit emotions to people (see Figure 4.5).

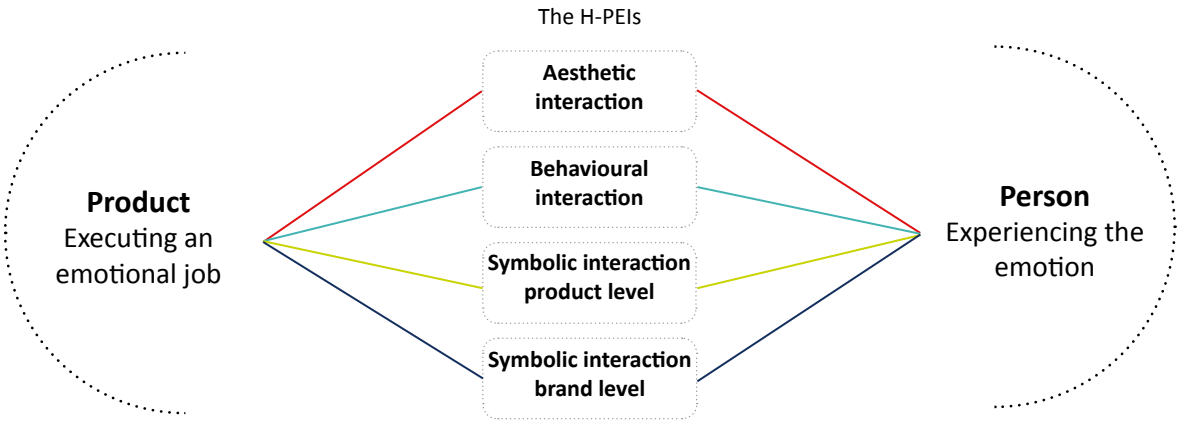


Figure 4.5. Human–product emotional interactions.

The four categories of human–product emotional interactions are based on the following approaches:

1. The pleasure approach to product affect (Jordan, 1999).
2. The three levels of design (Norman, 2004).
3. The innovation pyramid (Rampino, 2011).
4. The strategic use of design in a context of technological production (Eisenman, 2013).
5. The theoretical model of product attributes (Kamp and Desmet, 2014).

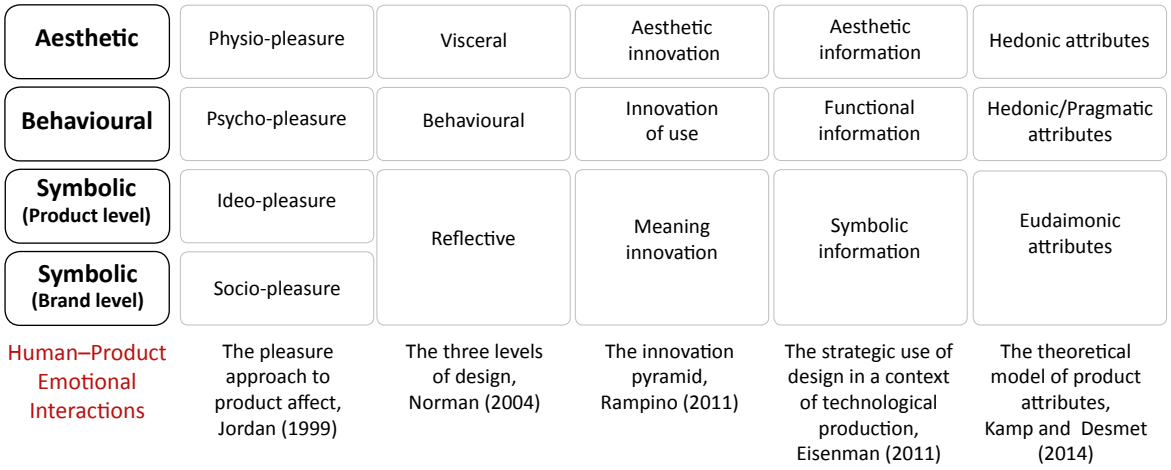


Figure 4.6. Approaches on which the human–product emotional interactions are based.

We already know that a product can provoke emotions that are linked to another person (i.e., a person can feel proud wearing a watch that had belonged to a beloved) or can be related to a special event (i.e. a person can feel love towards a pair of shoes that he or she wore on an unforgettable trip). However, the interest of this thesis is exclusively focused on the product design factors as triggers of emotions. The attributes of a product that can be designed and those attributes can provoke emotions in people have been named emotional design factors.

In order to experiment with and refine the vocabulary (the framework of 25 positive emotions, the emotional-jobs-to-be-done and the human–product emotional interactions), an exploratory survey for product designers has been launched. Designers are main actors in the process of designing new products, and in many manufacturing sectors, designers have strong participation in the product concept definition (Dell'Era, Buganza, Fecchio, and Verganti, 2011). The exploratory survey has been launched in collaboration with a crowdsourcing platform that connects companies and private clients with a worldwide community of designers (DESALL).

The major goal of the exploratory survey is to explore the understandability and usability of the three key concepts:

1. The 25 positive emotions
2. The statements of emotional-jobs-to-be-done 'performed' by the product
3. The human–product emotional interactions.

In order to engage the DESALL design community, a questionnaire was created; it had a three-step format to be filled out online and individually. The questionnaire was sent to the design community through the crowdsourcing platform where participants were informed about the objectives of the study. To stimulate the participation of designers, the questionnaire started by asking them to select one positive emotion (from the list of 25) that they had experienced because of a product. The three steps of the questionnaire were the following:

1. Select a positive emotion type that a product has recently evoked

Participants were asked to select one positive emotion type from the list of 25. The selected emotion must have been recently provoked by a product. The name of the different positive emotions and the corresponding emotional-jobs-to-be-done were the information given in step one.

2. Upload a picture of the product that evoked the selected emotion

For a better understanding of the answers, participants were asked to upload a picture of the product that had provoked the selected emotion. Step two displayed a card with the information regarding the selected emotion: a brief definition of the emotion and the emotional-job-to-be-done.

3. Describe the product

Participants were asked to briefly describe the details of the product that elicited the selected emotion. Participants had to specify how the product provoked the selected emotion and identify specific design factors in one or more of the four situations of human–product emotional interactions.

The questionnaire was answered by designers from 27 different countries (see Appedix B). A total of 70 responses were received. The results of the exploratory survey were analysed and discussed in detail with the review team, with the aim of refining the language of emotions to be adopted in the first test of the Emotion-Driven Innovation process.

In Figure 4.7, the number of answers per positive emotion type is illustrated. The most experienced emotion type was inspiration, followed by enchantment and sympathy. The least experienced emotions were amusement, kindness, love, relief, and respect. The emotions that were never indicated were desire, lust, satisfaction, and worship.

It can be asserted that our sample of designers feels more attracted towards emotions like inspiration, enchantment, and sympathy. On the other hand, it could be seen as a surprise that desire, satisfaction, lust, and worship were not selected by designers. The review team reflected on this result, which was perceived as an interesting stimulus for the refinement of language to be used in the Emotion-Driven Innovation process.

Considering the definitions of desire and satisfaction, it emerged that these emotions could be interpreted as generic emotional states. In particular, the emotion desire involves feelings of strong attraction; a person can feel attracted to a product because it provokes another specific emotion in the first place; for example, people can feel attracted to use or acquire a product that will make them experience

the feeling of calm (emotion relaxation). The emotion satisfaction involves feelings of joy at pleasing a desire; for example, a person can feel satisfied by a product because it stimulates her or his physical energy and helps him or her to achieve workout goals (emotion energised). Satisfaction and desire could be considered as emotional states that are the effects of other emotional states (the causes).

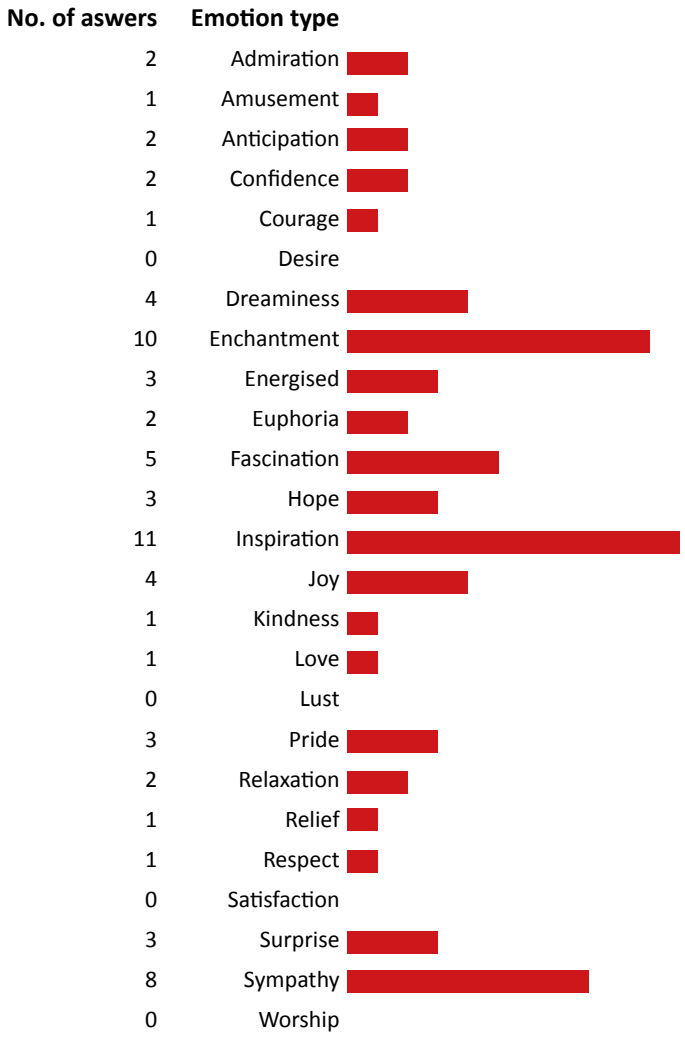


Figure 4.7. The number of answers per positive emotion type.

In the reflection with the review team about the results of the study, it was considered that designers did not choose lust because the description may not appear suitable in a professional design context. The positive emotion of lust involves feelings of sexual appetite. And, the positive emotion of worship was maybe not interesting for the designers since it involves feelings of devotion to something or someone: those feelings are mainly related to a religious context. These considerations were taken into account in the refinement of the framework of positive emotions that will be discussed in Section 4.1.2.

The analysis of the descriptions given in step three of the exploratory survey started by identifying the emotional design factors of the identified products. Figure 4.8 depicts the distribution of emotional design factors in relation to human–product emotional interactions.

Descriptions given in aesthetic interaction were grouped by common quality clusters. A common quality cluster contains a series of factors aligned to the same interest, which all together create a meta factor (Hekkert and van Dijk, 2011).

According to the concept of aesthetic proposed by Hekkert (2006) as the pleasure obtained by sensory perception, the descriptions given in the aesthetic interaction by our sample of designers were clustered in groups related to four senses of the human body (touch, smell, sight, and hearing). No product descriptions related to food were found, and, therefore, no responses related to the sense of taste. The finding of these answers was that most of the emotional experiences were caused because the product was perceived by the sense of touch and the sense of sight.

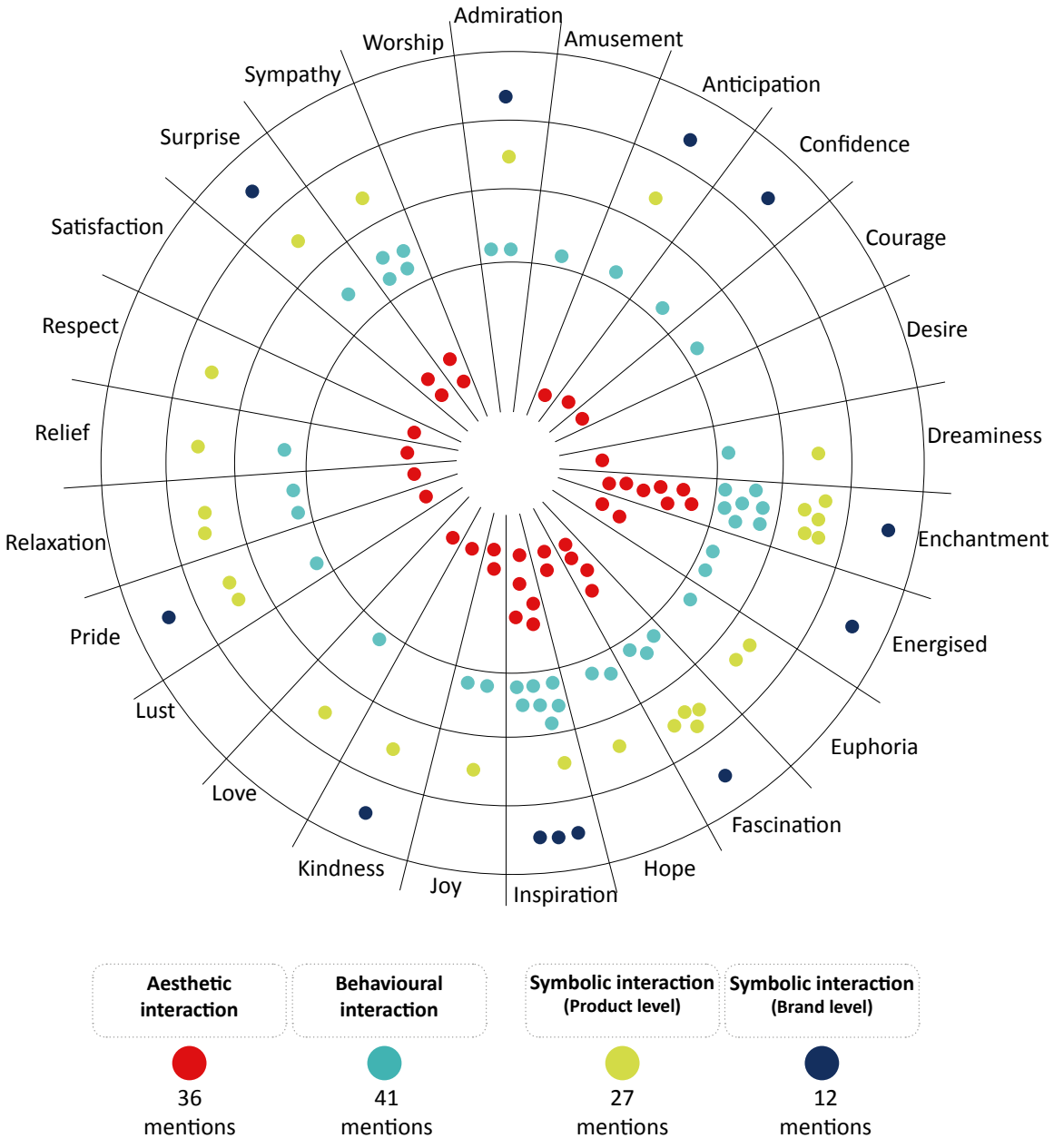


Figure 4.8. Distribution of product design factors in relation to the four human–product emotional interactions.

The principal finding from the product descriptions given by our sample of designers in behavioural interaction is that the positive emotions are related to moments of using the product:

1. Before the product starts to execute its function (example of an answer: "I can take the camera wherever I want").

Figure 4.9. Uploaded image of the product – positive emotion of inspiration.

2. When the product is executing its function (example of an answer: "Even though it is for transportation, it is very different from a car, I am the one moving it, I have way more road options, and I can explore a different route for commuting from my office to home, or even for going shopping, or just for fun. I can feel the weather (even though the weather here in Denmark is not that fun ...").

Figure 4.10. Uploaded image of the product – positive emotion of fascination.

3. When the product has executed its function (example of an answer: easy to clean after I have used it).

Figure 4.11. Uploaded image of the product – positive emotion of sympathy.

Descriptions related to the symbolic interaction of the product revealed that in order for the positive emotion to arise, people must be well informed about the different characteristics related to the product. Emotions like enchantment, love, and pride were related to the fact that designers knew the history,

the sustainability concerns and the technological innovation of the product. Emotions like dreaminess, euphoria, and fascination were elicited because the product provoked the imagination or curiosity of the designers, or because the product represented something else to them, like freedom. Designers mentioned the style of the product as an emotional design factor. The positive emotion types of euphoria, hope, and love were related to the style of the product: futurist, simple and classic, respectively; Figure 4.12. shows the products that designers uploaded for these answers.

Figure 4.12. Products related to the answers given in product image interaction: emotion of euphoria, a motorbike; emotion of hope, a jug; emotion of love, a watch. The pictures were uploaded by designers in the

Answers uncovered that there must be a strong bond between the product and the person in order to experience a positive emotion. Designers indicated that emotions like admiration, enchantment, joy, kindness, pride and relief arise because the product influences the person's self-esteem[5] or because the product permits self-expression.

Product descriptions regarding symbolic interaction at the brand level showed that in order for emotions to arise the person must be well informed about the brand. Positive experiences were linked to the fact that the brand was well known in its business niche, or that the brand was concerned about topics like sustainability.

Tables 4.3 and 4.4 present samples of product descriptions from the exploratory survey; all product descriptions are presented in Appendix C,

[5] Self-esteem reflects the general subjective emotional evaluation of an individual of their own value.

Positive Emotion	Uploaded image of the product	Descriptions on:			
		Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand
Admiration			The solution is brilliant. Elegant design that allows you to read the time easily		
Amusement		The sound when you make click			
Anticipation				Yes, it's related to the idea of the product, it represents innovation in its niche	
Confidence		When I pick up the product I am confident the product will work as intended. No need to fiddle or tinker to make the product work. A tried and tested device.			
Courage			For the bright red light. It makes me feel secure when I am riding my bike at night		
Dreaminess			I can see realized my fantasy, I can print anything I can imagine		
Enchantment				The idea that finally every one could have a domotic house with a cheap investment and that a lot of other innovations will arrive soon.	
Energised					The logotype
Euphoria				Futuristic design, excellent engineering	
Fascination		Seeing it makes me want to try it, reminds me the feeling of motion, of freedom of movement and direction, of speed.			
Hope				I know is from Karim Rashid, I know I will enjoy to use it	

Table 4.3. Sample of answers from the exploratory survey.

Positive Emotion	Uploaded image of the product	Descriptions on:			
		Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand
Inspiration		The smell of new			
Joy				The symbols on the faces of the product	
Kindness					I love the sustainability connected to the product.
Love				This watch, its design and history have particular meaning. When I was a Product Design student 25 years ago, this watch was launched. It was symbolizing a classic design at that time	
Pride					Playing a piano from that brand makes me feel important
Relaxation		When I see the needle touch the vinyl			
Relief					The knowledge applied
Respect				The product has meaning because of the designer	
Surprise		When I first touched it I was pleasantly surprised by the metal of its closure, which I did not expect to be so solid and cool to the touch.			
Sympathy			Because I live in a different city than my family, and by using all the apps available and the product itself, it makes me feel close to them, even when I don´t have the chance to see them everyday and keeps me in touch permanently.		

Table 4.4. Sample of answers from the exploratory survey.

Through the qualitative analysis of the descriptions given in step three, it has been observed that the four categories of human–product emotional interactions have helped the respondents to express clearly which design factors caused specific positive emotional experiences. In the following sections, the final definitions of the three key concepts are presented.

4.1.2. Positive emotions and emotional-jobs-to-be-done: the final framework

As was mentioned at the beginning of this chapter, we initially adopted the framework of 25 positive emotion types elaborated by Desmet (2012). This framework was discussed and analysed by the review team with the DESALL design community in light of the results of the exploratory survey.

It is important to underline that, as said in Section 4.1., the objective is not to develop a complete and comprehensive list of all emotional states from a psychological perspective, but to elaborate a language which can be easily adopted and used during a company workshop. There must be a reasonable number of emotions to discuss, which can each be discerned one from the other and integrated into the day-to-day vocabulary of people. For this reason, the word worship was excluded from the list. This emotion was never selected by respondents of our survey, and the review team agreed that this emotion could be linked to a spiritual experience and would be very difficult to transpose to an industrial context and hard to use during a company workshop.

The emotions of respect and admiration present a significant overlap; indeed, these emotions involved similar actions like to regard or to estimate someone or something because it is seen as valuable or worthy. The review team agreed to merge together these emotions under the name of admiration, with the following definition of the emotional-job-to-be-done:

'The product stimulates the emergence of warm approval, respect, and pleasurable contemplation.'

The emotions of anticipation and hope contain similar feelings, and both emotions are related to an event in the future, as is evident from Desmet's (2012) definitions:

'Anticipation is the experience of eagerly awaiting a desirable event.'
'Hope is defined as the experience of belief that something good can possibly happens.'

It was decided to combine the emotions of anticipation and hope, keeping the word hope due to the general understanding that the word anticipation it is not necessarily linked to a positive emotional state. The emotional-job-to-be-done of hope considers some aspects of the emotion of anticipation, as defined by Desmet (2012).

'The product arouses a state of expectation linked to the fact that something good is about to happen or to the desire for a certain thing to happen.'

The emotions desire and satisfaction were excluded from the final list: as explained in the previous section, these emotions represent general emotional states and are the effects of other specific emotions.

The feedback from the review team was focused on having a vocabulary of emotions easy to remember, natural to talk about and unambiguous in its understanding. Following these requirements, the words energised, lust and sympathy were changed to vitality, sensuality, and empathy, respectively.

The word energised was changed to vitality. Members of the review team agreed that when listening to the word energised, people tended to think only in terms of physical activities; while the experience of feeling energised in this context is regarding active thoughts and behaviours. The word vitality expresses the definition of the emotion energised in a better way. Vitality is the experience of being active and strong (see the definition of 'vitality' in the Oxford English Dictionary).

The experience of lust, according to the Oxford English Dictionary, is defined as a strong sexual appetite. It was decided to change the word lust to sensuality, which was considered more suitable in a professional design context.

Sympathy is defined as experiencing feelings of sorrow for someone else's misfortune (see the definition of 'sympathy' in the Oxford English Dictionary). Desmet (2012) defined sympathy as follows:

> 'Sympathy is the experience of an urge to identify with the feelings or state of someone (or something) that is suffering from misfortune or distress. This emotion is accompanied by feelings of compassion and mildness. Sympathy is an altruistic emotion because it involves genuine concern for the welfare of others.'

In the final framework of emotions, it was decided to substitute the emotion sympathy for empathy. Empathy is defined as the ability to understand and share feelings of another (see the definition of 'empathy' (Oxford English Dictionary, 2017). Both definitions are linked to behaviours of understanding, but the definition of empathy seems to be more suitable for designing a product to stimulate positive emotional states, as the experience of empathy is not normally linked to feelings of pity and sorrow.

Table 4.5 presents the final list of positive emotions and the corresponding emotional-jobs-to-be-done.

Emotion word	Definition (Desmet, 2012)	Emotional-job-to-be-done
Admiration	Admiration is the experience of an urge to prize or estimate someone (or something) highly.	The product stimulates the emergence of warm approval, respect and pleasurable contemplation
Amusement	Amusement is the enjoyment of a high-spirited state of playfulness, humour, or entertainment.	The product gives a feeling of intense playfulness and fun
Confidence	Confidence is the experience of faith in oneself or in one's ability to achieve something or to act in the right way.	The product gives a feeling of security and absence of anxiety (in relation to risks and uncertainties)
Courage	Courage is the experience of the moral or mental strength to persevere and withstand danger, fear, or difficulties.	The product must make me feel that I am able to do difficult or dangerous things, to face uncertainty and to be able to trust and believe in my abilities
Dreaminess	To be dreamy is to enjoy a calm state of introspection and thoughtfulness. This emotion combines being relaxed and stimulated, as it involves undirected cognitive activity.	The product frees the mind and helps to fantasize
Empathy	The feeling of sympathy is the experience of an urge to identify with the feelings or state of someone (or something) that is suffering from misfortune or distress.	The product stimulates feelings of understanding and closeness towards other people
Enchantment	To be enchanted is to be captivated by something that is experienced as delightful or extraordinary.	The product astonishes me and leaves me speechless
Euphoria	Euphoria is an emotion that is felt when one is carried away by an overwhelming experience of intense joy.	The product provokes a state of excitement
Hope	Hope is the experience of the belief that something good or wished for can possibly happen.	The product arouses a state of expectation linked to the fact that something good is about to happen or to the desire for a certain thing to happen
Inspiration	Inspiration is the experience of a sudden and overwhelming feeling of creative impulse.	The product ignites a creative impulse.
Joy	Joy is the experience of being pleased about (or taking pleasure in) something or some desirable event.	The product arouses a state of happiness and cheerfulness
Kindness	Kindness is the tendency to protect or to contribute to the well-being of someone (or something).	The product stimulates feelings of delicacy and tenderness
Love	Love is the experience of an urge to be affectionate and to care for someone (or something).	The product stimulates a feeling of profound affection towards someone or something
Pride	Pride is the experience of an enjoyable sense of self-worth or achievement. The unique feature of this emotion is that the object of emotion is oneself.	The product stimulates deep pleasure or satisfaction that rise from achievements
Relaxation	Relaxation is the experience of enjoying a calm state of being, free from mental or physical tension or concern.	The product stimulates a state of peace and serenity
Relief	Relief is the experience of enjoying the recent removal of stress or discomfort.	The product helps to get rid of a state of physical or mental stress
Sensuality	Lust is the experience of sexual appeal or sexual appetite. It involves an explicitly sexual element, such as erotic or sensual sensations. Related tendencies are to seduce or charm the object of lust.	The product stimulates seductiveness or physical attraction
Surprise	Surprise is experienced in response to a sudden event that was unexpected or is unusual because it violates an expectation or belief.	The product amazes with something unexpected causing a state of pleasure
Vitality	The experience of energised is the feeling to enjoy a high-spirited state of having energy or vitality. It stimulates general energetic thoughts and behaviour.	The product makes me feel vital and full of physical and mental energy

Table 4.5. The final list of positive emotions and the corresponding emotional-jobs-to-be-done.

4.1.3. Human–product emotional interactions

Human–product emotional interactions are defined as the situations in which the appearance (aesthetic interaction), the functions (behavioural interaction), the meanings of the product, and the meanings of the brand (symbolic interations) elicit emotions in people. These four situations are explained in the following paragraphs.

Aesthetic interaction

The aesthetic conditions of the appearance of the product support the action of being perceived through the senses (Eisenman, 2013). Aesthetic interaction is based on the product appearance, which is defined as the physical attributes of the product that can be perceived by the senses of the human body (sight, smell, taste, hearing, and touch).

For Norman (2004), the physical attributes play a central part at the visceral level, which is concerned with the immediate emotional impact caused by the appearance of the product. Hedonic attributes of a product can be perceived through the senses of the human body; they provoke a highly emotional experience, and the experience is immediate (Kamp and Desmet, 2014). Jordan (1999) defines physio-pleasure as a situation in which the senses of the human body work as an interface to perceive an object. However, the pleasure experienced via sensory perceptions is not related to the utility of the product (Blijlevens et al., 2017).

The physical attributes of the product are key elements in the differentiation of the product in the market; these attributes can be perceived without using the product or, in some cases, without understanding what the product is about (Rampino, 2011). As an example of this, it is interesting to refer to one of the answers of the questionnaire where the designer describes that he or she felt enchanted by the shape of the Alessi citrus squeezer designed by Philippe Starck[6].

'The shape is amazing, not immediately related to the use.'

Figure 4.13. Alessi citrus squeezer designed by Philippe Starck. The picture was uploaded by the designer in the questionnaire.

[6] Philippe Starck is a French designer known for his interior, product, industrial and architectural designs, including furniture.

Behavioural interaction

In the three levels of design of Norman (2004), he wrote explicitly that the behavioural level refers to the use of the product, and he points out four elements of this: function, understandability, usability and physical feel. But, thinking about two different products that are designed to execute the same function, we might wonder if these products provoke the same emotions. Considering emotional reactions at the behavioural level, it is possible to translate the four elements into questions: How does the product execute its function? How does the product react to user actions? Is the product intuitive when using it? and How does it feel to use the product?

To answer the questions above, we can speak about the Alessi kettle (9093), which communicates that the water has boiled by the sound of a bird singing. The kettle communicates the execution of its function through a pleasant/particular sound. This way of interacting is related to three concepts: 1) functional information, which facilitates the user's understanding of the function of the product and how to use the product (Eisenman, 2013); 2) pragmatic attributes, which are the attributes designed to accomplish the function of the product (Kamp and Desmet, 2014); and 3) innovation of use, which explains how a product modifies or evolves its way of use in order to mark a differentiation in the market (Rampino, 2011). Considering this, it can be asserted that the pleasure experienced from using a product is related to the cognitive and emotional responses that a person experiences (Jordan, 1999).

Emotional impact in behavioural interaction occurs when the product is used as a tool to perform an activity. The emotional reaction can be experienced at three different moments:

1. Before using the product, which is the moment related to functional information.
2. During the usage of the product, which is the moment related to pragmatic attributes of the product.
3. After using the product, which is the moment related to functional information and innovation of use.

The moments of behavioural interaction are also based on the descriptions given by designers in the exploratory study presented in the previous part of this chapter.

Symbolic interaction – product level

The symbolic meaning of the product goes beyond the product's utility; it is the channel of the values that a product epitomises, and these values provide ideo-pleasure when they are related to people's values. When this situation happens, a bond is created between the product and the person (Jordan, 1999). The symbolic interaction is a cognitive process: a process in which a person gives meaning to a product through semantic interpretations or symbolic associations, and, in this process, culture and context come into play (Desmet and Hekkert, 2007; Eisenman, 2013; Norman, 2004). Two descriptions given by designers in the exploratory survey emphasise these conditions in symbolic interaction:

> 'This watch, its design, and history have a particular meaning. When I was a product design student 25 years ago, this watch was launched. It symbolised a classic design at that time ...'

'I feel confident when the product represents my values to others.'

Products' semantic and symbolic associations are interpreted through the lenses of the socio-cultural context in which the product has been placed (Rampino, 2011). Products are designed to help people to achieve goals, but, meaningful goals are achieved through cognitive-affective appreciation, resulting in a strong relationship between a person and a product (Kamp & Desmet, 2014).

Emotional impact in the symbolic interaction of a product level is provoked by the meaning of the product: the set of beliefs and values associated with the product. The meaning is communicated through the tangible and intangible elements related to the product.

Symbolic interaction – brand level

Brand image is part of the eudemonic attributes of a product, which help people to achieve an intangible goal (Kamp and Desmet, 2014). The attributes of the brand can work as linkers between people. People create attachments towards a product that attends people's necessity to be connected with others (Mugge, Schifferstein, and Schoormans, 2005). This type of interaction can provoke social-pleasure, which is the pleasure that a person experiences when he or she creates strong relationships with others (Jordan, 1999).

The meaning of the brand level provokes the emotional impact when the meaning is embodied in the attributes of the brand. The communication of those attributes plays a significant role in emotional experiences.

4.2. Process structure: main objectives, phases, and methods

Emotion-Driven Innovation (E-DI) is a process to support product development teams in envisioning new emotion-focused product ideas. The E-DI process bases the creation of ideas on the experience, skills and, crucially, on the emotions of the people involved in the process. This condition defines E-DI as an inside-out process, where the vision of the new product stems from something that deeply represents the people involved in the team (Verganti, 2017).

The E-DI process is structured in three phases, each one with specific methods that integrate tools and guidelines to achieve the general objective of the process. These methods are meant to support multidisciplinary teams (designers, engineers, marketers, managers, etc.).

The coming sections present the details of every phase of E-DI process.

4.2.1. Emotion knowledge acquisition phase

This phase is particularly critical because, in order to generate new emotion-focused product ideas, people involved in the project need to develop the competence of emotional granularity. Emotional granularity could permit better communication throughout the innovation process; also, it can facilitate creative activities and help to formulate the design goals (Desmet et al., 2016; Yoon et al., 2016). This phase aims to support the team in creating a panorama of emotions to work with; the Learning Game and Dots Game are the methods created for this phase of the process.

Learning Game method

The Learning Game method consists of a set of cards and four guidelines for using the cards; it aims to develop the competence of emotional granularity and support the entire process.

There are nineteen emotion cards, each of which presents the name of the emotion, the definition of the emotion and the corresponding emotional-job-to-be-done. Figure 4.14 presents one example of emotion cards. There are also four cards representing the human–product emotional interactions; the interaction cards present the name of the interaction and the emotional design factors (see Figure 4.15).

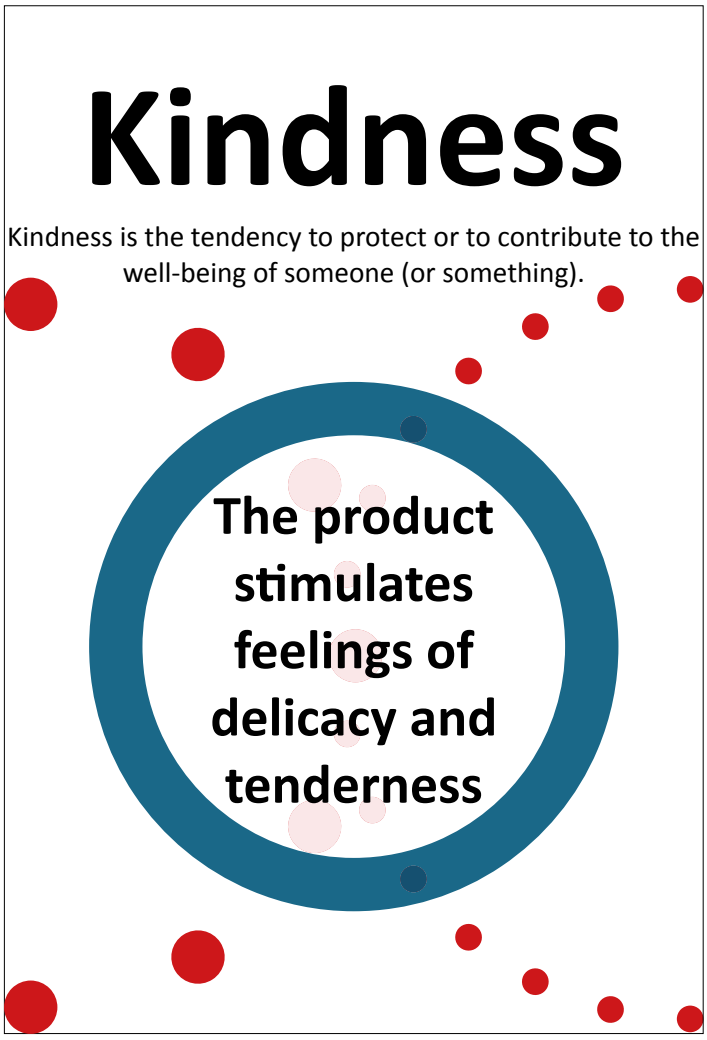


Figure 4.14. Example of emotion card.

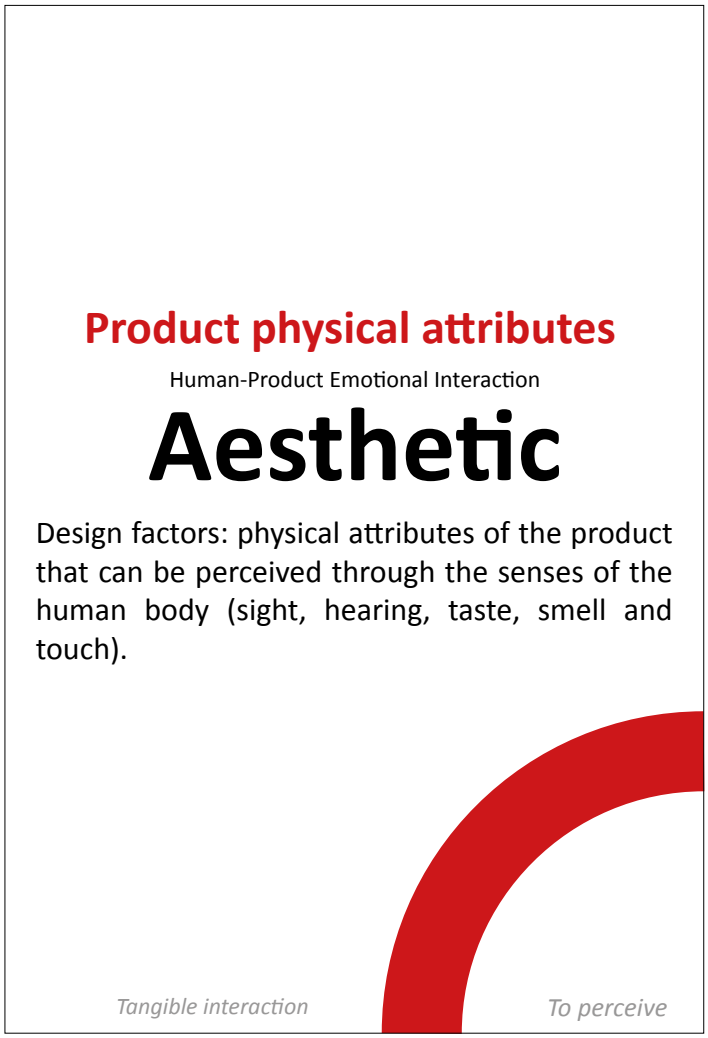


Figure 4.15. Human–product emotional interaction card.

The four guidelines for using the cards were designed to prepare team members for the definition of the emotional intention of the new product and to develop the competence of emotional granularity. The four guidelines are the following:

Encounter the cards (individual activity)

It aims to be an introductory activity for becoming familiar with the cards, and the steps of the technique are presented below.

1. Observe the emotion cards and choose one.
2. Read carefully the definition of the emotion and the emotional-job-to-be-done displayed on the selected card.
3. Identify a product that you own and that you know well that elicits the positive emotion described on the card.
4. Describe the product that you identify and how it is linked to the positive emotion of the selected card.

Share understanding (activity in pairs)

It develops emotional granularity by discussing the understanding of how different products can elicit the same emotion.

1. In pairs, observe the emotion cards and choose one.
2. Read carefully the information given on the card, and discuss what every participant understands about the emotional-job-to-be-done.
3. In pairs, select one card from the human–product emotional interaction cards, and read it carefully.
4. Each participant must identify a product that provokes the selected positive emotion and the selected human–product emotional interaction.
5. Participants must share the product they identify and how it is related to the same positive emotion and the emotional interaction with their partner.

Prepare to create – option A (team activity)

It aims to enhance the granularity of the emotional language of the team. With this technique, we try to reduce ambiguity in the understanding of emotions.

1. Every member of the team must select one emotion card from the deck, read the emotional-job-to-be-done and share briefly what he or she understands with the other members.
2. Every member must identify a product that provokes the selected emotion.
3. All members must identify the emotional design factors of the selected product that cause the selected positive emotion.
4. All members of the team must share the identified emotional design factors and how they are related to the selected emotion.

Prepare to create – option B (team activity)

1. Every member of the team must select one emotion card from the deck, read the emotional-job-to-be-done and share briefly what he or she understands with the other members.
2. Read the human–product emotional interaction cards, and every member of the team must share what he or she understands.
3. The team selects one product to perform an analysis of in relation to the selected emotion. The product could be anything: a product that some of the members own, a competitor's product or a product of the company.
4. The team reflects and discusses what the design factors that trigger the selected emotion could be and how those design factors are related to human–product emotional interactions.

Dots Game method

It is a method aimed to create a 'panorama of emotions' to be used when working with the new product. The panorama of emotions is the shared view of how the nineteen positive emotions are experienced in a selected sample of the products present in the market.

The Dots Game comprises a matrix (see Figure 4.16) and the guidelines to perform an emotional analysis of the selected products. The game should be played in team. In order to perform the Dots Game method properly it is important to have some experience with the Learning Game method. The more products are analysed, the stronger the panorama of emotions will be. The analyses should be made individually but at the end of the activity, all the results must be combined to create the shared view. The guidelines are presented next.

Step 1: Identify the sample of products

Select the products to analyse. The selection of products depends on the strategic objective of the innovation project in which the E-DI process is performed. It is recommended to make the selection before the analysis session.

Step 2: Reflect

Using the emotion cards and the human–product emotional interaction cards as support, reflect on the situations in which the selected products can provoke positive emotions. This activity must be done individually.

Step 3: Vote

Every member of the team has four dots to give. For each product, everyone must identify a maximum of four different emotions, but it is not mandatory to apply the four dots. The four dots are related to the four human–product emotional interactions; the idea is to capture the few key emotions that, from the experience of each person are evoked by the products.

Step 4: Count to visualise the panorama of emotions of the product sample

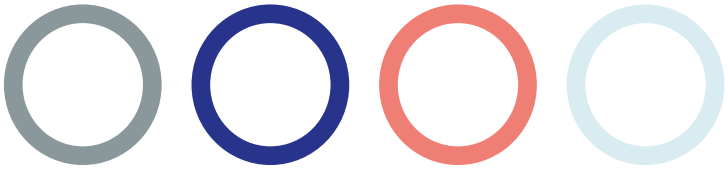
On the matrix page add the results of all members of the team.

The analysis of products already developed can open discussions about their success in the market in relation to the emotions that the products provoke. The outcome of the Dots Game method is the input for the first method of the Emotion Goal Definition phase

Dots Game matrix

Emotional analysis

Project _____



	Product 1	Product 2	Product 3	Product 4	Total
Admiration					
Amusement					
Confidence					
Courage					
Dreaminess					
Empathy					
Enchantment					
Euphoria					
Hope					
Inspiration					
Joy					
Kindness					
Love					
Pride					
Relaxation					
Relief					
Sensuality					
Surprise					
Vitality					

Figure 4.16. Dots game method – the matrix board (tool).

4.2.2. Emotion goal definition phase

The second phase (Emotion Goal Definition) is the core of the E-DI process; it is aimed at defining the emotional intentions of the new product. In the second phase, the challenges to cope with are the following: making strategic decisions by selecting the specific emotions to work with regarding the new product and transforming the selected emotions into a product design brief. The Filter Game and Transform Game are the methods that have been developed to cope with these challenges.

Emotional intentions are defined through the selection of specific emotions that the new product will embody, taking into account the emotional positionings of main competitors and/or their own current products resulting from the Dots Game method. The selection of the emotions must be aligned to pursue the product innovation strategy that the team wants to follow: incremental innovation or radical innovation.

New product ideas pursuing incremental innovation will be products that follow an existing model, aligned to cultural and aesthetic dominant archetypes (Rampino, 2011). Incremental product innovation is the application of small modifications to a product to improve its performance, stimulate its desirability or lower its cost (Norman and Verganti, 2004). This type of innovation can offer products favoured by consumer purchase decisions, since consumers prefer products that are similar to those already existing (Bloch, 1995).

New product ideas moving towards radical innovation will be products with big alterations to the typical product configuration (Henderson and Clark, 1990). Radical product innovation can offer products with new archetypes and domains (Norman and Verganti, 2004). This type of product can provoke a strong positive emotional impact if the modifications permit the user to recognise the potential of the product and do not lead to disorientation (Rampino, 2011). With time these products can become dominant models.

Filter Game method

The Filter Game method allows the 'emotional strategy' in the market to be defined for the new product, by selecting the specific emotions to work with. A circular board and a three-step guideline comprised the Filter Game method. The circular board (see Figure 4.17) facilitates the visualisation of the results of the Dots Game method. Prior to starting, the team needs to briefly write the overall objective that the company has for the new product and a very short description of the target customer. Depending on the product innovation strategy, members of the team must select between two and four positive emotions. Filter Game method must be performed in team; below the three-step guideline is explained.

Step 1: Place the emotions

The positive emotions must be placed clockwise, starting from the most experienced emotion in the Dots Game method. The most experienced emotion must be placed in the first superior right-hand space on the circular board.

Step 2: Visualise to discuss

Depending on the goals of the new project, discuss what could be convenient directions for the new product to head in: a) looking for incremental innovation or b) looking for radical innovation.

The selection of the category of innovation must be coherent with the overall objective of the product. Team members must know that by selecting incremental innovation, they will be selecting emotions that are frequently experienced in the product sample. This condition implies that the new product ideas will express a similar language to the products in the market. If the team selects radical innovation, they will select emotions that are not experienced frequently or are never experienced in the product sample. This condition implies that the new product ideas could create possibilities for product differentiation.

Step 3: Select and write the emotions

After selecting the direction for the new product, write the selected emotions in the red circle on the board. It is recommended to select between two and four emotions that are placed in sequence.

Phase two - **Emotion Goal Definition**

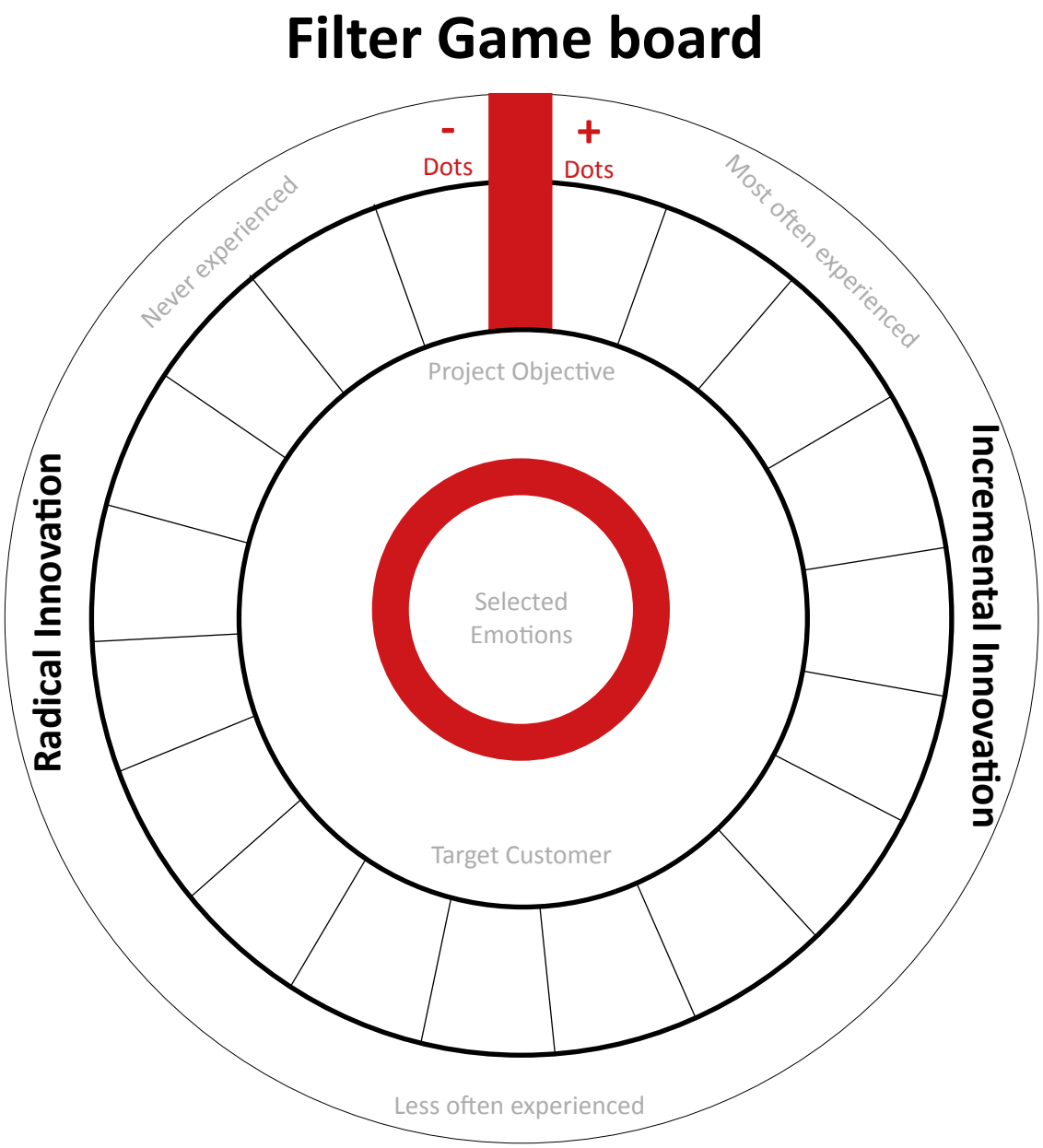


Figure 4.17. Filter Game method – circular board (tool).

Transform game method

The Transform Game method is aimed at transforming the selected emotions into a product design brief. The method comprises a circular board, the human–product emotional interactions and the procedure for creating the product design brief.

The circular board has two faces: the back face displays information to support the definition of the product design brief. The front face displays four statements, each of which corresponds to one of the human–product emotional interactions. Members of the team should place the selected emotions in the most appropriate interaction; this action allows the team to visualise the new product in a holistic way. Transform Game method must be played in team. The steps to elaborate the product design brief with the transform game method are shown below:

Step 1: The emotions

On the front face of the tool, write in the red circle the emotions selected in the Filter Game method.

Step 2: The emotions in the human–product emotional interactions

Place the selected emotions in the four situations of the human–product emotional interactions. The team must reflect when and why it is convenient to provoke the selected emotions.

Step 3: The emotional intentions in aesthetic interaction

Imagine the first encounter of the person with the product; the emotional impact occurs when any of the senses of the human body perceive the product. Define through which sense(s) of the human body the product will be perceived, in order to provoke the pre-defined emotion.

Step 4: The emotional intentions in behavioural interaction

Imagine when the product is being used; the user carries out actions so that the product performs its function (like pressing a button), and the product reacts by executing its function. The emotional impact occurs through the specific characteristics of the product and in it communicating and executing its function.

Step 5: The emotional intentions in products (symbolic interaction)

Imagine all the elements (tangible and intangible) that will be related to the new product: price, packaging, advertising, product service, social media communication, logo, the designer of the product, the history of the product, materials, etc. All together represent something significant to the user/customer. The emotional impact occurs after a person has reflected on what the product represents for him or her. Define what the symbol will the product represent in order to provoke the pre-defined emotion.

Transform Game board

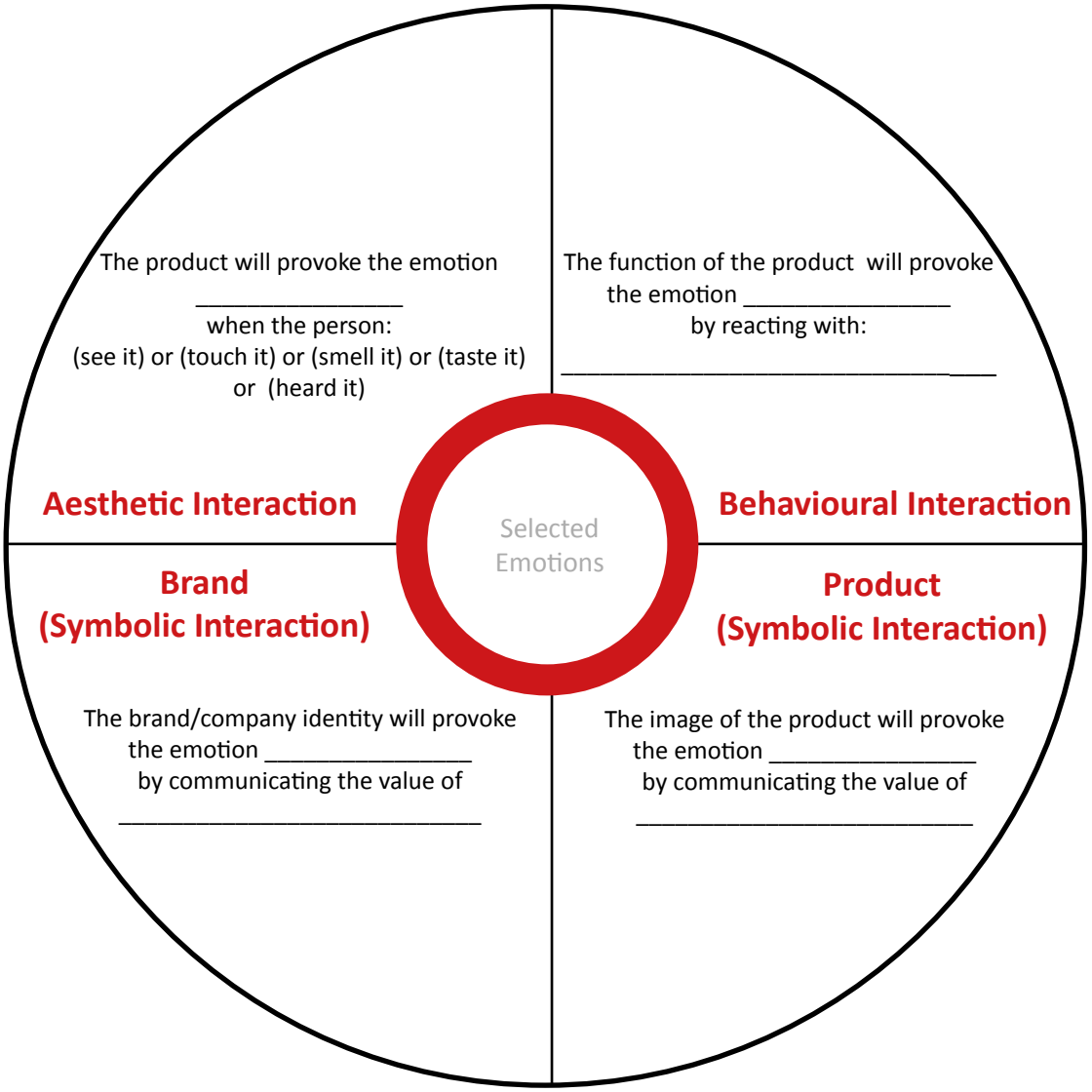


Figure 4.18. Transform Game method - front face of the circular board (tool).

Step 6: The emotional intentions in brands (symbolic interaction)

A person can choose a product because she or he identifies him/herself with the brand that the product belongs to; the emotional impact is caused by the meaning of the brand and/or company. This emotional impact occurs after a person has reflected on what the brand represents to him or her.

4.2.3. Idea generation phase

This phase aims to translate the emotional intentions into new emotion-focused product ideas. To attain the objective, the third phase works with a method and a set of guidelines to foster idea generation in a focused way. The main outcome of the Idea Generation phase is to produce ideas that emerged from the reflective activities of what the emotions signify for the team and what they will signify for the user or customer.

The Idea Generation phase is not interested in the quality of the sketch of the idea, but it is focused on generating 'thick ideas'. The concept of the thick idea is used here to refer to product holistic ideas that contain enough characteristics based upon a deep reflection on the meaning of specific emotions to achieve specific emotional effects.

Translate Game method

The method aims to foster the activity of idea generation, supported by the product design brief created in the previous phase. The Translate Game method consists of three principal steps, and every step is supported by worksheets and guidelines.

1. Generation of details: It is the moment to bring together all the thoughts about the attributes for the new product. Members of the team must work individually. The generation of details is based on the human–product emotional interactions corresponding with the product design brief created before. Figure 4.19 presents the board for generating details of aesthetic interaction.

2. Creation of ideas: It consists of the origination of the idea for the new product. The new ideas arise from the collection of details generated before. Members of the team must take the details generated in the previous step as the main input to generate new ideas. Every person must create an idea using the tool (see Figure 4.20). Members of the team must work individually.

3. Evaluation of ideas: It is the assessment of the ideas supported by the product design brief created in the previous phase (Emotion Goal Definition). The indications for evaluating the ideas are very simple and are presented below:

- Set the ideas in a place where all members of the team can see them.
- Give each idea a number.
- Every idea must be presented and explained to the team by the creator of the idea.
- In order to evaluate, every person must give a dot to the human–product emotional interaction that he or she considers that the idea achieves the best.
- Count the dots, and select the three most rated ideas.

Translate Game Tool
Step 1: Construction of details
Aesthetic Interaction

Imagine how will be the physical attribute(s) of the product will be related to thhe senses.
How will the sounds be if the product will be perceived by hearing it? How will the materials or textures be if the product will be perceived by touching it? How will the lights, colours or shapes be if the product will be perceived by seeing it? Etcetera.

Example: The powerful sound of a Ducati engine can provoke dreaminess, and when the person hears the sound in the street, the person can imagine himself or herself driving that motorbike.

Detail: powerful sound of the engine

Post-its area	Indications Be brief and concise when writing the details Write one detail on one post-it

Figure 4.19. Translate Game method - board to generate details of aesthetic interaction (tool).

Translate Game Tool
Step 2: Idea Generation

Project/Product Name _____

Idea #			
Aesthetic Interaction	Behavioural Interaction	Product	Brand
Drawing area			

Figure 4.20. Translate Game method – board to generate the ideas (tool).

Translate Game Tool
Step 3: Evaluation of Ideas

Project/Product Name _____

	Aesthetic Interaction	Behavioral Interaction	Symbolic interaction - Product	Symbolic interaction - Brand	**Total**
Idea 1					
Idea 2					
Idea 3					
Idea 4					
Idea 5					
Idea 6					
Idea 7					
Idea 8					
Idea 9					
Idea 10					
Idea 11					
Idea 12					
Idea 13					
Idea 14					
Idea 15					
Idea 16					
Idea 17					
Idea 18					
...					

Figure 4.21. Translate Game method – board to evaluate the ideas (tool).

4.3. Chapter conclusions

The three design knowledge domains that have been explained in Chapter one of this document are present in the objectives of the E-DI process. First, the aim of developing the competence of emotional granularity is aligned with the design epistemology domain, which is the domain referring to people's design skills. Second, the efforts to facilitate tools to guide the process of generating new ideas based on the knowledge of emotions are related to the design praxeology domain; design praxeology refers to the knowledge based on creation, development, and application of methods to support design practices. And third, the activities of visualising the new product idea in the market and expressing the configuration of the new product idea convey the design phenomenology interests. The design phenomenology domain studies the form and configuration of products and the relation between products and different contexts (Cross, 1999; Feast & Melles, 2010).

Process development: testing the E-DI in academic environments

Process development is the third phase of the process research methodology (Platts, 1993). It consists of testing the methods, tools, and guidelines of the process created in the previous phase. In order to validate the feasibility, usability, and utility of the process and to refine it through the testing sessions, four field studies have been conducted, applying a beta test[7] (Chiesa, Coughlan, and Voss, 1996; Cooper and Schindler, 2013). The Emotion-Driven Innovation (E-DI) process was tested by two groups of graduate design students. Those in the first group did not have any professional experience as product designers, while those in the second actively worked as professional product designers at the time of the study.

[7] A beta test is a type of test with a series of consecutive steps, in which a group of potential users 'try out' a product. In this case, the product is the process to be tested (Chiesa, Coughlan, & Voss, 1996).

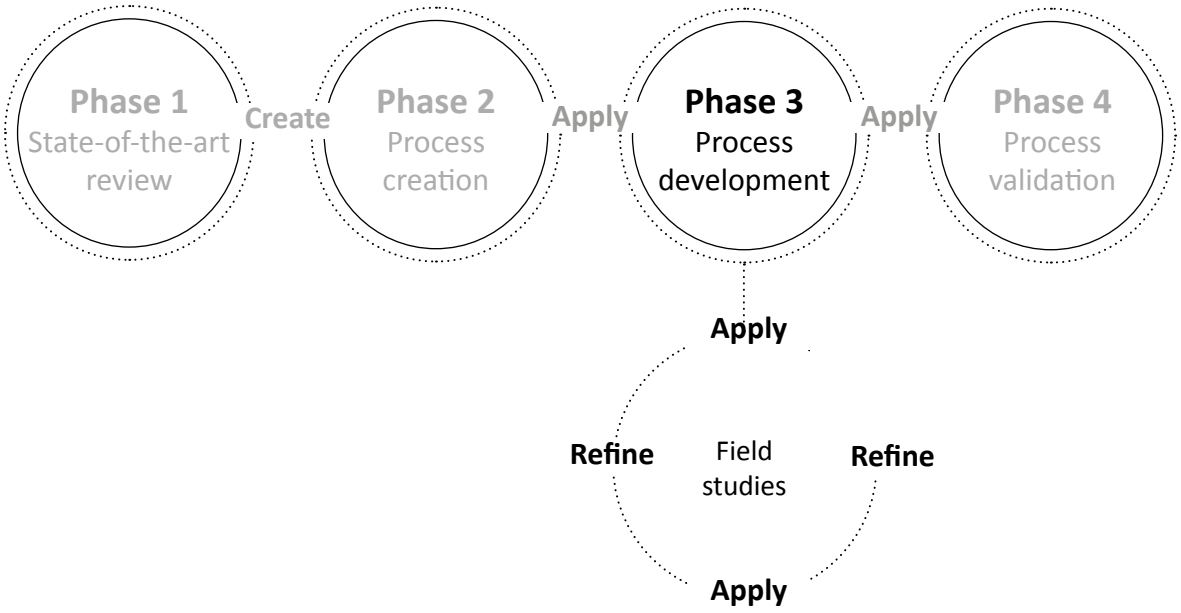


Figure 5.1. Process research methodology, phase 3 - Process development.

5.1. The fundamental conditions to develop a process

There are three conditions that must be defined to test a process: the type of involvement of the researcher, the approach to improving the process, and the places in which the process is tested (Platts, 1993).

We adopted the action research approach, as it is centred on the participation of the researcher as facilitator (Platts, 1993). We aim to adopt approaches in which the researcher is not isolated from the events that happen while the tests are taking place, and we seek to involve the researcher in directing and influencing the way in which the tests are being conducted. We recognise that the background and experience of the researcher could have an impact on the testing sessions; both could influence the application of the process and the way in which the results are analysed. This challenge was addressed whenever possible by supporting the application of the process with a different facilitator.

There are two possible approaches to improving the process: 1) applying modifications to the process after all testing sessions have been completed or 2) iteratively refining the process after every session. The latter approach was employed, as in general, it generates more robust and useful processes (Platts, 1993).

In an attempt to generate strong improvements in the process, we selected academic design environments as the first locations for the testing sessions. This selection meant we could cover two types of participants:

1. Design students without professional experiences as product designers.

This type of participant aided in assessing the understandability of the language of E-DI process, including the framework of the 19 positive emotions, the statements of the emotional-job-to-be-done, and the human–product emotional interactions (H–PEIs). Participants of this profile are believed to give valuable feedback, as they are open to assimilating new concepts.

2. Design students who, at the time of the study, were actively working as professional product designers.

This type of participant could provide significant feedback regarding the direct benefits of the E-DI process in product design activities.

5.2. The approach to testing

The major aim of testing the E-DI process was to determine whether the process effectively supports the generation of emotion-focused new product ideas. With this in mind, the testing sessions involved assessing the feasibility, usability, and utility of the process.

The evaluation of the feasibility of the process involved verifying whether the E-DI process could be executed and finished as it was laid out in the process creation phase. The usability evaluation aimed to test the structure, methods, and guidelines in order to develop a process that is easy to learn and use. Finally, the assessment of the utility of the process concerns confirming whether the process is achieving its declared objectives (Platts, 1993, 2001; Moultrie, Clarkson, and Probert, 2007).

To assess the usability of the process, feedback was gained through recorded, semi-structured post-workshop interviews, as well as through direct observation during the testing sessions. These methods are meant to obtain immediate insights from both the participants and the researcher. The interview structure was intended to allow the order of the questions to be modified depending on the answers given by the participants.

Feedback on the utility of the process was generated by conducting interviews in the same style, as well as from direct observation and the direct outputs of the workshops (worksheet tools presented in chapter four and used by participants). The three methods used to obtain data were triangulated in order to verify the coherence of the results (Platts, 1993; Moultrie, Clarkson, and Probert, 2006, 2007).

As mentioned at the beginning of this chapter, the development of the E-DI process was conducted through four studies. The first two were intended to validate the understandability of the language of the process, particularly in relation to the Learning Game method. Refining this method was considered to be a central issue, since it introduces the key concepts that will be applied throughout the entire process.

The first study was conducted with graduate design students of the University of Minho in Guimaraes, Portugal. The group consisted of 12 students with bachelor's degrees in industrial design, product design, graphic design, visual arts, architecture, and urban planning. These 12 students were split into two groups

of six people. The second study involved four PhD. service design students from the University of Porto in Portugal. The participants had educational backgrounds in service design, service design innovation, and product service solutions.

The feasibility, usability, and the utility of the entire process was tested in studies 3 and 4. The third study took place at the Design Studio of the Faculty of Engineering of the University of Porto (Design Studio FEUP) in Portugal. It focused on two graduate-level design students, one PhD service design student, and one PhD product design student. The fourth study was conducted with seven graduate design students from the Scuola Italia Design in Padova, Italy. All participants in studies 3 and 4 were design students simultaneously working as professional product designers.

Table 5.1 depicts the approach to developing the E-DI process. Table 5.2 presents the questions used for the semi-structured interviews.

5.3. Exploring language used to discuss emotions in product innovation (studies 1 and 2)

The first two workshops started by presenting the research project and the objectives of the testing session. The Learning Game method was tested, and two main activities were performed: 'encountering the cards' (individual activity) and 'sharing understanding' (paired activity).

5.3.1. Study 1 at the University of Minho, Portugal

Direct observations

After the research project and the objectives of the study were introduced, the Learning Game method cards were spread out on the table. Participants seemed surprised by the number of cards representing positive emotions. Prior to the beginning of the first workshop activity, participants were spontaneously sharing their different understandings of the 19 positive emotions.

The first activity (encountering the cards) was performed without complications. Participants selected easily the cards and identified products that provoked the chosen emotion. Most of the participants clearly described how the products they chose inspired a specific positive emotion. When participants were sharing their product emotional experiences, other participants were expressing how they experienced the same emotion with a different product or how the same product provoked a different emotion. There were five participants who chose two cards to describe the product emotional experience.

Process development phase			Study 1	Study 2	Study 3	Study 4
Methods tested		Learning Game	●	●	●	●
		Dots Game			●	●
		Filter Game			●	●
		Transform Game			●	●
		Translate Game			●	●
Criterion	**Method to collect feedback**	**Moment to collect feedback**				
Feasibility	Direct observation	After the workshop			●	●
Usability	Direct observation	During the workshop	●	●	●	●
	Semi-structured interview	After the workshop	●	●	●	●
Utility	Direct observation	During the workshop			●	●
	Semi-structured interview	After the workshop			●	●
	Worksheets				●	●
		Places	University of Minho - School of Architecture (Guimaraes, Portugal)	Faculty of Engineering of University of Porto (FEUP) (Portugal)	Design Studio FEUP	Scuola Italiana Design (Padova, Italy)
		No. Of participants	12	4	4	7
		Participant profile	Master design students	PhD design students	Master design students and PhD students/ Professional product designers	Master design students/ Professional product designers

Table 5.1. Process development phase – approach to testing.

Criterion	Method to collect feedback	Study			
		1	2	3	4
Usability	Semi-structured interview	- Can you identify the differences between the 19 positive emotions? If yes - What were the elements that helped you to differentiate between the 19 positive emotions? If not - What problems did you address in differentiating between the 19 positive emotions? - Did you have difficulty understanding and implementing the concept of human–product emotional interactions?			
				- How easy or difficult was it to execute the methods? - What is your opinion about the visual design of the tools?	
Utility	Semi-structured interview			- Do you think emotional knowledge could bring value to your design methods? - Do you think the process is useful in the definition of emotional objectives for new products? - Do you think the process is useful for generating strong and meaningful ideas? - What were the moments or methods of the process that were easy to go through for you? - What were the moments or methods of the process that were difficult to go through for you? - Would you be willing to apply the process or some methods of the process in your design activities?	

Table 5.2. Questions related to usability and utility criteria applied in the semi-structured interview.

In the second activity (sharing understanding), participants seemed much more comfortable selecting an emotion card and a human–product emotional interaction (HPI) card. The second activity was performed without difficulty by the majority of participants, and all identified products that provoked the selected emotion and the situation in which the product unleashed the emotion (H–PEIs). However, some participants (3 out of 12) struggled to describe how the products provoked the emotion in the specific category of H–PEIs; these participants expressed that they needed more time to understand the different conditions that represent human–product emotional interactions.

Figure 5.2. Participants interacting with Learning Game cards.

Participants' feedback

Participants pointed out that at first glance, they only read the emotional-job-to-be-done on each card, which was sufficient to understand what the emotion means. But reading the definition of each emotion boosted their comprehension. Participants specified that the definitions of the emotions helped them connect the positive emotions to personal experiences; while the statements concerning emotional jobs facilitated the process of distinguishing their emotional experiences caused by a product or an artefact.

Participants asserted they were impressed by the large number of positive emotions and mentioned that the colours of the cards helped them identify the different emotions within the variety. Some stated that emotions such as dreaminess and sensuality are not part of their 'daily' emotional expressions.

One participant felt that it was very difficult to link emotional experiences to specific H–PEIs. He indicated that it was difficult to understand the characteristics of a product that trigger a certain emotion; when he tried to link his product emotional experience to a specific H–PEI, he was unable to identify the specific characteristics of the product that unleashed the emotion. This individual mentioned that he decided to listen to the other participants' descriptions of the cards in order to comprehend the H–PEIs and successfully perform the activity.

The workshop revealed that the vocabulary used to describe the emotional jobs to be done effectively supports the understandability of the emotions and the differences between them. After some time using the cards, talking about the positive emotions, and sharing product emotional experiences, participants seemed more confident in speaking about a considerable number of positive emotions. We can assert that the distinction between the positive emotions was addressed properly by the participants; however, we acknowledge that to develop competence with emotional granularity people must experience the Learning Game method a considerable number of times.

The feedback gained and the direct observations made were taken into account to apply the following modifications to the Learning Game method:

1. The information regarding the human–product emotional interactions was simplified (see Figure 5.3).
2. The human–product emotional cards were separated from the deck of Learning Game cards.
3. The four interactions are displayed together in A4 sheet form.

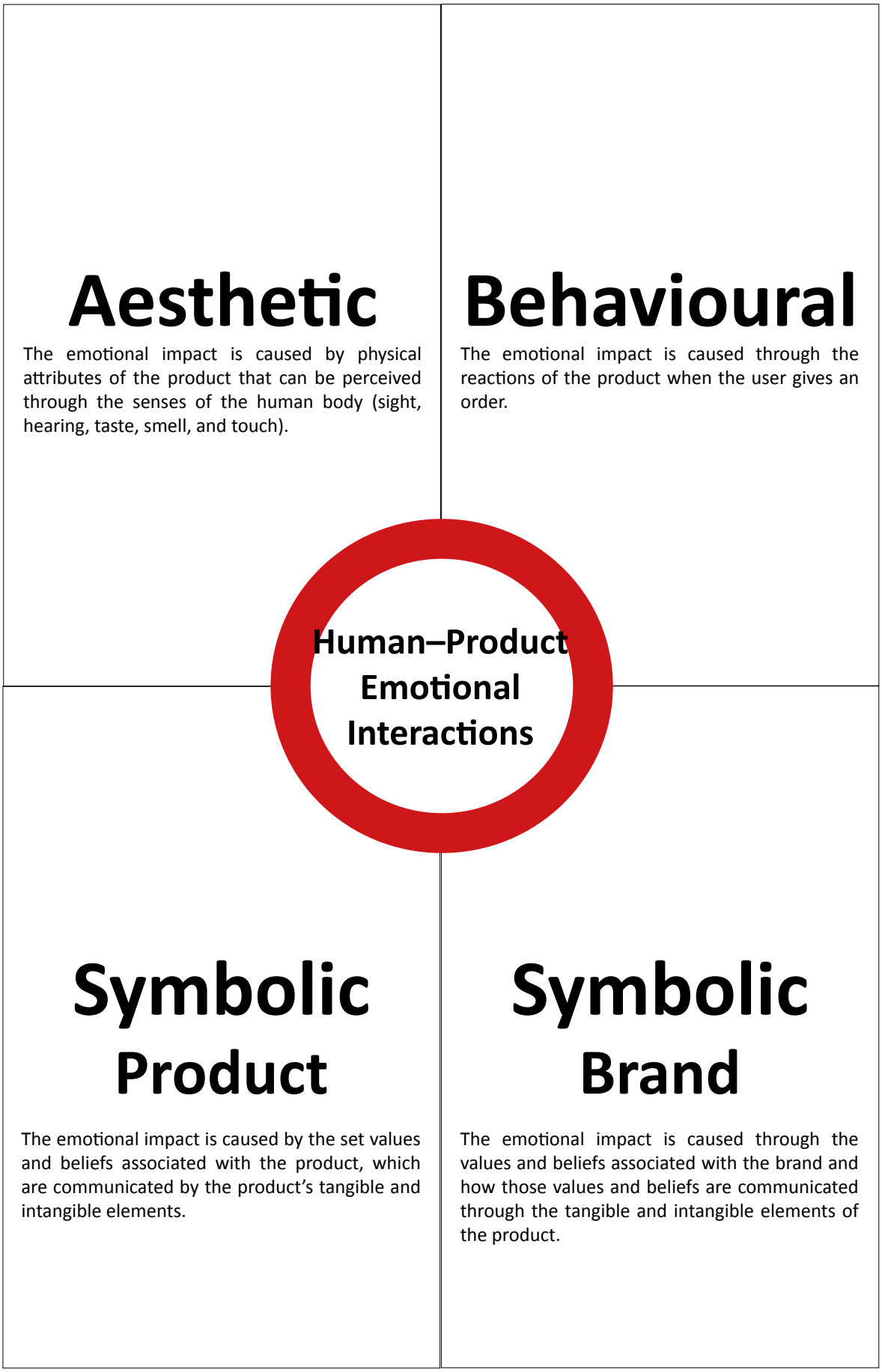


Figure 5.3. Human–product emotional interactions, modified after study 1.

5.3.2. Study 2 at the Faculty of Engineering of the University of Porto, Portugal

Direct observations

Participants in the second study had some similar behaviours to those in the first study. Participants were again surprised by the number of positive emotions, which stimulated them to observe and read the information on all cards. Before the formal workshop activities began, participants were sharing their understandings of the positive emotions and how they experienced those emotions with specific products.

During the first activity (encountering the cards), participants did not have difficulty distinguishing between the 19 positive emotions and selecting one emotion card. Only one participant struggled to identify a product that triggered the emotion of his selected card; he mentioned five products that might provoke the emotion, but could not isolate one and describe the emotional experience.

In the second activity (sharing understanding), the cards were more familiar to the participants, so the pairs easily selected cards for both the emotion and the human–product emotional interaction. Participants seemed to be confident when identifying a product that provoked their selected positive emotions and when categorising their product emotional experiences in one of the four emotional interactions.

Participants' feedback

Participants indicated that the cards carry a lot of information; they mentioned that the description of the emotional job is sufficient to distinguish each emotion and suggested moving the definitions of the emotions to the back of each card.

Regarding the human–product emotional interactions, one of the participants declared that it did not make sense to assess the product based on more than aesthetic qualities. This comment brought out an enthusiastic discussion among all the participants, most of whom understood the coherence of applying H–PEIs to identify or describe product emotional experiences.

One student specified that the two symbolic interactions (product and brand) should be expressed as one. The participant explained that in product service, it is difficult to separate the brand from the meaning of the product, as the brand influences the product's identity, logo, packaging, main colours, etc.

The second study confirmed the value of the emotional job statements in helping participants understand each of the 19 positive emotions and identify the differences between them. We observed that even though participants faced some complications in understanding human–product emotional interactions, these concepts raised their awareness about how different interactions with a product could trigger many diverse emotions.

We believed that combining the two symbolic interactions (product and brand) could be an interesting simplification. We recognised that there are opportunities to improve the H–PEI concepts;

however, in the first study, participants did not mention that they encountered any difficulty in applying these concepts. Thus, we decided it was best to wait for the results of study 3 before acting on this suggestion.

5.4. Creating emotion-focused new product ideas (studies 3 and 4)

Studies 3 and 4 had the objective of testing the entire process in order to refine the five methods of E-DI. The participants in these two studies were given the assignment of designing a new home speaker. An emotional analysis had to be done to create a panorama of emotions to work with the new product; this was delivered by analysing products from the brand Bang & Olufsen[8] (see Figure 5.4). The motivation for selecting these products was to cover the interests of all the designers participating in the study. The products were presented to participants using videos and several images.

Figure 5.4. Bang & Olufsen speakers. Source of pictures www.bang-olufsen.com.

Studies 3 and 4 were centred around a four-hour workshop following the agenda presented below.

- Welcoming: presentation of the project, the intentions of the study, and the agenda of the day (10 minutes)
- Participant introduction (20 minutes)

Emotion knowledge acquisition phase

[8] Bang & Olufsen is a high-end Danish consumer electronics company that designs and manufactures audio products, television sets, and telephones.

- Learning Game method (30 minutes) and Dots Game method (20 minutes)

Emotion goal definition phase

- Filter Game method (20 minutes) and Transform Game method (20 minutes)
- Break (20 minutes)

Idea generation phase

- Translate Game method, consisting of step 1: detail generation (20 minutes), step 2: idea generation (30 minutes), and step 3: idea evaluation (10 minutes)
- Workshop closure and semi-structured interviews (40 minutes)

5.4.1. Study 3 at Design Studio FEUP

The third study took place at Design Studio FEUP in Portugal. It was conducted via a workshop completed by a group of two graduate design students, one PhD service design student, and one PhD product design student. All participants were working as professional product designers at the time of the study.

Learning Game cards were sent to participants two days before the workshop, enabling them to execute the first activity (encountering the cards) prior to their arrival. The second and third activities (sharing understanding and preparing to create) occurred at the beginning of the workshop. The feedback gained through the semi-structured interviews and through direct observation is presented below. Results related to worksheets are presented afterwards.

Direct observation and participants' feedback

Learning Game method (Emotion Goal Definition phase)

It was clear that the emotional job statements helped designers to identify and express emotional experiences caused by products. This activity aided them in differentiating between the 19 positive emotions. Designers expressed that the emotional jobs to be done and the definitions of every positive emotion were fairly easy to understand. They also mentioned that they were able to identify the emotional jobs being accomplished by some of their designs. Designers seemed to be pleased when reading the emotional job statements.

Regarding the human–product emotional interactions, two PhD student s (from product design and service design research areas) pointed out that the two symbolic interactions (product and brand) should be merged together. The designers expressed that the brand is always related to what the product symbolises.

The participants also mentioned that the concept of the human–product emotional interactions can help designers to structure new product ideas because it encourages them to think broadly about how the product can provoke emotions.

Dots Game method (Emotion Goal Definition phase)

The application of the Dots Game method showed that designers were motivated to analyse products from an emotional perspective and not just based on usability aspects or market indicators.

It is important to remember that the emotional analysis of products was first performed individually. Then, the participants needed to combine their individual results. In this activity, designers were sharing their thoughts about the results of the Dots Game, and they initiated a rich discussion about how, in some of the speakers, it was fairly easy to identify the prevailing emotion.

Participants suggested that the visual expression of the Dots Game matrix needs to be easier to interpret. They recommended displaying a picture of the product being analysed in the matrix board.

Filter Game method (Emotion Goal Definition phase)

The Filter Game method followed participants' conversation about the previous method, and its execution was a crucial moment during the workshop. Participants mentioned that they enjoyed seeing the results of Dots Game method in the circular board of the Filter Game.

To support the selection of the positive emotions, designers displayed the Learning Game cards on the table in accordance with the results of the Dots Game method. The application of the Filter Game method lasted longer than planned; designers appeared quite impassioned when exchanging opinions and reflected deeply on the types of innovation (incremental or radical) that might serve as the directions for the new product.

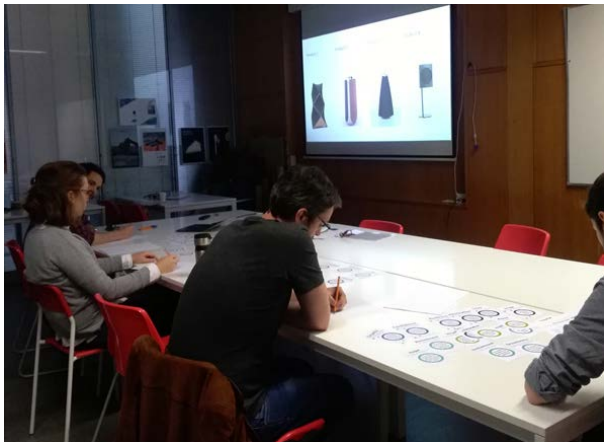


Figure 5.5. The third study. The participants interacting with Learning Game cards in the Dots Game method.

Designers did not consider it appropriate to choose between incremental and radical innovation as the single direction of the product in the market. They selected two emotions from the incremental innovation spectrum in order to design a product with a language that the customer knows and to establish or renew a connection between the customer and the product. From the spectrum of radical innovation, they chose two other emotions. The designers indicated that these emotions could introduce peculiar features to the product that could capture the attention of a potential client and support brand differentiation. At the end of the activity, designers expressed their satisfaction with this decision.

Although designers did not choose only one category of innovation (radical or incremental), the Filter Game method appeared to be beneficial in supporting strategic decisions within the team. We can assert that the selection of positive emotions was based on a reflective process.

Transform Game method (Emotion Goal Definition phase)

Designers specified that the visual design of the circular board used in the Transform Game method did not facilitate the process of writing down the objectives of the new product. They mentioned that a linear board could be useful in minimising disorganisation.

The designers indicated that the product design brief made with the Transform Game method helped to detail the product objectives. They also noted that the product design brief can be useful in not only the idea generation phase, but also the following phases in maintaining the alignment of the product with the emotional objectives.

Translate Game method (Idea Generation phase)

When completing the first step of the Translate Game method (generation of details), designers appeared to be fairly comfortable using the tools. In step 2 (creation of ideas), each designer generated one idea; during this activity, designers mentioned that the board used to express the ideas was too small to present both the sketches of each new idea and the corresponding details of the human–product interaction. The third step (evaluation of ideas) lasted for less time than planned. Designers evaluated their ideas silently and quickly. This activity was merely designed to distinguish the ideas that best achieved the objectives of the product design brief.

One of the designers mentioned that he felt that the process contributed to the generation of stronger ideas and helped to organise his thoughts during the design process.

'It was brilliant to start by learning and not to immediately start with a design brief to come up with ideas'.

A graduate design student also mentioned that understanding emotions is crucial for him as a designer. He was working on developing an interface for an autopilot vehicle, a project in which he believes emotions play a significant role in designing a pleasant transportation experience for the passenger.

Worksheet outputs

Figure 5.6 presents the panorama of emotions created by the Dots Game method. The emotions of admiration and sensuality predominated in the selected Bang & Olufsen speakers, while euphoria and enchantment were not elicited by these products.

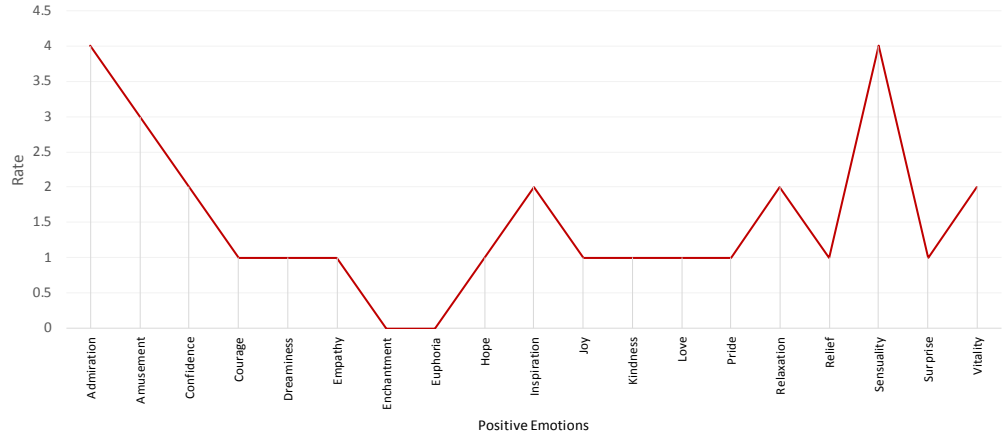


Figure 5.6. Panorama of emotions elicited by Bang & Olufsen speakers, created in study 3.

Through the Filter Game method, designers selected the emotions admiration and sensuality from the incremental innovation spectrum and enchantment and euphoria from the radical innovation spectrum.

The product design brief was structured as follows: for the aesthetic interaction, designers selected the emotions enchantment, sensuality, and euphoria; for the behavioural interaction, sensuality and euphoria; for the symbolic interaction at the product level, admiration and enchantment; and for the symbolic interaction at the brand level, admiration. Table 5.3 presents the results of the product design brief.

During step 1 of the Translate Game method, which concerns the generation of details, designers considered important attributes such as powerful sound, noble materials, personalised features, and light-based communication in the aesthetic interaction. When considering behavioural interaction, sound-and light-based interaction was highlighted. In order to provoke the emotions of admiration and enchantment in the symbolic interaction at the product level, designers considered it important that the new home speaker be exclusive, innovative, and part of a limited edition. In the symbolic interaction at the brand level, details such as offering unique shopping experiences and/or special installation services were considered necessary to provoke admiration.

The Translate Game method is the expression of the entire process. The ideas generated contain the assimilated knowledge of the positive emotions, the decisions the group made as team, and the shared view of what the positive emotions signify into the configuration of the new product idea. Table 5.3 presents the results of the worksheets from step 1 of the Filter Game, Transform Game, and Translate Game methods. The ideas generated in step 2 of the Transform Game method are presented afterwards.

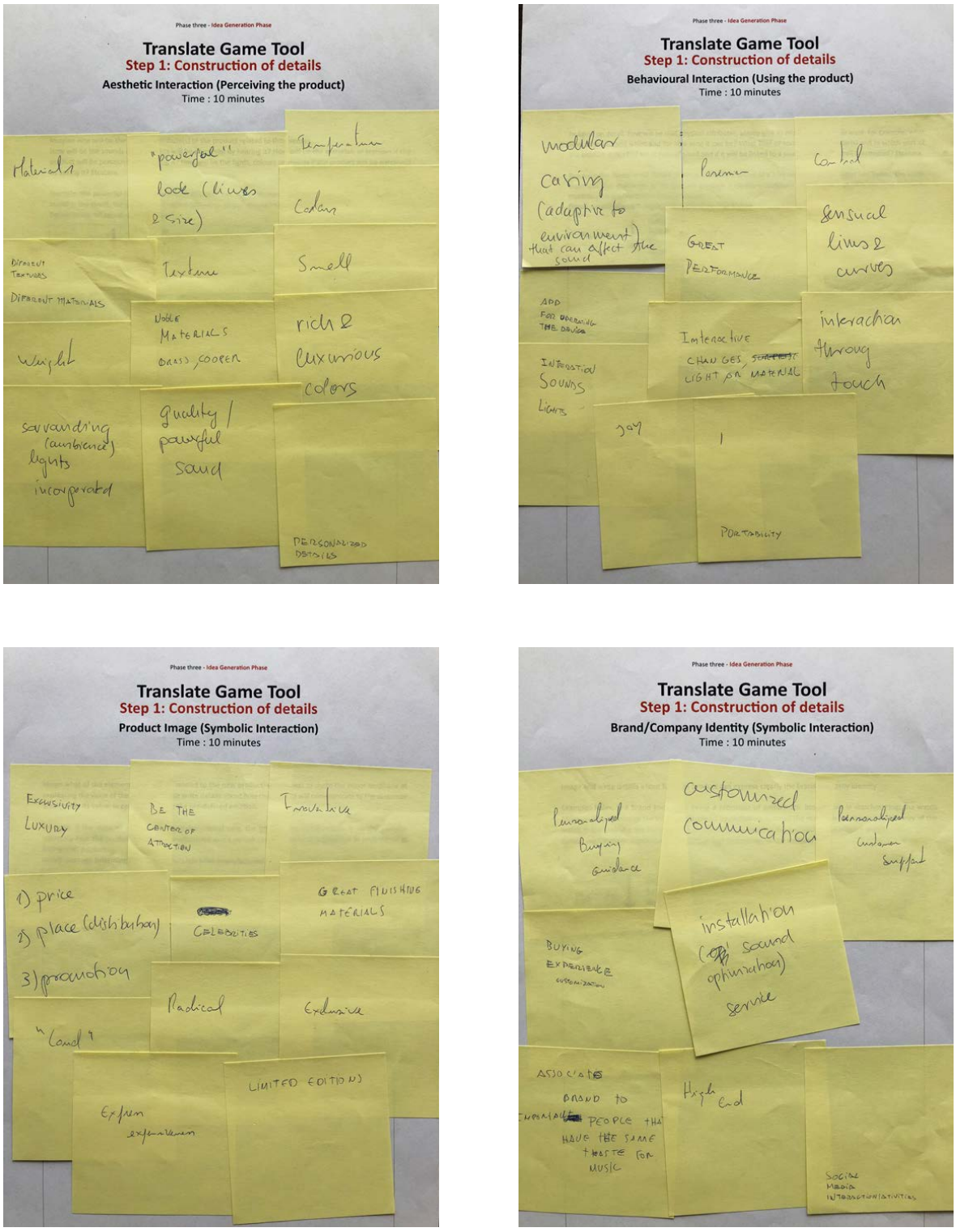


Figure 5.7. Details generated in the human–product emotional interactions.

Results of:	Study 3			
Filter Game	Positive emotions selected			
	Admiration, Sensuality, Enchantment and Euphoria			
	Emotions from Incremental and Radical Innovation			
Trasnform Game method	The selected emotions on the Human–Product Emotional Interactions			
	Aesthetic	Behavioural	Symbolic interaction - product	Symbolic interaction - brand
	Enchantment	Sensuality	Admiration	Admiration
	Sensuality	Euphoria	Enchantment	
	Euphoria			
	Perceived by the following senses of the human body:	**By reacting with:**	**Symbolising**	**Symbolising**
	Touch	Not specified	Exclusiveness	Exclusiveness
	Sight			
	Smell			
	Hearing			
Translate Game method	**Translate Game method - details written in step 1**			
	Rich and luxurious colours	Modular: a home speaker to adapt to the context and enhance the quality of the sound	Limited edition	Customised
	Personalised details	Portable	The home speaker as the centre of attention	Buying experience
	High-quality, powerful sound	Interior with lights	Finishing materials	Installation experience
	Lights	App to operate the speaker	Price, place and promotion	Social media interaction activities
	Noble materials	Touch interaction		Associate people that have the same music taste
	Communicate with the temperature of the object			
	Textures			
	Smells			

Table 5.3. Study 3 – results of worksheets.

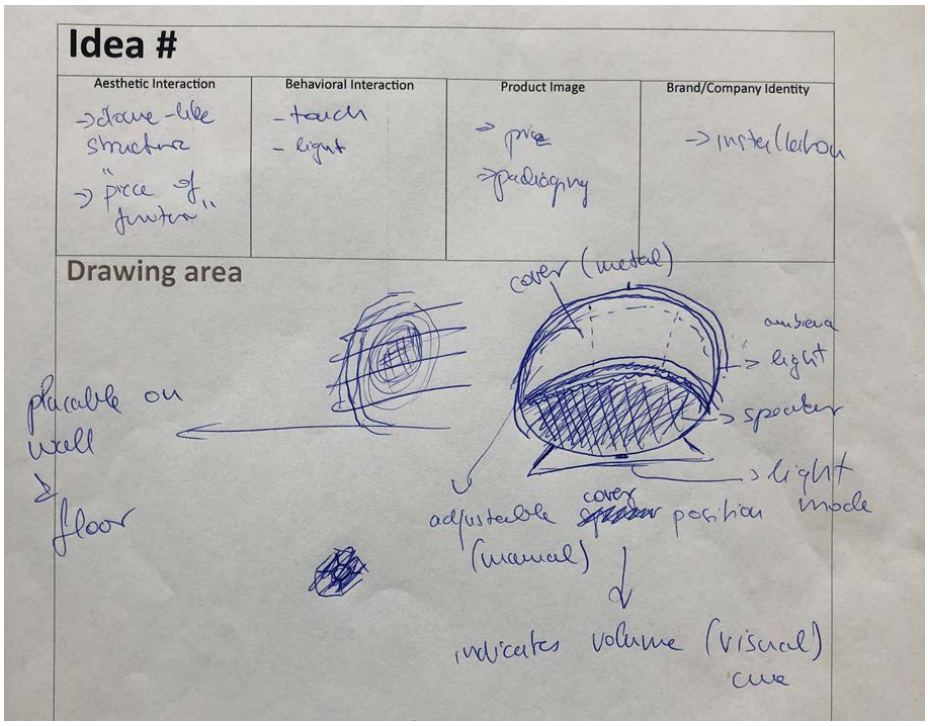


Figure 5.8. Study 3 – developing the process, idea 1.

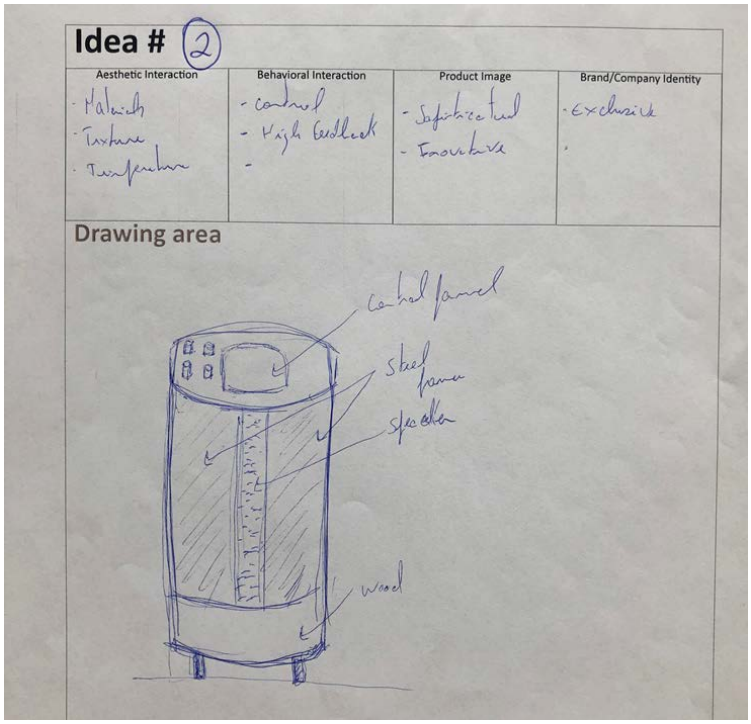


Figure 5.9. Study 3 – developing the process, idea 2.

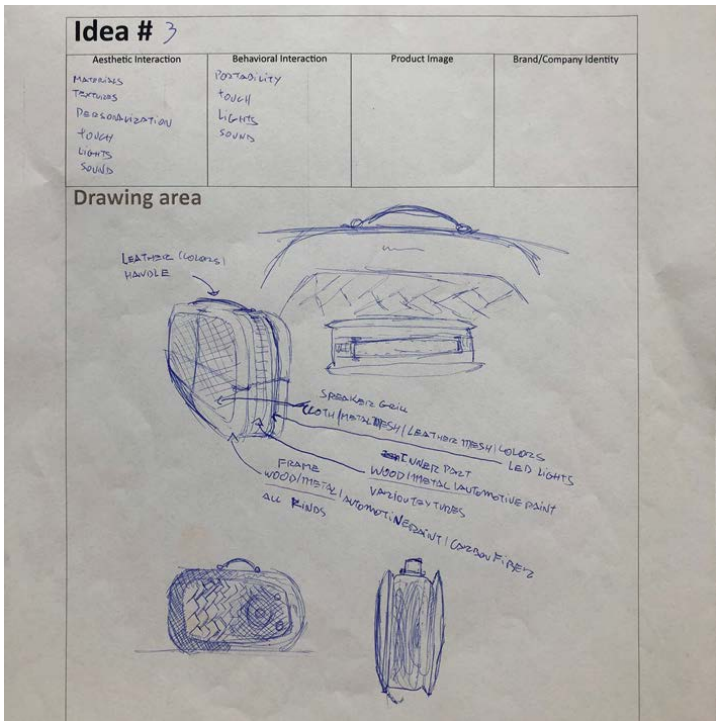


Figure 5.10. Study 3 – developing the process, idea 3.

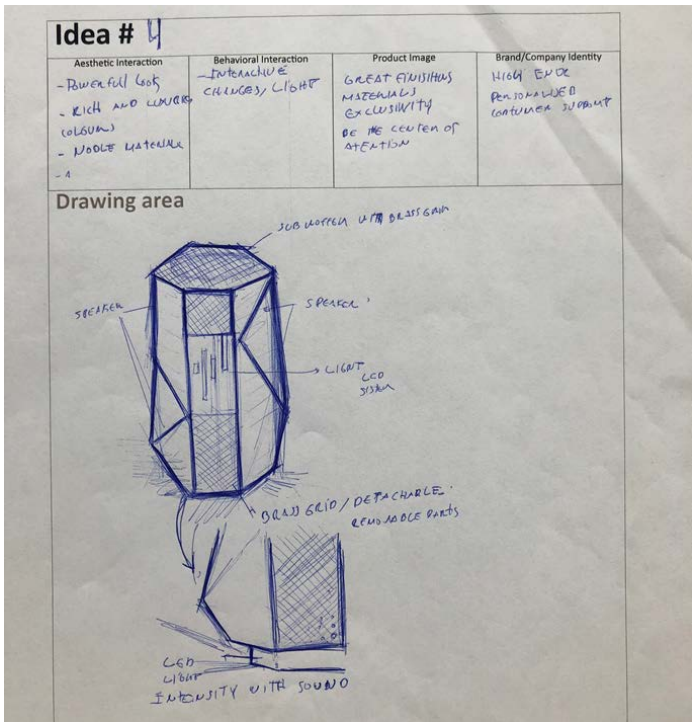


Figure 5.11. Study 3 – developing the process, idea 4.

The main details of the ideas generated in step 2 of the Translate Game method are as follows:

Idea 1: The product is a round-shaped speaker. Its main material is metal, and the principal way to communicate with the user relies on lights. The home speaker is designed to be a piece of furniture.

Idea 2: The speaker is rectangular-shaped and has rounded corners. Its main materials are metal and wood. It has the look of a high-end home speaker

Idea 3: This is a portable and customised speaker, the user can express him/herself choosing different features and materials.The speaker shares some similarities with ideas 1 and 2. The speaker's main interaction with the user consists of light-based communication, and its main materials are metal and wood.

Idea 4: This product is another customised speaker that mainly communicates with the user via lights.

The shapes of the new home speaker ideas might be different, but all the ideas share similar characteristics. Table 5.4 summarises the main details of each idea.

Idea	Aesthetic interaction	Behavioural interaction	Symbolic interaction	
			Product	Brand
1	Metal	Lights	Price	Installation experience
2	Metal/Wood	High-end look	Sophisticated	Exclusive
3	Metal/Wood	Lights	Portable	Customised
4	Noble materials	Lights	Exclusive	Customised

Table 5.4. Main descriptions of ideas relating to the human–product emotional interactions discussed in study 3.

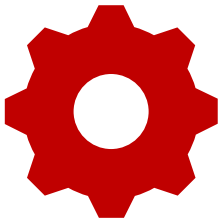
Through the direct observation and feedback gleaned in the study, it has been demonstrated that the E-DI process can be followed and executed; however, in order to improve the process, the following modifications were made:

1. The human–product emotional interactions were altered to consist of three interactions: aesthetic, behavioural, and symbolic. The information displayed was reformulated (see Figure 5.12).
2. A picture of the product to be analysed was added to the visual design of the Dots Game.
3. The board used in the Transform Game method was changed from circular to linear. The indications were reformulated in order to indicate the starting point of the method. In the behavioural interaction, the product's moments of use were added to provide a more solid structure (see Figure 5.13).
4. The dimensions of the board used to create the ideas in step 2 of the Translate Game method were modified from A4 to A3 size (see Figure 5.14).

Aesthetic
Interaction

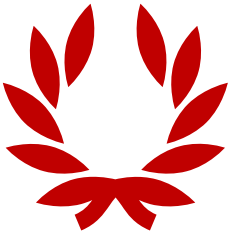
The product is seen as an artwork that provokes aesthetic pleasure, which can be perceived through the senses of the human body (sight, hearing, taste, smell, and touch).

Behavioural
Interaction



The product is used as a tool to perform an activity.
It is the direct functional interaction between the user and the product.

Symbolic
Interaction



The product is perceived as a symbol of 'something else:' a concept, idea, value, belief, quality, etc. For example, it may represent youth, intelligence, or prestige
The symbolic meanings can be communicated by the tangible and intangible elements related to the product, i.e. material, price, advertising, product history, product designer, product communication, packaging, etc.

Figure 5.12. Human–product emotional interactions, modified after study 3.

Transform Game

Product design brief

Team worksheet

Selected Emotions

Aesthetic Interaction

The product will provoke the emotion of:

_____

_____

_____

When the person:

_____ hears it

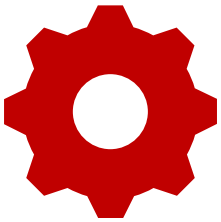
_____ sees it

_____ touches it

_____ smells it

_____ tastes it

Behavioural Interaction



The product will provoke the emotion of:

_____

_____

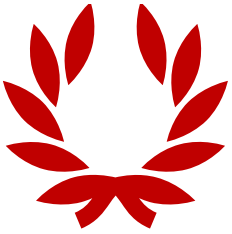
_____

_____before using it

_____while using it

_____after using it

Symbolic Interaction



The product will provoke the emotion of:

_____

_____

_____

because it is perceived as a symbol of:

_____

_____

Figure 5.13. Board used to create the brief in the Transform Game method, modified after study 3.

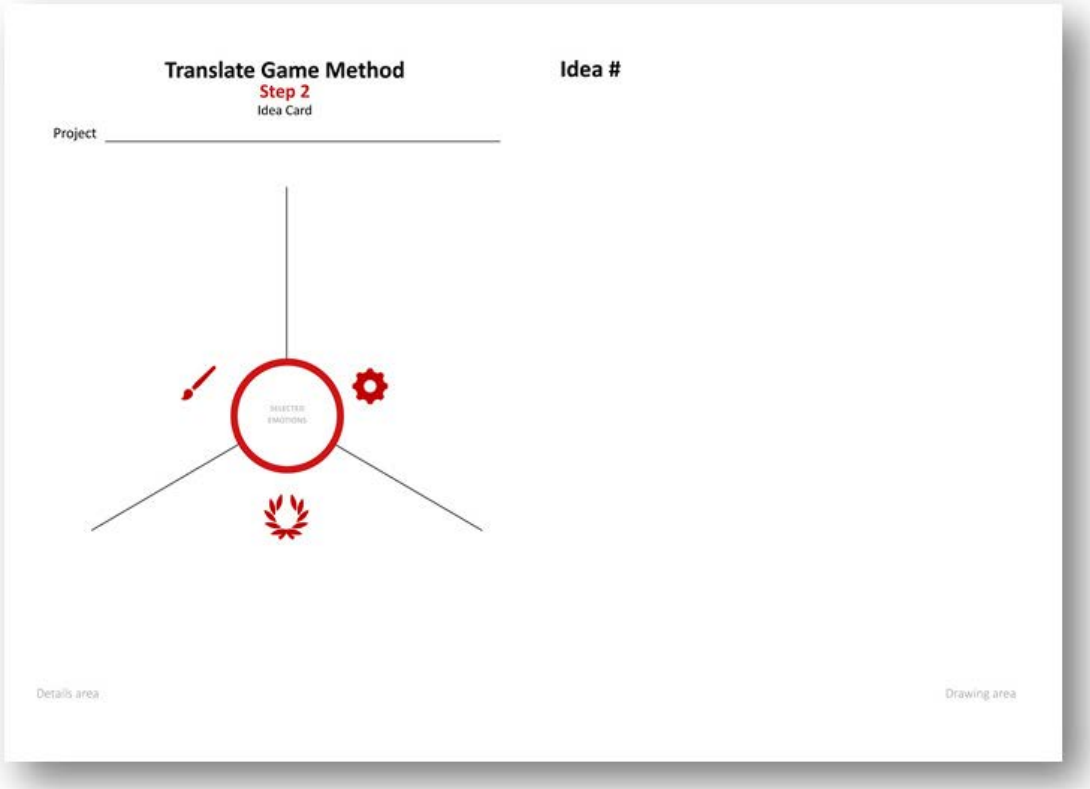


Figure 5.14. Board used in step 2 of the Translate Game method, modified after study 3.

5.4.2. Study 4 at Scuola Italiana Design

The fourth study was conducted at Scuola Italiana Design in Padova, Italy, and involved seven graduate design students who, at the time of the study, were actively working as product designers. To enhance the understandability of the vocabulary used in the Learning Game method, the names of the positive emotions and the statements of emotional jobs to be done were translated from English to Italian. This was done with the support of an undergraduate psychology student. The workshop of study 4 followed the same procedure as the previous one.

Direct observation and participants' feedback

Learning Game method

In activities two and three, designers stated that when reading the name of any given positive emotion, most of them had different understandings of that emotion. However, designers indicated that the statements of emotional jobs to be done helped them to identify the differences between the emotions and to unify the group's interpretations of those emotions. They also expressed that while they recognised all the emotions, they did not refer to all of them in their daily vocabularies.

Figure 5.15. Designers interacting with Learning Game cards in the fourth workshop.

Dots Game method (Emotion Goal Definition phase)

The Dots Game method opened up a conversation about how designers feel different positive emotions about different characteristics of the speakers, such as their sizes, interfaces, and brands.

As with study 1, designers displayed Learning Game cards from which participants could read, discuss, and select emotions. The designers' behaviours (open to speaking their minds, receptive to hear) showed that the Filter Game method stimulated them to express their opinions. We assumed that the circular board encouraged equal participation.

Designers mentioned that the concepts of incremental and radical innovation had facilitated the selection of the emotions, stating that the discussions sparked by this method supported a solid decision.

Transform Game method (Goal Definition phase)

Designers created the product design brief without complications. They mentioned that being involved in the creation of the brief enhanced their creativity and created strong engagement with the new product idea.

Participants also noted that through the application of the Transform Game method, their thoughts for the new ideas became organised. They explained that relating the emotions to the H–PEIs helped them to think in a systemic way about new ideas.

Translate Game method (Idea Generation phase)

Designers mentioned that step 1 of the method (the generation of details for the new ideas) was a relaxing and inspiring activity. They indicated that this activity facilitated the creation of the idea, as they put out all their thoughts without restrictions while observing and analysing the thoughts of the other participants.

The new size and design of the board supported the creation and expression of the new ideas in a holistic and detailed way. The evaluation of the ideas was performed without any difficulty; after each designer presented an idea, every other participant indicated his or her opinion on the board and shared

his/her thoughts about the ideas generated in the workshop.

One of the designers expressed that attending the workshop placed him in a good mood as he worked alongside colleagues. He felt inspired and prepared to generate emotion-focused ideas.

'The beginning of the day was a bit difficult for me, as I did not feel motivated to work with other people, but I was curious about the workshop,' he said. 'And I can tell that hearing and speaking of positive emotions during the workshop changed my mood completely. I was feeling relaxed and receptive, and when we started to draw the ideas, I was feeling inspired and prepared.'

Worksheet outputs

In the emotional analysis performed with the Dots Game method on the Bang & Olufsen speakers, the predominant positive emotions were enchantment, sensuality, confidence, and pride. The positive emotions of amusement, hope, and relaxation were not elicited to the designers by any of the speakers.

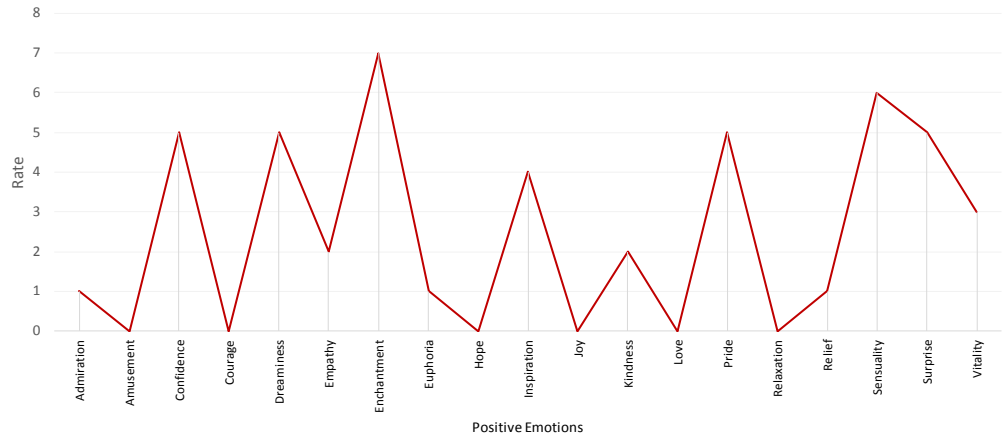


Figure 5.16. Panorama of emotions elicited by Bang & Olufsen speakers, created in study 4.

Designers selected the positive emotions confidence, pride, surprise, and admiration from the incremental innovation spectrum. They stated that the brand is very well-known in its market and that they intended to maintain that same identity in their new ideas. Table 5.5 presents the selected emotions and the structure of the product design brief made through the Transform Game method.

The main details generated in step 1 of the Translate Game method were as follows: In the aesthetic interaction, the new speaker was suggested to have a sculptural shape. In the behavioural interaction, details about hidden controls in the interface of the speaker were highlighted. For the symbolic interaction, two details were mentioned several times: communicating the values of the brand through the different aspects of the product and designing the new speaker with high-end materials.

Results of:	Study 4		
Filter Game method	**Positive emotions selected**		
	Confidence, Surprise, Pride and Admiration		
	Emotions from Incremental Innovation		
Transform Game method	**The selected emotions on the Human–Product Emotional Interactions**		
	Aesthetic	**Behavioural**	**Symbolic interaction**
	Admiration	Surprise	Admiration
	Pride	Confidence	Confidence
	Perceived by the following senses of the human body:	**At the following time:**	**Symbolising:**
	Hearing	Before using it	Sculpture
	Sight	While using it	
Translate Game method	**Translate Game method - details written in step 1**		
	Speaker as sculpture	Feedback with LED lights	Interaction with the delivery date
	Architectural piece in scale	Wow effect by discovering functions	High-end materials
	Different textures to touch	Facial recognition to play personalised playlists	Communicate the values of the brand
	Fine lines	Controls that disappear or appear according to interaction	
	Contrast of empty and full space	Additional functions to the usual intended for a speaker	
	Iconic shape		

Table 5.5. Study 4 – results of worksheets.

As in study 3, the physical configuration of each idea for the speakers is different, but all share similar features. Table 5.6 presents the main descriptions written on the worksheets for every idea.

Idea	Aesthetic interaction		Behavioural interaction	Symbolic interaction
	Shape	Materials		
1	Totem	Wood/Ceramic	Sound emitting from an unexpected place	Use of unusual materials
2	Sculpture	Wood/ Ceramic/ Aluminium	Pop-up components	Use of unusual materials
3	Cosy form	-	Pieces hidden. They appear depending on the function of the speaker	Special attention to the customer and the product after buying the product
4	Monumental form	Wood	Appearing/disappearing dynamic'	Use of unusual materials
5	Iconic shape	-	Removable pieces during the use of the speaker	Must symbolise an icon within the spectrum of similar speakers
6	Iconic shape	Metal/Leather	Intuitive interaction	Must communicate the style of the brand
7	Mutant object	Wood	Functions included that are not related to a speaker	Detects user, and play music according to user preferences

Table 5.6. Study 4 – main descriptions of ideas relating to the human–product emotional interactions.

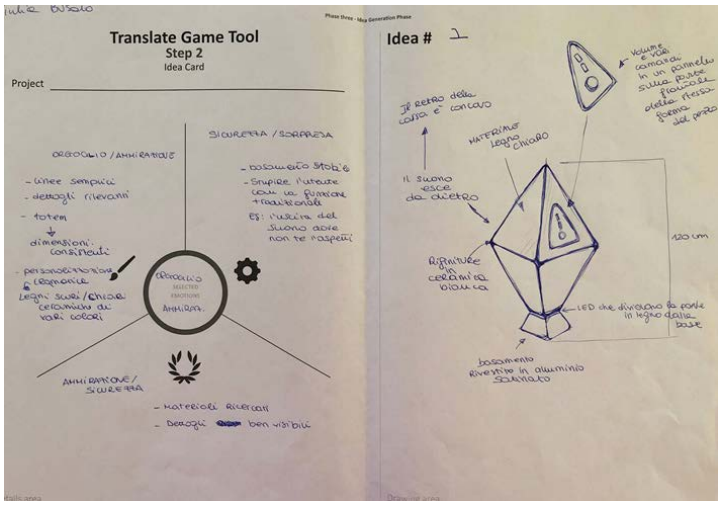


Figure 5.17. Study 4 – developing the process, idea 1.

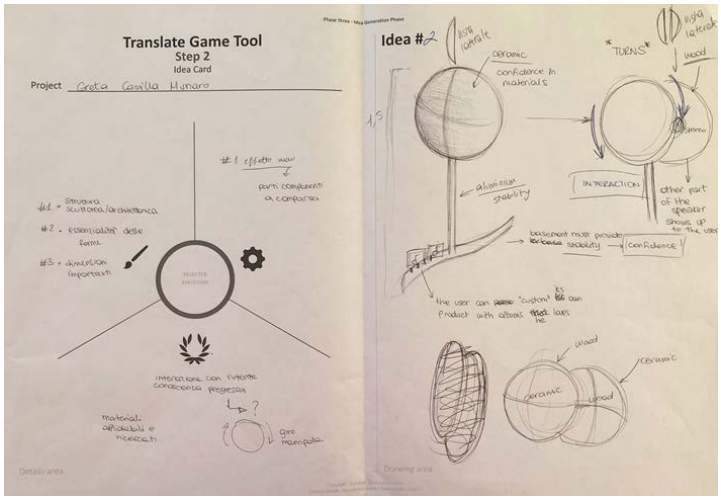


Figure 5.18. Study 4 – developing the process, idea 2.

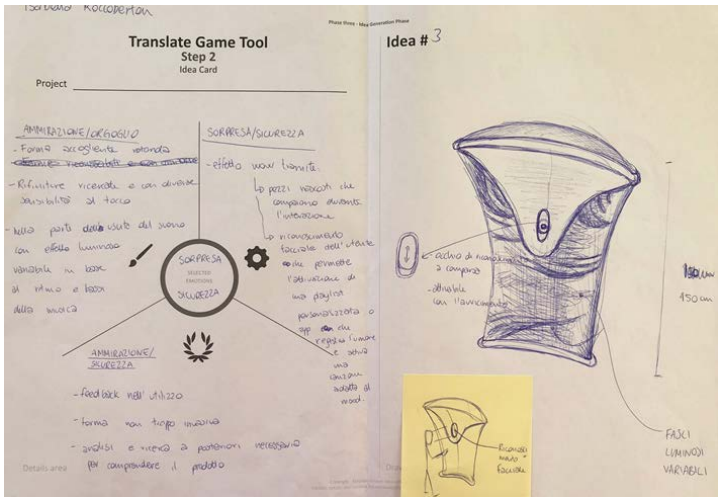


Figure 5.19. Study 4 – developing the process, idea 3.

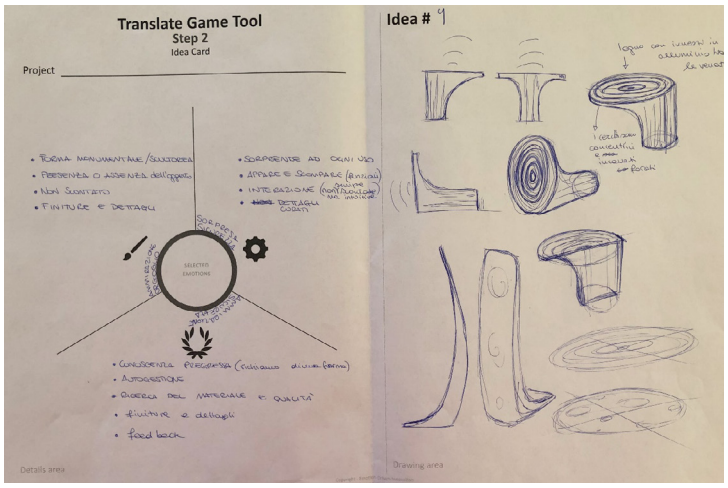


Figure 5.20. Study 4 – developing the process, idea 4.

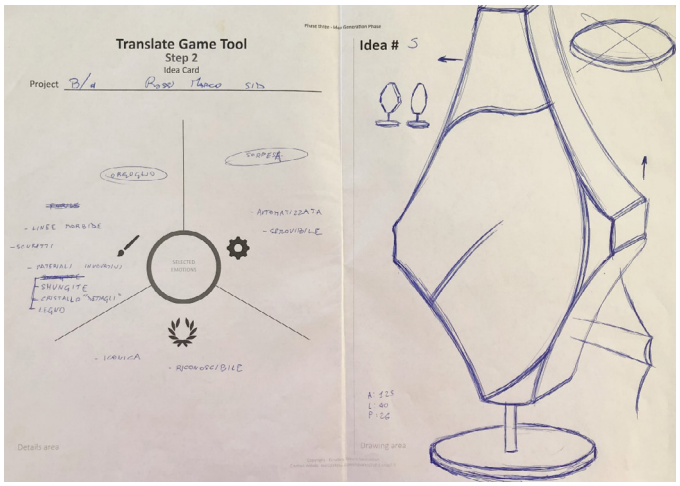


Figure 5.21. Study 4 – developing the process, idea 5.

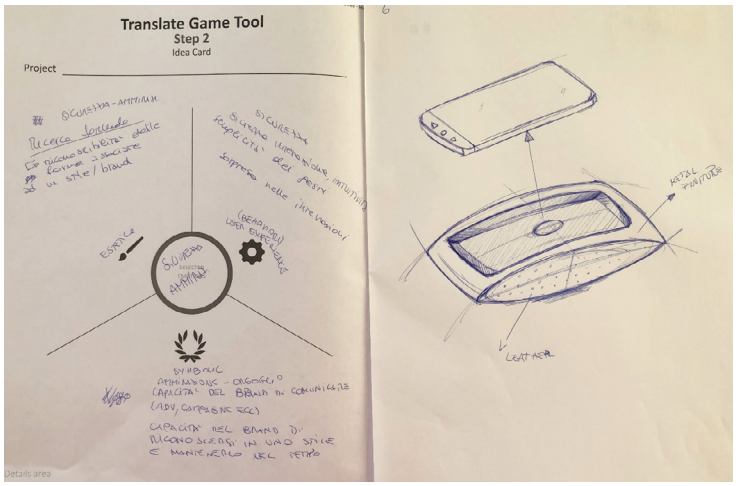


Figure 5.22. Study 4 – developing the process, idea 6.

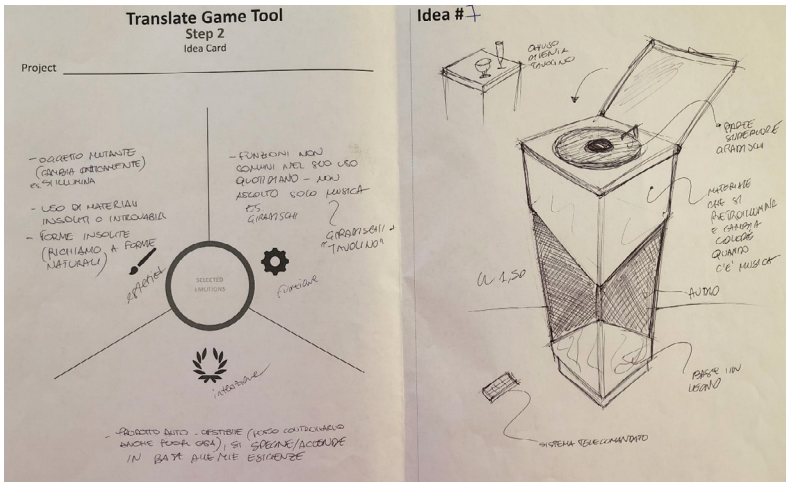


Figure 5.23. Study 4 – developing the process, idea 7.

After analysing the feedback and the worksheets, the only modification made was to step 1 of the Translate Game method. The board used to generate the details was modified into three boards, each of which is related to the human–product emotional interactions.

5.5. Chapter conclusions

The qualitative information gained through the four studies was divided into three categories: 1) the language of emotions, 2) the phases of the process (including their respective objectives), and 3) the intended outcome of the entire process.

Understanding and using the language of emotions

The statements of emotional jobs supported participants in understanding the differences between the 19 positive emotions. From observing participants using the language of E-DI, we can state that the vocabulary used and the guidelines for applying it have raised useful discussions in which participants explored how positive emotional experiences are caused by products and how emotional experiences can vary depending on the context in which a person interacts with a product. These activities helped to create a common understanding of emotions and to formulate new ideas to enrich emotional experiences. Regarding the H–PEIs, participants commented that the symbolic interactions at the product and brand levels were difficult to differentiate. The feedback was taken into account to reformulate the H–PEIs as three interactions (aesthetic, behavioural, and symbolic) and to present these concepts in a different format in subsequent studies.

Achieving the objectives of every phase

Regarding the three objectives of the E-DI process, we observed that the creation of a shared view of how emotions occur in a sample of products was an inspiring and useful activity for participants. Participants expressed satisfaction with an analysis that involved identifying their emotions and suggested

including pictures of the products that are being analysed in the Dots Game matrix to facilitate the activity. The achievement of the analysis helped these participants to understand how different emotional experiences can be created by the same product.

Studies 3 and 4 showed that the visual design of the Filter Game stimulated equitable participation. The concepts of radical and incremental innovation were crucial elements in the selection of emotions for the new product. The correlation of the categories of innovation with the results of the emotional analysis encouraged deep reflections as the group strove to select emotions to pursue a category of innovation, as well as to understand what the selected emotions signified to the people involved in the design team. The concepts of incremental and radical innovation served as a guide to visualise the objectives of the new product. Participants also found the Transform Game method helped them to structure and itemise the objectives.

As far as idea generation is concerned, the Translate Game method supported divergent and convergent thinking. The generation of details encouraged the expression of all thoughts about how selected emotions can be provoked, while the creation of ideas helped to synthesise these inspirations to shape an idea that achieved the stated objectives. We modified the visual design of the Translate Game method according to the feedback of participants, altering the board's size and visual structure to facilitate an adequate expression of ideas.

Supporting emotion-focused idea generation

The ideas generated in studies 3 and 4 incorporated novel features compared to the sample of products used to perform the emotional analysis, with very specific details on the human–product emotional interactions. This is a reassuring result, as the main aim of the process is to foster the generation of novel and emotion-centric product ideas. Although the ideas were generated individually in the Translate Game and expressed different morphological configurations, the details on how to provoke emotions were conceptually similar among all ideas. This emphasises the fact that the team members had unified their understandings of the selected emotions and focused their creative efforts on specific emotional directions.

	Language	Phases	Outcome
	Related criteria		
	Usability	Feasibility	Utility
		Usability	
		Utility	
+	**Understanding and using the language**	**Achieving the objectives of every phase**	**Supporting emotion-focused idea generation**
+	The statements of emotional jobs facilitated the identification of and differentiation between the 19 positive emotions.	**Objective 1: create a panorama of emotions to work with**	There is a similar understanding of the selected positive emotions for the new product; the ideas generated expressed similar characteristics despite the fact that every person generated the new ideas individually.
+	The statements of emotional jobs have supported to generate a similar understanding of emotions between the team members.	The simple design of the Dots Game method has facilitated the accomplishment of emotional analysis by every participant.	
+	The statements of emotional jobs have helped participants to recognise emotional experiences caused by products.	The creation of the panorama of emotions for the new product (which is the combination of the individual emotional analyses of all team members) has raised useful discussions to gain knowledge about positive emotions, understand others' emotional states as well as one's own, and compare positive emotional states regarding the same stimulus.	The new product ideas contain specific details related to every interaction of the human–product emotional interactions.
+	The application of the concepts of human–product emotional interactions has raised designers' awareness about the different scenarios in which a product and its attributes (tangible or intangible) may spark different emotions.	**Objective 2: define the emotional intentions of the new product**	The new product ideas expressed novel features compared to the sample of products that was used to perform the emotional analysis.
+	The application of the concepts of H–PEIs has helped designers to express their visions explicitly and coherently, yielding of holistic, emotion-focused ideas.	The circular board of the Filter Game has stimulated the exchange of opinions, opened discussions, and facilitated equal interaction between participants.	
+		The concepts of radical and incremental innovation used in the Filter Game method have supported strategic decisions regarding to defining a clear vision of the objectives of the new product in relation to the user, customer, or products from competitors.	
+		The product design brief created in the Transform Game method stimulated systematic thinking by structuring the short list of positive emotions in relation to the H–PEIs.	
+		**Objective 3: translate emotional intentions into new product idea**	
+		The guidelines and boards of the Translate Game method have helped participants to focus on creative thinking.	
+		Step 1 of the Translate Game method has fostered divergent thinking by allowing the participants to freely express all their thoughts about the attributes of the new product idea.	
+		Step 2 of the Translate Game method has encouraged convergent thinking by interpolating the inspirations created prior into one new emotion-focused product idea.	
+		The board of idea generation has facilitated the holistic expression of new ideas.	
-	The combination of emotion cards and human–product interaction cards created confusion when using the Learning Game method.	**Objective 1: create a panorama of emotions to work with.**	
-	The symbolic interactions (product and brand level) were difficult to understand as different interactions.	The lack of product images in the matrix of the Dots Game method was a disadvantage in the emotional analysis.	
-		**Objective 2: define the emotional intentions of the new product**	
-		The visual design of the circular board of the Transform Game methoddid not support participants in writing down the objectives of the new product.	
-		**Objective 3: translate emotional intentions in new product idea**	
-		The dimensions of the board used to generate ideas in the Transform Game method were insufficient to facilitate the expression of ideas.	

Figure 5.24. Synthesis of the results of the field studies.

Process validation: towards the application of E-DI in real design practice

Process validation is the fourth phase of the process research methodology (see Figure 6.1), it aims to validate the process with a wider audience (Platts, 1993; (Moultrie, Clarkson, and Probert, 2007). In this research project, the concept of "wider audience" refers to the involvement of professionals with different skills (e.g. designers, marketers, engineers, communication specialists, etc.) that represent the typical profile of an interdisciplinary product development team in real design practice. The validation of the process was carried out with 3 field studies applying beta type test (Chiesa, Coughlan, and Voss, 1996; Cooper and Schindler, 2013). The field studies were centred around a workshop of four hours and were to define the E-DI process at a 'micro' level (execution time and guidelines of every method) to be applicable in a consultancy project or design firm.

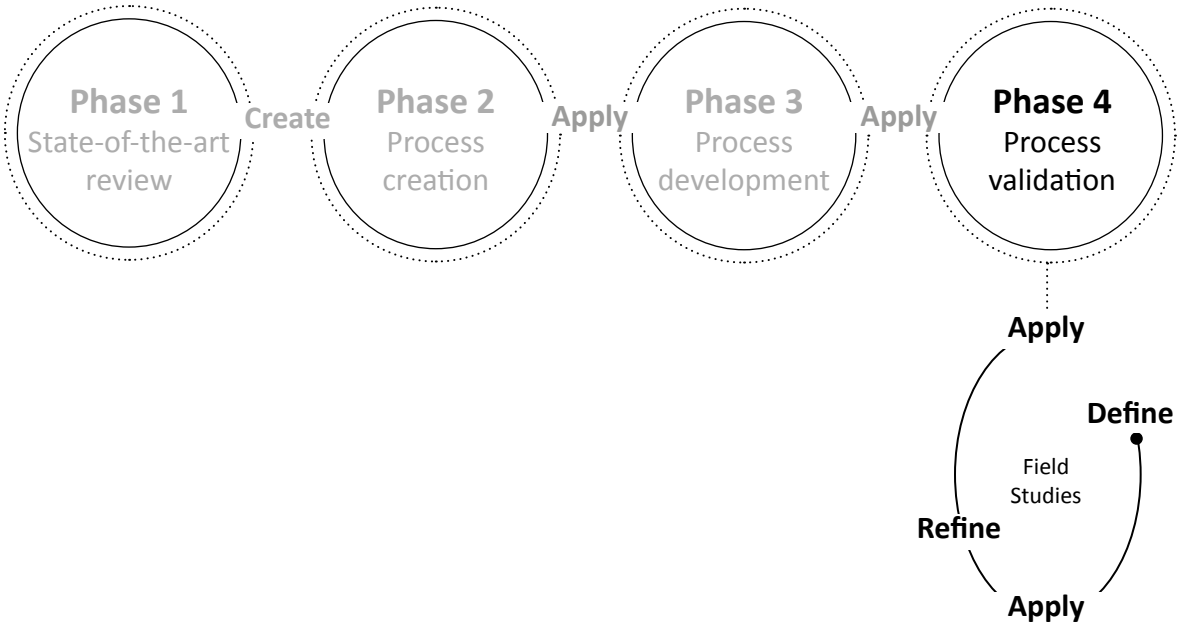


Figure 6.1. Process research methodology, phase 4 – Process validation.

After having validated the process, it was interesting to delve deeper two themes with two additional studies: 1) to understand the relative usability and utility of the process in comparison with another process; and 2) to explore the relationship between the selection of frequent or infrequent positive emotions in sample of products currently present in the market (outcome Filter Game in the 2nd phase of E-DI) with the level of novelty of the ideas (outcome of Translate Game method in the 3rd phase of E-DI).

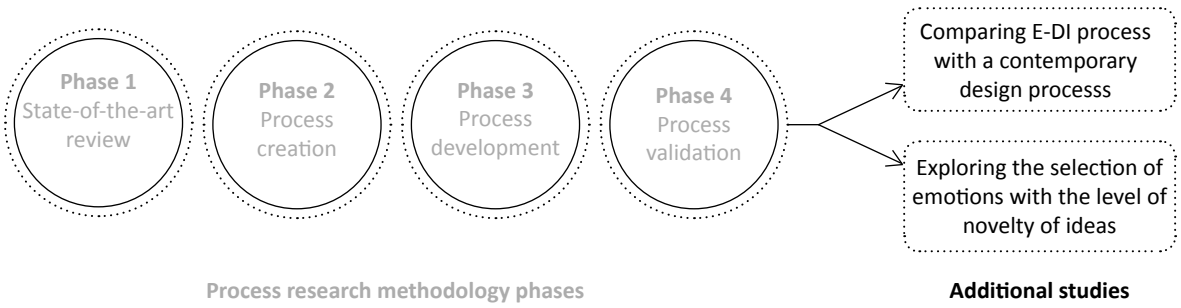


Figure 6.2. The two additional studies performed after having validated E-DI process.

The coming section presents the validation of the process; afterwards the two additional studies are presented.

6.1. Defining the process

The consolidation of E-DI applied the same three fundamental conditions used in the process development phase: 1) the involvement of the researcher, 2) the approach to evolve the process, and 3) the places to test the process (Platts, 1993).

The role of the researcher remained as a facilitator. This assignment will allow the researcher to observe the performance of the process with a different profile of participants and gain qualitative inputs. The approach to evolving the process will follow the same conditions applied in the process development phase; modifications will be made in response to the feedback gained after every testing session has been conducted. With respect to the places to test the process, three field studies have been conducted in collaboration with the consultancy company T2i[9]. T2i offers services to make innovation a continuous process in the companies and gain competitiveness in the markets. The consultancy company facilitated to conduct the studies involving different professionals in the same settings of the workshop. Table 6.1 displays the approach of the testing session with a wide audience.

The testing sessions in process validation involved assessing the usability and utility of the process (Platts, 1993; Moultrie, Clarkson, and Probert, 2006, 2007). The usability criterium concerns to create methods and techniques that can be executed without complications. The utility criterium explores whether Emotion-Driven Innovation process supports effectively the generation of emotion-focused product ideas. The outcome of validating the mentioned criteria will be the main input to define the E-DI process to be applicable in real design contexts.

Three methods were applied to obtain qualitative data. Regarding the usability of the process, evidence was obtained through the direct observation and with a post-workshop semi-structured interview. The usability criterium was validated by analysing the inputs of the workshops (worksheets), the direct observation, and with the semi-structured interview after the workshop was concluded (Platts, 1993; Moultrie, Clarkson, and Probert, 2006, 2007).

[9] Trasferimento tecnologico e innovazione.

Process validation phase – Consolidating the process					
		Study	1	2	3
	Methods tested	Learning Game	●	●	●
		Dots Game	●	●	●
		Filter Game	●	●	●
		Translate Game	●	●	●
		Transform Game	●	●	●
Criterion	Method to collect feedback	Moment to collect feedback			
Usability	Direct observation	During the workshop	●	●	●
	Semi-structured interview	After the workshop	●	●	●
Utility	Direct observation	During the workshop	●	●	●
	Semi-structured interview	After the workshop	●	●	●
	Worksheet		●	●	●
		Place	t2i, Trasferimento Tecnologico e Innovazione (Treviso, Italy)		
		No. Of participant	11	12	4
		Participant profile	(1) Commercial communication expert (1) Creative director of an advertising and inbound marketing campaigns (1) Service designer (2) Experts in ergonomics (2) R&D Managers (1) Founder of digital agency of communication (1) Architect (2) Product designers	(5) Product designers (1) Entrepreneurship finance consultant (2) Graphic designers (1) Business model's consultant (1) Marketing consultant (1) Commercial communication expert (1) Student of user experience	(1) Product designer (1) Commercial communication expert (1) Marketing consultant (1) Art director

Table 6.1. Process validation phase – the approach of the field studies conducted in collaboration with T2i.

The assignment of the workshops was to design a new corkscrew (the Italian word 'cavatappi') We used four corkscrews of Alessi[10] as a sample of products to conduct the emotional analysis in Dots Game method, see figure 6.2.

[10] Alessi is a company of household items and kitchen utensils in Italy.

Corkscrew Socrates

Designer J
asper Morrison

Corkscrew - (PRODUCT) RED Alessandro M.

Designer
Alessandro Mendini

Sommelier corkscrew - Parrot - Proust

Designer
Alessandro Mendini

Corkscrew Anna G.

Designer
Alessandro Mendini

Figure 6.3. Sample of corkscrews used in Dots Game method. Source of the pictures www.alessi.com.

6.1.1. Consolidating the process – study 1

The first workshop involved the participation of eleven professionals; the team was split into two groups. Bellow the main findings are presented.

Direct observation and participants feedback

Learning Game method confirmed to be useful to understand the distinctions of the nineteen emotions. Participants mentioned they were able to identify the emotional jobs on products that they own or use, but also in designs projects that they have been involved.

Figure 6.4. Participants of the first workshop - process validation.

The application of Dots Game method showed that some participants (3 out of 11) had difficulties to perform the emotional analysis individually. Those participants mentioned that they need to interact and hear the opinions of the other people in order to achieve the activity.

The application of Filer Game method demonstrated that the concepts of radical and incremental innovation are useful to define the emotional intentions of the new product. From observing participants, the selection of the emotions was performed after participants had a rich discussion of the intentions for the new product; also Filter Game method was executed in the time scheduled. However, participants mentioned that the method lacks information to guide the team in case the decision will be to select emotions that lie between radical and incremental innovation.

After the selection of the positive emotions in Filter Game method, participants elaborated the product design brief of Transform Game method relatively easy; the two teams completed the brief without needing to clarify indications and in the scheduled time. The two groups shared the opinion that the product design brief created in Transform Game method is useful to catalyse the emotional intentions previously established.

Regarding the Translate Game method, participants mentioned that the generation of details (step 1) was a joyful activity, they felt that the activity stimulate their imagination and focused their creativity to address the objectives established before. The participants mentioned that the generation of ideas was an effortless activity, as they felt engaged with the process since it applies their emotional experiences and it allows to exchange opinions about what they understood about specific emotions.

Figure 6.5. Participants working with Transform Game method.

Outputs of worksheets

With Filter Game method, Group 1 decided to select the emotions love, sensuality and inspiration from the radial innovation spectrum; while group 2 decided to combine emotions from the two categories of the innovation, selecting the emotions love, sensuality from radical innovation spectrum and relaxation and hope from incremental innovation spectrum.

In Transform Game method participants of group 1 decided to set the emotions of love and sensuality in the symbolic interaction, looking to represent the symbol of duality with the new corkscrew. Group 2 decided to convey the symbol of a promise with the new corkscrew, the team set the emotions of love and hope in the symbolic interaction. Tables 6.2 and 6.3 present the entire results of the Transform Game method.

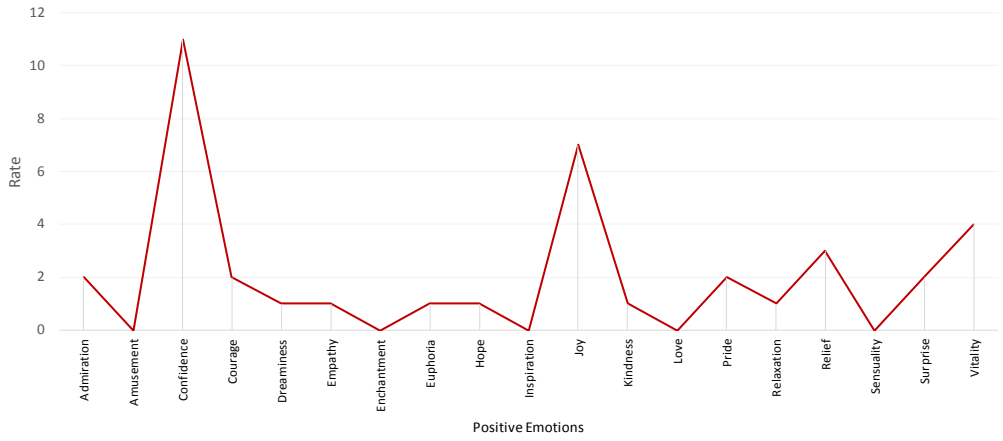


Figure 6.6. Panorama of emotions of corkscrews created in study 1 by group 1.

Results of:	**Group 1**		
Filter Game method	**Positive emotions selected**		
	Love, Sensuality and Inspiration		
	Emotions from Radical innovation		
Transform Game method	**The selected emotions on the Human–Product Emotional Interactions**		
	Aesthetic	**Behavioural**	**Symbolic**
	Love	Love	Love
	Sensuality	Sensuality	Sensuality
	Inspiration	Inspiraiton	
	Perceived by the following senses of the human body:	**At the following time:**	**Symbolising:**
	Touch	Before using it	Duality
	Sight	While using it	
	Hearing		
Translate Game method	**Details written in step 1**		
	Soft finishes	Mark the cork with the date	Packaging to break by two
	Rounded tips	Change the shape when use it	Yin Yang symbol
	Soft material	It has a harmonic music	Kaleidoscope
	Changed the color when touch it	It amplifies the sound when removing the cork	Two hemispheres
	Resilient materials	When I insert corkscrew the rotary movement creates a luminescent effect	
	It produces a sound when used it	Two persons to open the bottle	
	Red colors		

Table 6.2. Defining the process, study 1 - results of Group 1.

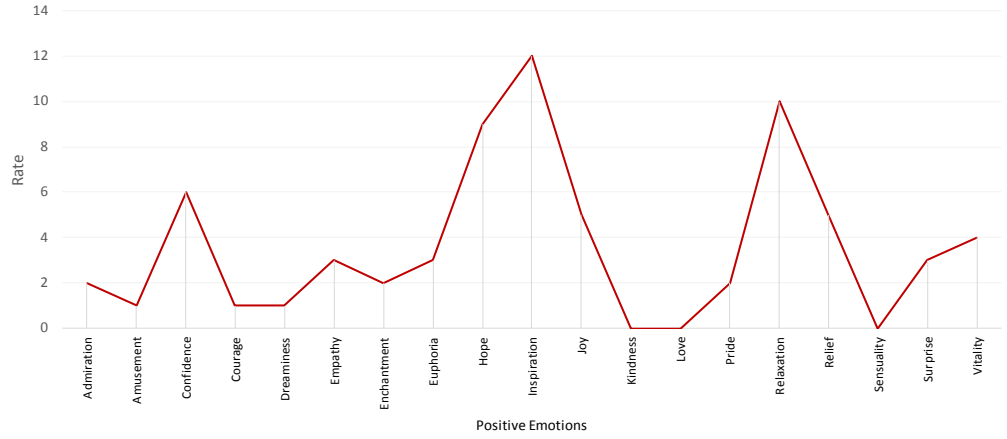


Figure 6.7. Panorama of emotions of corkscrews created in study 1 by group 2.

Results	**Group 2**		
Filter Game method	**Positive emotions selected**		
	Love, Sensuality, Relaxation and Hope		
	Emotions from Incremental and radical innoavtion		
Transform Game method	**The selected emotions on the Human–Product Emotional Interactions**		
	Aesthetic	**Behavioural**	**Symbolic**
	Relaxation	Relaxation	Love
	Sensuality	Hope	Hope
	Perceived by the following senses of the human body:	**At the following time:**	**Symbolising:**
	Touch	Before using it	A promise
	Sight	While using it	
		After using it	
Translate Game method	**Details written in step 1**		
	Gold color	Mountain	Man and woman hands
	Opaque	Promise	Forever
	Red colors	Print date on cork	Gesture of love
	Satin finish	Smooth movements	Promise
	Metal Satin		Ritual
	Dark colors		Freedom
	Soft touch		Love
	Bold		Night
	Warm		Romantic night
	Light		
	Wood		

Table 6.3. Defining the process, study 1 - results of Group 2.

In the next pages the ideas generated by group 1 and 2 are presented. Tables 6.4 and 6.5 present the details of ideas related to the human–product emotional interactions of both groups.

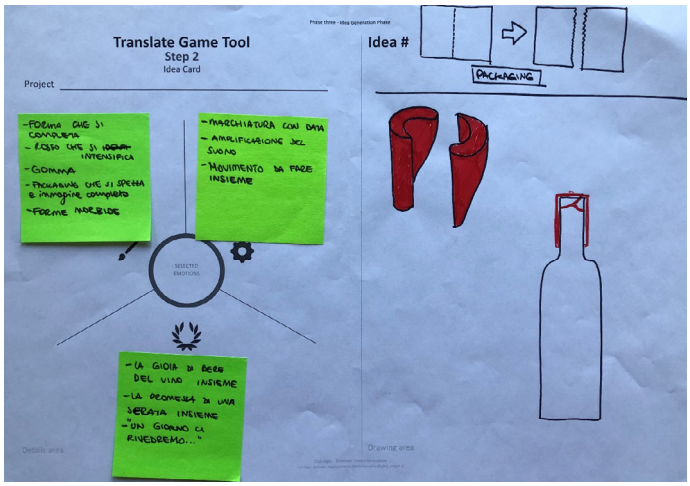


Figure 6.8. Defining the process, study 1. Idea 1 of group 1.

The idea 1 expresses a corkscrew designed that marks the date of the opening of the bottle and amplifies the sound of the cork when removing it. The corkscrew is designed in two pieces which are packaged separately; the half' of the corkscrew can be offered to someone as an invitation to a romantic moment. The main material is soft to provoke tenderness to the touch and its red colour intensifies in the moment of the opening the bottle.

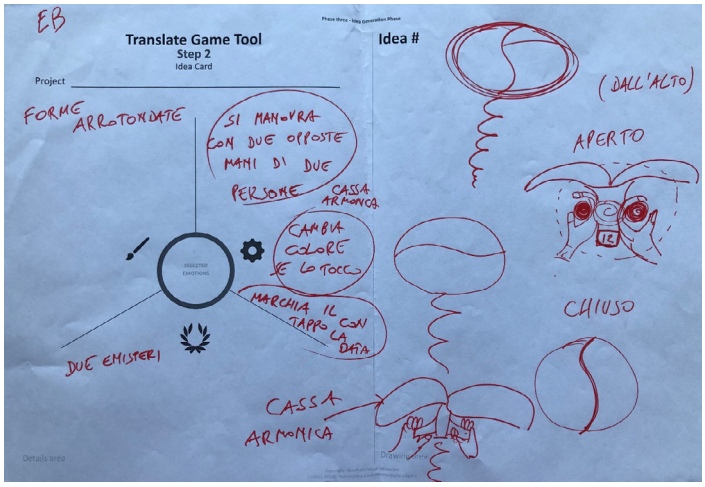


Figure 6.9. Defining the process, study 1. Idea 2 of group 1.

Idea 2 expresses a corkscrew that also stamps the date of the opening of the bottle and its colour changes to the touch. The shape of the corkscrew conveys the yin yang symbol; when the two halves separate, they turn into handles to operate the corkscrew. To remove the cork two persons need to synchronize the two handles.

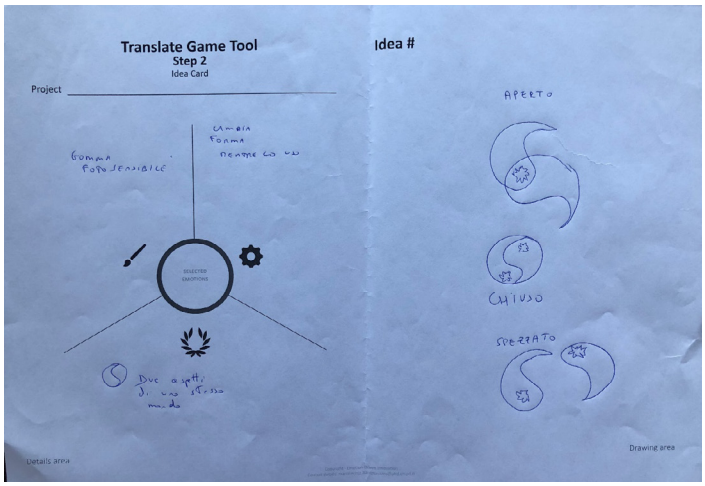


Figure 6.10. Defining the process, study 1. Idea 3 of group 1.

Idea 3 is very similar to idea 2; it conveys the symbol of yin and yang. The round shape of the two poles of yin and yang separate when introducing the spiral in the cork, transforming the round shape into two handles to pull the cork out.

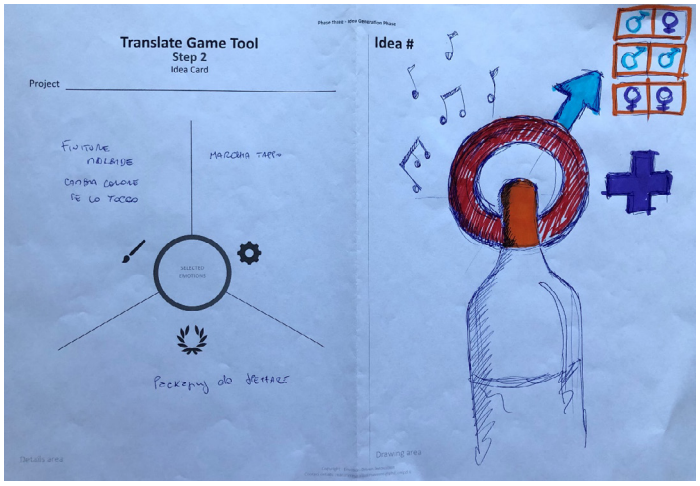


Figure 6.11. Defining the process, study 1. Idea 4 of group 1.

The corkscrew of idea 4 has a different form to the rest of the ideas of group 1. The corkscrew of idea 4 is designed in two pieces: a piece conveying the symbol of man or woman and a ring. The two pieces are packaged separately. In order to remove the cork from the bottle, the two pieces must be joined; the union activates music programmed to listen while the bottle is opened. This corkscrew also marks the cork with the day in which the bottle was opened and its colour change to the touch.

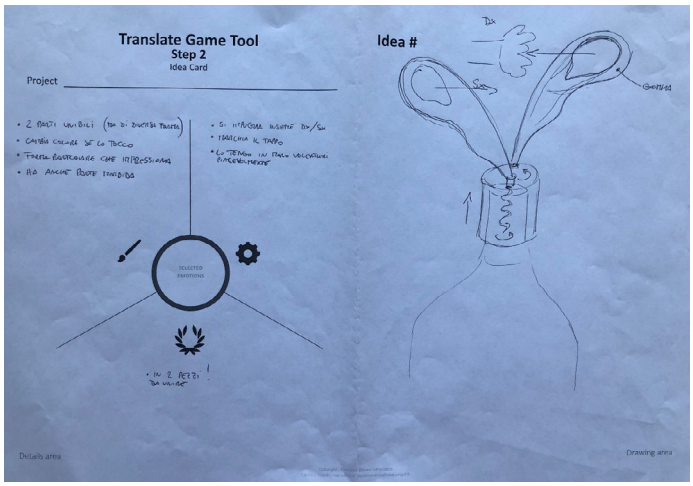


Figure 6.12. Defining the process, study 1. Idea 5 of group 1.

Idea 5 shares some characteristics with the other ideas: it also stamps the day of the opening of the bottle and changes the colour to touch. The corkscrew of idea 5 is composed by two pieces that must set together to open the bottle; the two pieces have to be handled by two persons in the ritual of the opening a bottle of wine.

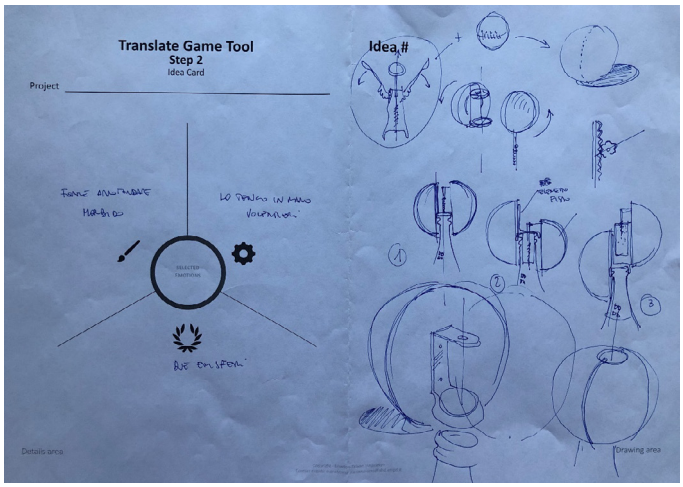


Figure 6.13. Consolidating the process, study 1. Idea 6 of group 1.

Idea 6 of group 1 presents a corkscrew with round shapes and soft materials. The shape of the corkscrew is designed to be used as a toy. The round shape of the corkscrew is composed of two hemispheres which operate together to remove the cork from the bottle.

Idea	Human-Product Emotional Interactions of ideas of group 1		
	Aesthetic	**Behavioural**	**Symbolic**
1	Soft materials to touch Red colour that intensifies when opening the bottle.	The corkscrew marks the date of the opening of the bottle and amplifies the sound of the cork when removing it.	The corkscrew is designed in two pieces which are packaged separately; the "half" of the corkscrew can be offered to someone as invitation to a romantic moment.
2	Round finishes Its colour changes to touch	The corkscrew stamps the date of the opening of the bottle	The shape of the corkscrew conveys the yin yang symbol To remove the cork, it is needed the synchronization of two hands.
3	Round shape	The round shape of the two poles of yin and yang separate when introducing the spiral in the cork, transforming the round shape into two handles to pull the cork out.	It conveys the symbol of yin and yang
4	It changes its colour to touch	The two pieces of the corkscrew are packaged separately; in order to remove the cork from the bottle the two pieces must be joined; the union activates a music programmed to be listened while the bottle is opened. It marks the cork with the day of the bottle opening	It is designed in two pieces, a ring and a piece conveying the symbol of man or woman
5	It changes its colour to touch	It stamps the day of the opening of the bottle The corkscrew is composed by two pieces that have to set together when opening the bottle	The two pieces of the corkscrew have to be handled by two persons in the ritual of the opening a bottle of wine.
6	Round shape Soft materials to touch	The shape of the corkscrew is designed to be a toy before using the object	The round shape of the corkscrew is composed by two hemispheres which operate together to remove the cork from the bottle.

Table 6.4. Details expressed in the human–product emotional of ideas of group 1.

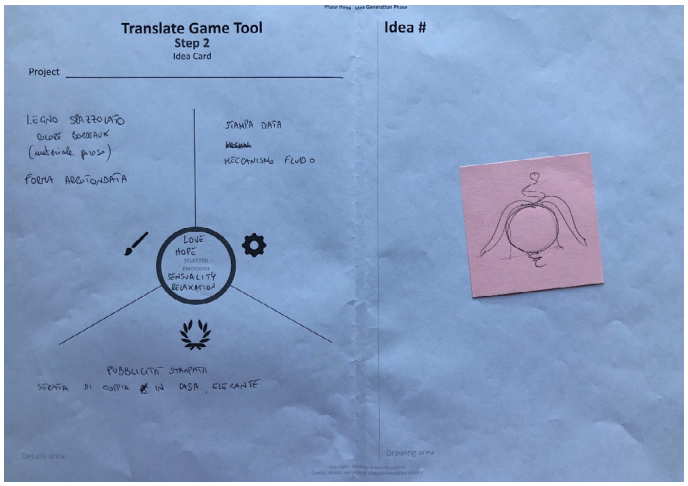


Figure 6.14. Defining the process, study 1. Idea 1 of group 2.

Idea 1 of group two expresses a corkscrew with wood materials and round shape. The corkscrew stamps the date of the opening the bottle. The marketing communication of this corkscrew must convey an image of a couple.

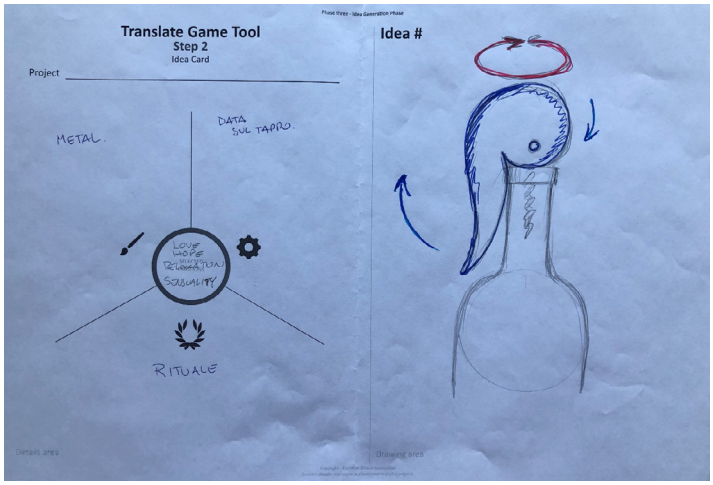


Figure 6.15. Defining the process, study 1. Idea 2 of group 2.

Idea 2 represents a round metal corkscrew; it is similar to idea 1, it stamps the date of the opening the bottle. The round shape is meant to be handled by two hands symbolizing the union of two people.

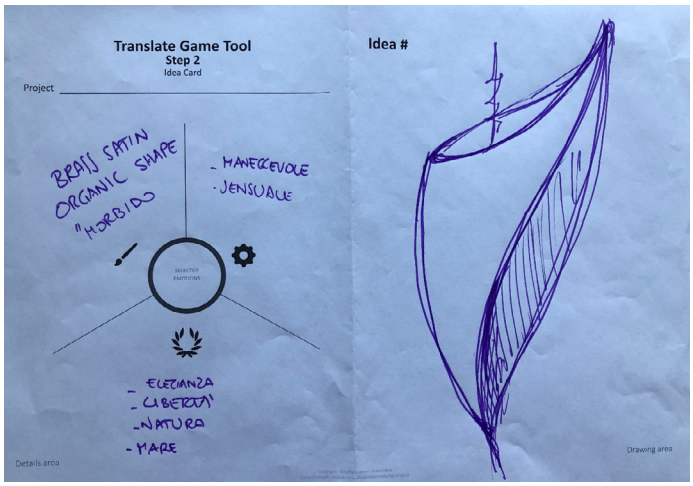


Figure 6.16. Defining the process, study 1. Idea 3 of group 2.

Idea 3 shows a corkscrew with an organic shape and soft materials. The curves of the organic form are intended to stimulate the touch to the product. The shape of the corkscrew pursues to represent freedom and nature.

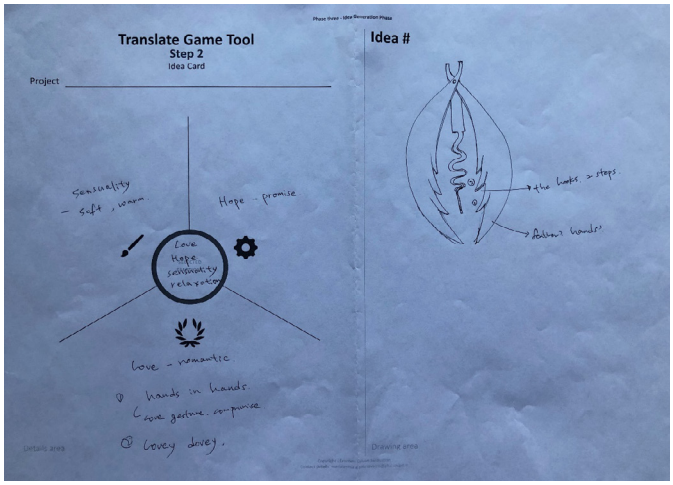


Figure 6.17. Defining the process, study 1. Idea 4 of group 2.

Idea 4 describes a corkscrew with soft and warm materials to stimulate the sense of touch. The corkscrew is designed to be handled by two persons when opening the bottle.

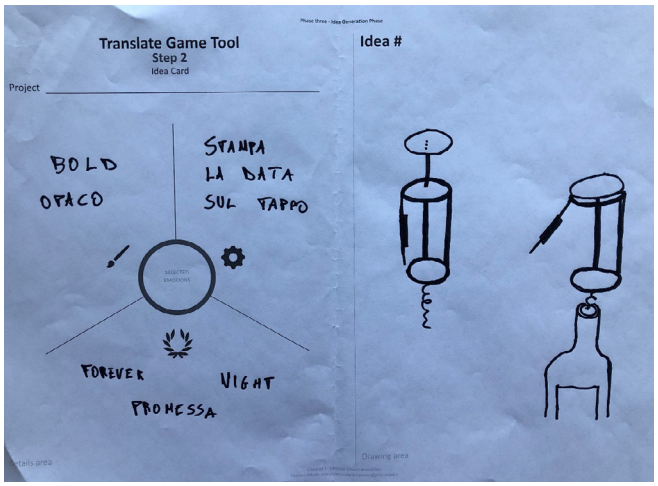


Figure 6.18. Defining the process, study 1. Idea 5 of group 2.

Idea 5 represents a more conventional shape. The finished of the corkscrew is opaque and round. This corkscrew stamps the date of the opening the bottle.

Idea	Human–Product Emotional Interactions of ideas of group 2		
	Aesthetic	**Behavioural**	**Symbolic**
1	Wood material Round shape	The corkscrew stamps the date of the opening the bottle	Publicity of the corkscrew with the picture of a couple.
2	Round metal corkscrew	It stamps the date of the opening the bottle	The round shape is meant to be handle by two hands symbolizing a ritual between the two people.
3	Organic shape Soft materials	The curves of the organic shape trigger the touch while opening the bottle	The shape of the corkscrew pursues to represent freedom and nature.
4	Soft materials Warm touch	The corkscrew is designed to be handle by two persons when opening the bottle.	
5	Opaque colour Round forms	This corkscrew stamps the date of the opening the bottle.	No details given

Table 6.5. Details on the human–product emotional of ideas of group 2.

Every participant of each group presented and explained the idea generated. The evaluation of the ideas was performed after the presentation. This activity lasted around 20 minutes (10 more than it was scheduled). It was observed that participants had engaged with their ideas and expressed passion when they were presenting them.

Conclusions of study 1

The workshop had confirmed that Emotion-Driven Innovation process achieved its principal objectives. However, the workshop also has revealed the need to modify guidelines and add information in some of the methods.

We observed that some participants had complications to achieve the emotional analysis individually (Dots Game method). This situation brought out a very important characteristic of the process. Emotion-Driven Innovation considers the emotions of every person in the team. In order to create a rich and genuine panorama of emotions to work with the new product, it is highly important that every person communicates authentically (and without having been influenced) what emotion(s) the product provokes to her or him. To this regard, it was created an individual package of the five methods for every participant, in order to stimulate genuine contributions. The individual package contains space to write down notes for every method, where participants can express their personal thoughts.

The Filter Game method proved to be valuable to strategically define the emotional intentions for the new product. Participants of both groups expressed that the selection of emotions has been done after a reflective discussion. However, the participants of group 2 questioned the direction in the market for a product that integrates emotions that lie between the two categories of innovation (radical and incremental).

Taking this into account, the industrial design principle MAYA (most advanced yet acceptable) was adopted. The principle combines a correlation between novelty and typicality; a design following the design principle MAYA will maintain the typicality of the existing design model, as much as possible, while pursuing to innovate, as much as possible (Hekkert, Snelders, and Van Wieringen, 2003). Empirical studies have been conducted to provide evidence of the MAYA principle, to demonstrate that preserving the typicality of a model of products can increase the novelty of new designs (Hekkert P., 2006). As it was stated before, product to pursue incremental innovation will be produced with small modifications, preserving configurations of existing models, while products that will pursue radical innovation will be products that represent new archetypes and domains (Bloch, 1995; Norman and Verganti, 2004; Rampino, 2011). Taking this into consideration, it seems right to adopt MAYA principle as direction for the product in the market that seeks to integrate aspects of the two categories of innovation (incremental and radical). Figure 5.21 presents the Filter Game board modified.

Regarding the Idea Generation phase, participants stated that due to the fact that the generation of details does not require to formulate an entire product idea, it made them feel relaxed; this situation contributed to stimulate their imagination. Also, participants mentioned that to have speared times to write details for every human–product emotional interaction, facilitated to focus their creativity to target specific elements of the product design brief. From observing participants, the creation of the idea was a pleasant activity; we observed some participants did not feel confident with their skills to draw the idea, but they did feel confident about the idea they were shaping.

We observed that the participants that decided to design a new corkscrew to pursue radical innovation, expressed bolder ideas, compare to the sample of products presented to perform the emotional analysis in Dots Game method.

The principal limitation of the study was the lack of time to perform the workshop; the limitation was reflected especially in the Idea Generation (step 2 of Translate Game method). The ideas that both groups generated have a strong reflective process behind: the ideas expressed that participants understand and identify the emotions with the same connotation; all the ideas content details to achieve the objectives

of the product design brief; and even though the ideas share similar characteristics, the ideas are diverse among them.

However, the board of ideas missed some details that participants explained in their presentations.

During the presentation of the ideas, every person explained its idea in an exceptional way, mentioning details that were not specified in the boards. We believe that with the appropriate time to generate the idea participants can fully articulate their ideas in the corresponding board. This evidence will be considered to define a time frame in which designers will be able to register in fine details their ideas. The new frame time will be defined after the three consolidation studies, to have a better impression of the proper amount of time.

Figure 6.19. Participants of study 1 presenting their ideas.

Filter Game board

Team worksheet

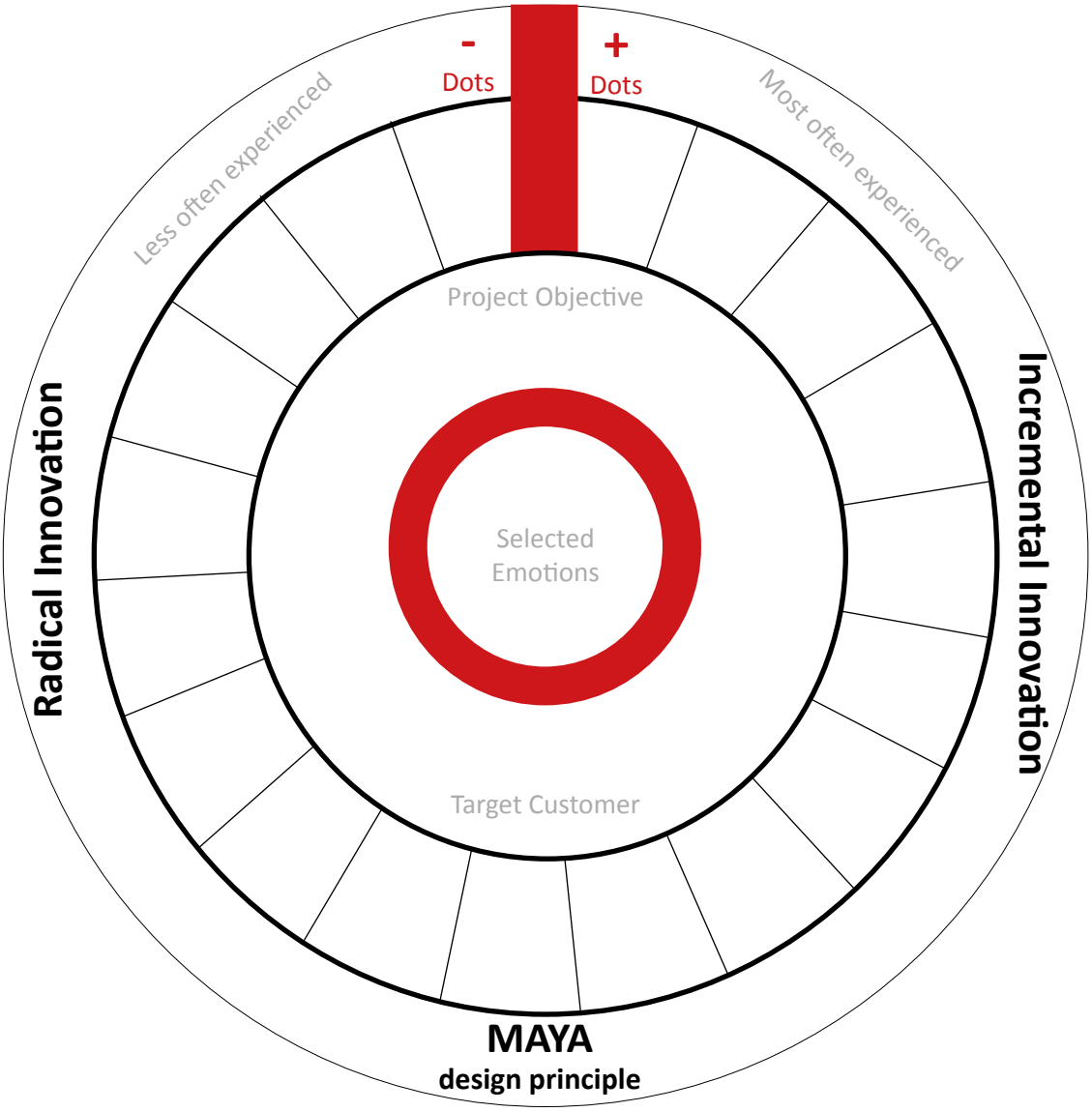


Figure 6.20. Filter Game method, the board modified after study 1.

6.1.2. Consolidating E-DI process – study 2

The participants of workshop 2 were: five product designers, an entrepreneur finance consultant, two graphic designers, a business model's consultant, a marketing consultant, a commercial communication expert and a student of user experience. The group was split into two teams of 6 persons each. The results of the application of the five methods of the process are presented below.

Direct observation and participants feedback

In the Learning Game method activities, participants mentioned that they considered the emotional jobs as clear objectives if the intention is to design a product to target specific positive emotions.

Participants pointed out that the exchange of emotional experiences related to products, helped them to differentiate the emotions, and to distinguish emotional experiences, either related to people or to an artefact. As an example, they mentioned two emotions that at first glance signified the same for the majority of the participants (relaxation[11] and relief[12]) but that after the application of Learning Game method, participants identified that the causes of this emotions are different and therefore the emotional effects are different. Participants were enthusiastic to analyse products (in this case a very common products to them) from an emotional perspective. In the summary of the individual analysis, participants seemed stimulated to discuss their emotional experiences towards the corkscrews.

We notice that the new design of the Filter Game method is strong and provides good support to define directions for the new product. Participants commented that seeing the results of Dots Game method, made them think that the most experienced emotions were the important ones to the new product ideas. But, when they distributed the emotions in the circular configuration of Filter Game board and observed that the emotions were linked to the radical and incremental innovation categories and to the MAYA design principle, they understood that all emotions were important. Participants realised that the definition of the short list of emotions will rely on the market direction that the team will decide to chase with the new product. Participants mentioned that this method made them feel challenged and engaged with the process.

The application of Filter Game method was one of the moments of the workshop, which was clearly observed all participants sharing opinions and achieving together the objective of the method. We believe these behaviours led solid decisions and make every member of the team genuinely engaged with the project.

[11] Relaxation is the experience of enjoying a calm state of being, free from mental or physical tension or concern (Desmet, 2012).

[12] Relief is the experience of enjoying the recent removal of stress or discomfort (Desmet, 2012).

Figure 6.21. Participants of study 3 generating details with Translate Game method.

The elaboration of the product design brief with Transform Game method brought out a peculiarity of the method. Participants of group 1 decided to define the precise connection of the selected emotions with a specific sense of the human body (aesthetic interaction) and the moment of use (behavioural interaction); while participants of group 2 followed strictly the instructions. See tables 5.6 and 5.7 for more details.

The guidelines of Transform Game method are:

1. From the selected emotions specify the positive emotions to be provoked in every interaction (aesthetic, behavioural and symbolic).
2. In the Aesthetic interaction specified the senses of the human body on which the new product will be perceived and therefore provoke the selected emotion(s).
3. In the behavioural interaction specified the moment of usage of the product to provoke the selected emotion(s).
4. In the symbolic interaction, define what the product will symbolize in order to elicit the selected positive emotion(s).

Regarding to Translate Game method, participants commented that the first step was the moment to write down freely all the thoughts about the new idea that started to emerge when the team was elaborating the product design brief. Due to this fact it has been confirmed that the visual design and the guidelines of the method triggers the imagination of participants. The activity to create the ideas resulted in similar circumstances that the previous workshop; there was a lack of time to formulate the idea and to evaluate the ideas generated. The participants presented the ideas created but did not manage to evaluate them due to lack of time.

Outputs of worksheets

Through the application of Filter Game method participants of both groups selected emotions from the incremental innovation. Group 1 decided to select the emotions confidence, surprise and pride; while group selected the emotions enchantment, surprise and admiration.

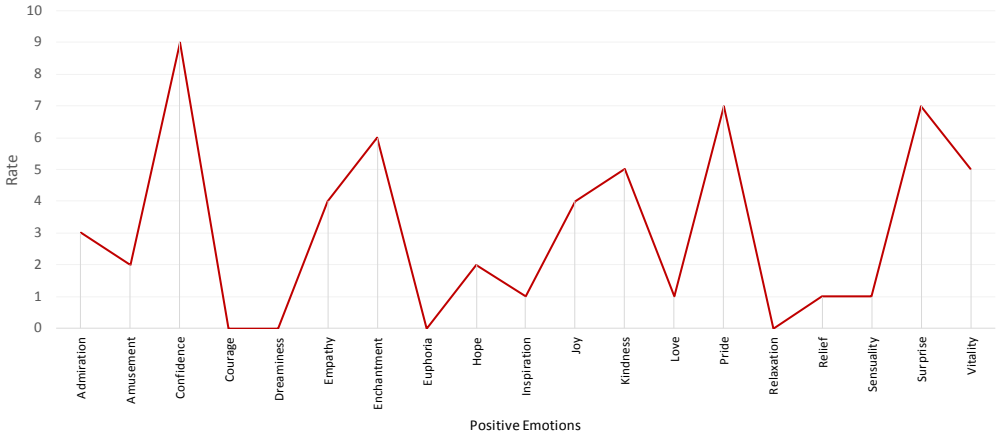


Figure 6.22. Panorama of emotions of corkscrews created in study 2 by group 1.

Regarding the Transform Game method, the product design brief of the two groups was elaborated in a different way, as it was mentioned before. Participants of group 1 set the positive emotions surprise and confidence in aesthetic interaction; specifying that the positive emotion surprise must be provoked through the senses of hearing, sight, and smell. The positive emotion confidence was linked to the sense of touch; participants reasoned that in order to make feel confident the user or customer, it is important that the product provokes the emotions when the person touches or holds the product. The emotion surprise was related to the sense of sight, smell, and hearing; participants considered that a combination of different materials could provoke surprise to people.

In the behavioural interaction group 1 linked the emotion confidence to the moment before using the product, they considered that the product must communicate that it will perform its function properly and that it is easy and safe to use. The emotion Surprise was linked to the moment when the product is in use, an element of surprise each time the product is used can create a stronger bond with a commonly used product. The emotion pride was linked to the moment after using the product; participants mentioned that the new corkscrew must elicit the sense of achievement every time it is used.

Regarding the symbolic interaction, participants indicated that the new corkscrew must provoke the emotion of pride, to symbolize social status. Table 6.6 presents of results of Transform Game method, as well as the written details in step 1 of the Translate Game method.

Results of:	Group 1				
Filter Game	Positive emotions selected				
	Confidence, Surprise and Pride				
	Emotion from Incremental innovation				
Transform Game method	The selected emotions on the Human–Product Emotional Interactions				
	Aesthetic		Behavioural		Symbolic
	Surprise		Pride		Pride
	Confidence		Surprise		
			Confidence		
	Perceived by the following senses of the human body:	**To provoke the positive emotion of:**	**At the following time:**	**To provoke the positive emotion of:**	**Symbolising:**
	Touch	Surprise	Before using it	Confidence	Social Status
	Smell	Confidence	While using it	Surprise	
	Sight		After using it	Pride	
	Hearing				
Translate Game method	Details written in step 1				
	it can be operate with one hand		Details given for the emotion Confidence		Limited edition
	Make a click sound when opening the bottle		It checks the chemical components of the wine		High end finish
	Unusual dimension		It measures the temperature of the wine		Branded
	It identify and open the bottle itself		It identifies the origin of the wine		Simple shape, minimalist
	Soft materials		When opening the bottle it makes no sound		Sophisticated design
	Unusual opening system		It cleans the mouth of the bottle.		Leonine head
	Wood materials		Details given for the emotion Surprise		Personalized with a graphic or symbol to identify uniqueness
	It has a peculiar smell		Slow motion opening		
	Carbon fibber material		Feel the cork go up smoothly		
	Tobacco smell		Bottle opening counter		
	Ultralight		Details given for the emotion Pride		
			Quality wine detector		
			Indicates the status of the wine		
			the guests are pleased for the no sound at opening the bottle		

Table 6.6. Defining the process, study 2 - results of Group 1.

The product design brief of group 2 was elaborated following strictly the guidelines. The team decided to set the emotions surprise and enchantment in the aesthetic interaction, specifying that the new corkscrew must be perceived by the senses of sight and touch. The emotion enchantment was placed in the behavioural interaction; the group selected all the moments of use the product as important to provoke the emotion. In the symbolic interaction, they placed emotion admiration. Table 6.7 presents the results of group 2.

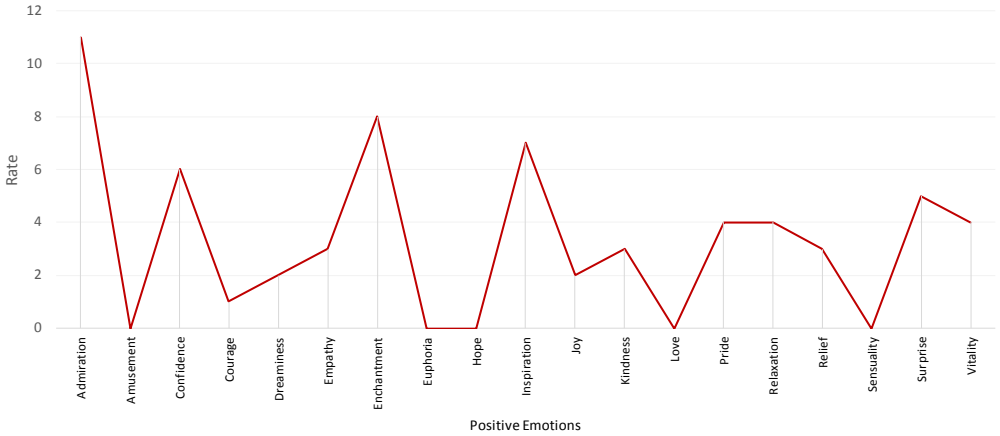


Figure 6.23. Panorama of emotions of corkscrews created in study 2 by group 2.

Results of:	**Group 2**		
Filter Game	Positive emotions selected		
	Enchantment, Surprise and Admiration		
	Emotion from Incremental innovation		
Transform Game method	The selected emotions on the Human–Product Emotional Interactions		
	Aesthetic	Behavioural	Symbolic
	Enchantment	Enchantment	Admiration
	Surprise		
	Perceived by the following senses of the human body:	**At the following time:**	**Symbolising:**
	Touch	Before using it	The sharing
	Sight	While using it	
		After using it	
Translate Game method	Details written in step 1		
	Soft natural colour	Transformable	Conviviality message
	Marble materials	Harmonized opening	Smile promoter
	Dark colours	Unexpected object	Sparks a conversation
	Matt black colour	It has connectivity	Tags pictures you take during dinner
	Unusual shape	Gives information about the wine, that is not specified in the label of the bottle	Sense of belonging
	Light		Attracts the attention of everybody
	Metal materials		
	Hidden function	It reads the information of the wine and send it to a smartphone	Opening the bottle as an experience
	Brilliant inserts		
	Soft materials	Hand-used by opening performed in a different way	
	Self standing		
	Raw materials	It gives information by approaching it to the bottle	
	Lights		
	Shining		

Table 6.7. Defining the process, study 2 - results of Group 2.

Below are explained the ideas generated by group 1 in the second study and Table 6.8. presents the details related to the human–product emotional interactions of every idea created by group 1.

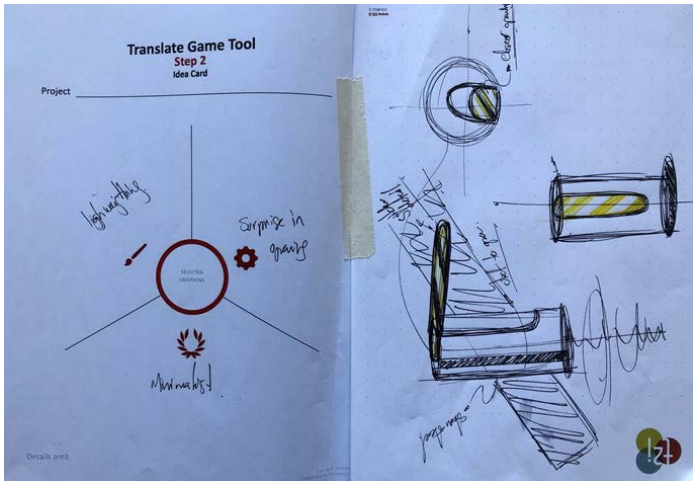


Figure 6.24. Defining the process, study 2. Idea 1 of group 1.

The idea 1of group 1 presents a minimalist design. The main material is metal with gold details. The corkscrew will drive slow moments at the moment of pulling out the cork, allowing the user to feel the rotatory movement when opening the bottle.

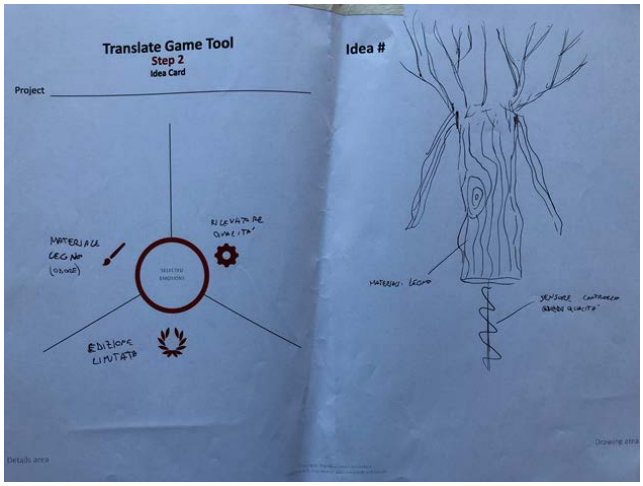


Figure 6.25. Defining the process, study 2. Idea 2 of group 1.

The corkscrew of the idea 2 of group 1 has a more daring form; it symbolizes a tree, from which two of its branches help to operate the corkscrew. The corkscrew is mainly made with wood materials. The screw is designed to detect the quality of the wine and it will be a limited-edition design.

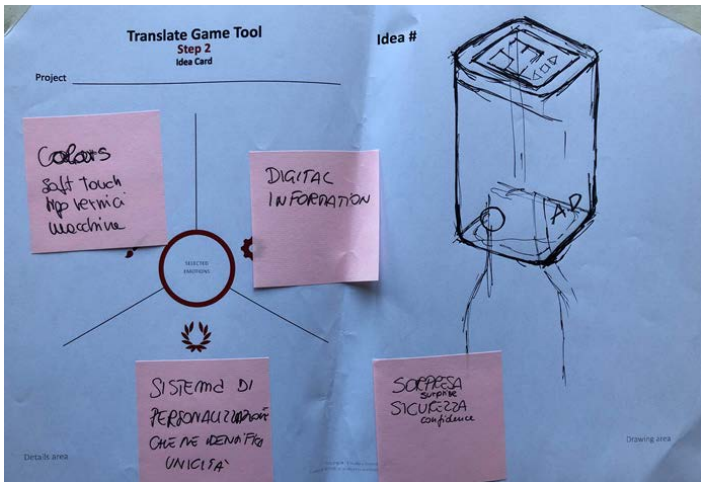


Figure 6.26. Defining the process, study 2. Idea 3 of group 1.

Idea 3 of group 1 presents an electric corkscrew; it gives information about the wine through digital technology. The user can personalize the corkscrew with a symbol or sign that the customer designs at the time of purchase.

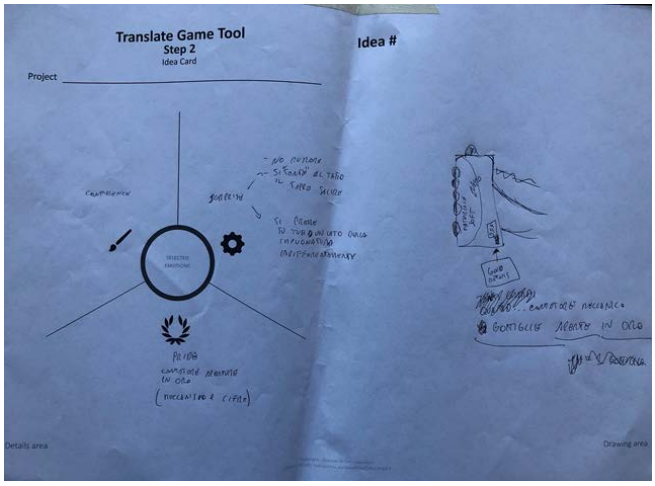


Figure 6.27. Defining the process, study 2. Idea 4 of group 1.

Idea 4 of group 1 expresses a corkscrew that can be operated with one hand. The idea indicates that the corkscrew does not make a sound when opening the bottle. It also indicates gold personalized details.

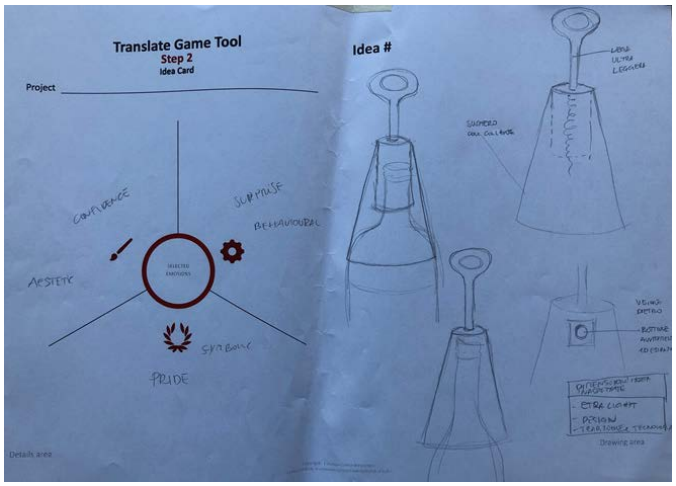


Figure 6.28. Defining the process, study 2. Idea 5 of group 1.

Idea 5 of group 1 presents a corkscrew that can stands in the body of the bottle when opening it. The handle is thought to be ultralight with a combination of wood and metal materials. The corkscrew is designed to be the cap of the bottle after it has been opened and be placed in the table all the time.

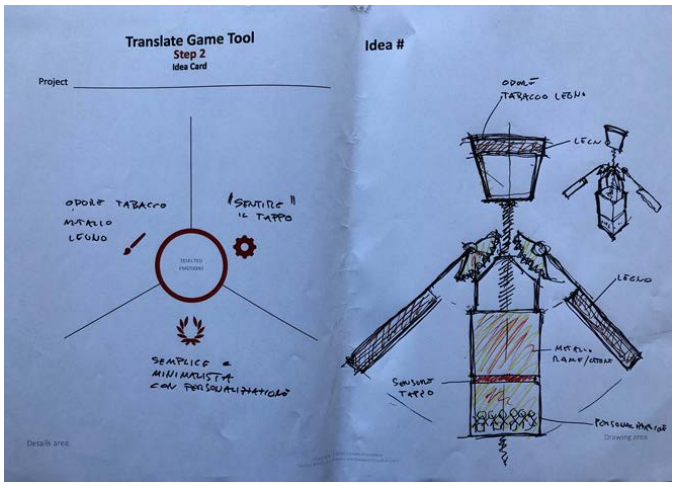


Figure 6.29. Defining the process, study 2. Idea 6 of group 1.

Even the design of the corkscrew is designed to have a tobacco smell. It is made of wood and metal materials. At the moment of using the corkscrew, it allows the user to feel the cork coming out. This corkscrew also can be personalized by the customer.

Idea	Human-product emotional interactions of ideas of group 1		
	Aesthetic	**Behavioural**	**Symbolic**
1	Metal materials Minimalist design	Slow movements when opening the bottle	Minimalist design
2	Wood and metal materials	Detects the quality of the wine	Limited edition Symbolizing a tree
3	Soft materials to touch	Electrical corkscrew Gives information about the wine through digital technology	It permits to be personalized by the customer with a symbol or sign.
4	It stands in the body of the bottle	It can be operated with one hand It does not make sound when opening the bottle	It can be personalized
5	Ultralight Wood and metal materials	It stands in the body of the bottle when opening it	The corkscrew is designed to be the cap of the bottle after it has been opened and be present in the table all the time.
6	Tobacco smell Wood and metal materials	It permits to the user feels the cork come out	It can be personalized

Table 6.8. Details related to the human–product emotional interactions of ideas of group 1.

Next, are explained the ideas generated by group 2 and table 5.9 displays the details related to the Human–product emotional Interactions of every idea created by group 2.

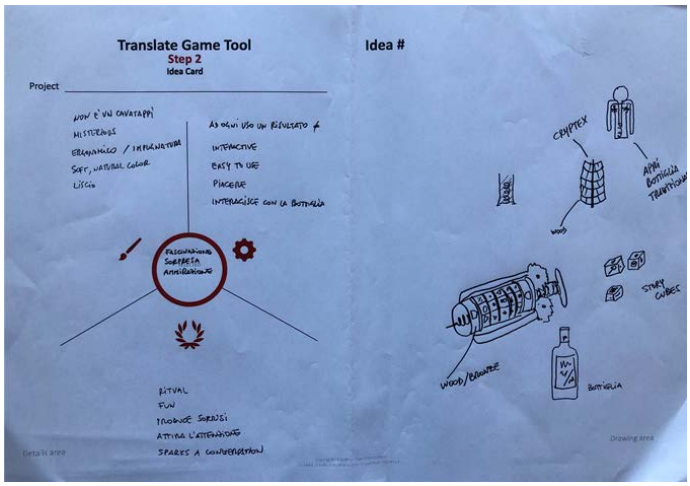


Figure 6.30. Defining the process, study 2. Idea 1 of group 2.

The idea one of group two presents a corkscrew that at first glance does not look like a corkscrew. It is designed as a cryptex[13] and in order to operate it (to open the bottle), the user and the guest(s) can play to find the combination to unlock the cryptex. The materials of this corkscrew are wood and bronze.

[13] A cryptex is defined as a portable vault used to hide secret messages.

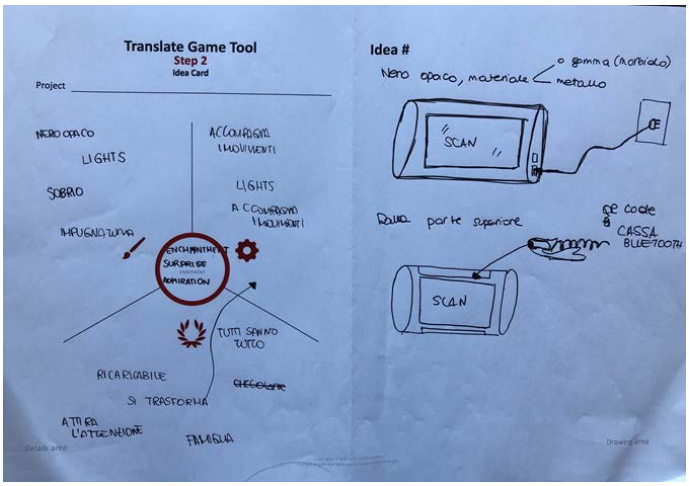


Figure 6.31. Defining the process, study 2. Idea 2 of group 2.

Idea 2 of group 2 presents an electric corkscrew that can be operated with one hand. It is designed with matt black colours and soft materials to touch. After opening the bottle, the corkscrew scans the wine and gives some information about it; pursuing to trigger a conversation with the information given and to call the attention of the people around.

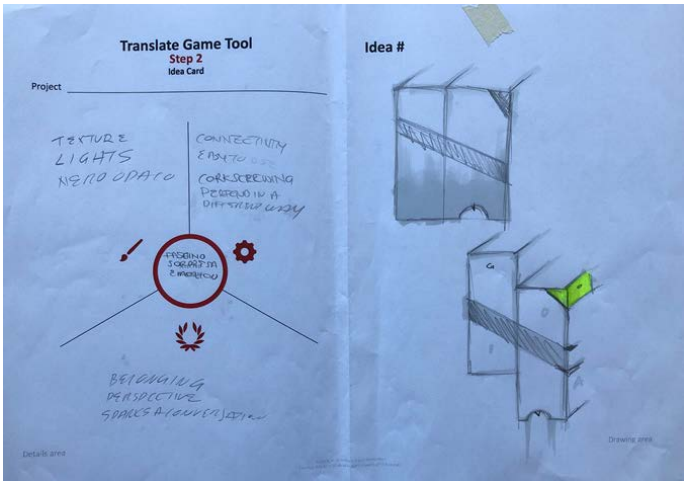


Figure 6.32. Defining the process, study 2. Idea 3 of group 2.

Idea 3 of group 2 presents a very unconventional form for a corkscrew; it is an electrical corkscrew and its configuration is composed of two rectangular blocks. In order to open the bottle, the two blocks must be joined, and it should be operated by two persons.

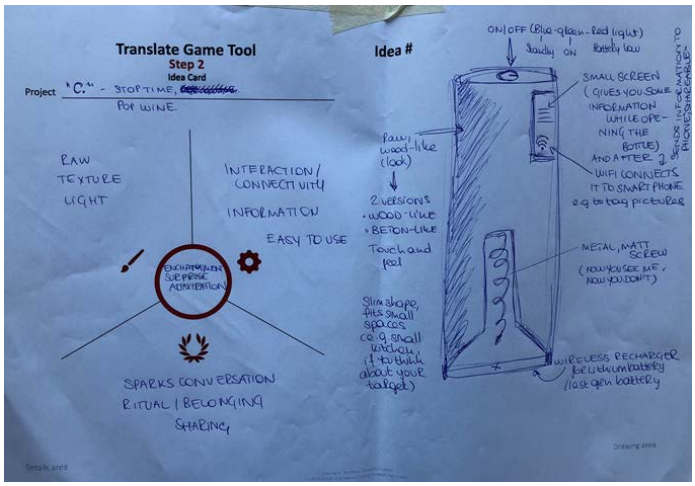


Figure 6.33. Defining the process, study 2. Idea 4 of group 2.

The idea 4 of group 2 represents a corkscrew made in raw materials but combined with technology. It is an electrical corkscrew that can be connected to a smartphone and your social networks to identify the photos of the event where the bottle of wine was open.

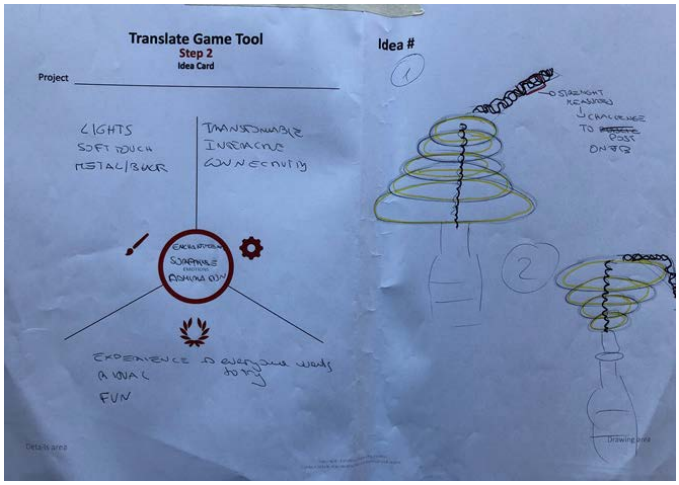


Figure 6.34. Defining the process, study 2. Idea 5 of group 2.

Idea 5 of group 2 expresses a corkscrew with spiral shape; the spiral is the continuation of the screw that goes inside the bottle. The materials proposed are light and soft to touch but strong enough to pull out the cork. The user can feel and see the screw going inside the bottle. The unconventional shape is thought to call the attention of the guests of the event and motivate them to open the bottle.

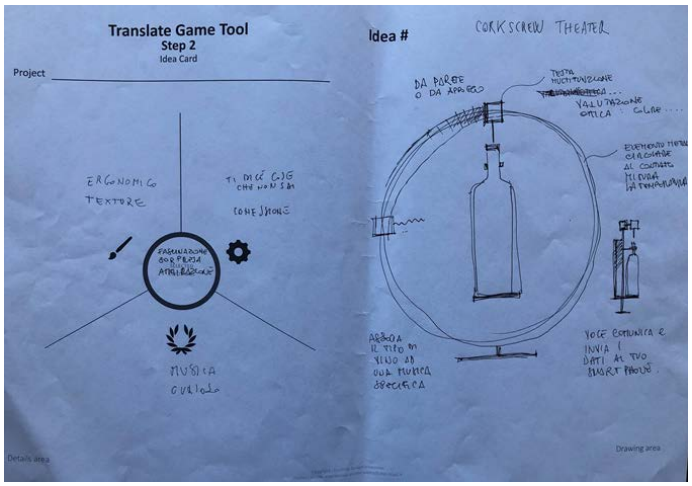


Figure 6.35. Defining the process, study 2. Idea 6 of group 2.

The idea six of group 2 presents a self-stand corkscrew with a ring as the principal element of its configuration. The bottle is placed in the centre of the ring when opening it; turning the bottle into the centre of the event. The corkscrew identifies the type of wine and plays music according to it to stimulate an enjoyable moment for the user and guest(s).

Idea	Human-product emotional interactions of ideas of group 2		
	Aesthetic	Behavioural	Symbolic
1	It does not look like a corkscrew Wood and bronze materials	It is designed as a cryptex	The user and the guests can play to find the combination lock to open the bottle
2	Matt black colours Soft materials to touch	It can be operated with one hand It scans the wine and gives some information about it to the user	It pretends to triggers a conversation with the information given
3	It is composed by two rectangular blocks	In order to open the bottle, the two blocks must be joined.	It is designed to be operated by two persons.
4	Raw materials	It is an electrical corkscrew that can be connected to a smartphone and your social networks.	It can identify the photos of the event where the bottle of wine was open.
5	Spiral shape Light but strong material	The user can feel and see the screw going inside the bottle	It pretends to call the attention of the guests of the event and motivate them to open the bottle.
6	It is a self-stand corkscrew with a ring as principal element	The bottle is placed in the centre of the ring when opening it	The corkscrew identifies the type of the wine and plays a music according to it, to stimulate an enjoyable moment for the user and guest(s)

Table 6.9. Details related the human–product emotional interactions of ideas of group 2.

Conclusions of study 2

The five methods of Emotion-Driven Innovation have been confirmed to have a solid design to facilitate the development of emotional granularity, support strategic decisions when defining the emotional intentions of the new product, and to stimulate creative thinking to generate strong emotion-focused ideas. However, as in the previous workshop, one of the limitations of the application is the lack of time to execute the idea generation activity.

In the feedback at the end of the workshop, one participant mentioned that must of the time he works alone and was concerned about working in team for the workshop. But he felt that the different types of participation during the workshop (individual, in pairs and in team) make him felt confident to collaborate with others and be receptive to hear the opinions or ideas of others.

No modifications were identified to be made to. A third study was performed to corroborate the definition of E-DI process.

6.1.3. Definition E-DI process – study 3

The workshop of study 3 had the participation of the four following professionals: a product designer, a commercial communication expert, a marketing consultant and an art director. Below, the outcomes of the application of Emotion-Driven Innovation process are presented.

Direct observation and participants feedback

It has been confirmed the value of Learning Game method mostly the emotional-jobs-to-be-done. Participants mentioned that the statements were useful to first learn about the 19 positive emotions; then to discern their emotional experiences caused by any stimulus; and to identify the emotional experiences caused by products.

Regarding Dots Game method, in the combination of the individual results of the analysis, participants noticed that some of the emotions had the same rate; this circumstance did not affect the selection of the emotions due to participants selected the never experienced emotions of the radical innovation spectrum. However, this situation uncovered the need to modify the guidelines of Dots Game method in order to avoid getting emotions with the same value and to facilitate a clear selection of emotions.

Also, in the application of Dots Game method participants stated that to perform individually the emotional analysis of products already developed introduced them into a reflective moment. Participants mentioned that those corkscrews are very well known in Italy, but performing the emotional analysis aroused a question in the participants, what does each of the products represent to them?

In the Filter Game method after selecting the emotions, the same question came out again, what will the new product represent for the team? And what will the new product represent for the user? Participants had exchanged opinions until all members of the team understood the selected emotions in the same way. The conversation around the table also was about what the emotions signify to the team and what was the relationship with the category of innovation.

Figure 6.36. Participants of study 3, using Learning Game cards.

It was observed that the elaboration of the brief was achieved without complications. This fact was confirmed by the participants, not clarifications were needed, and participants mentioned it was an easy and enjoyable activity since the team has discussed the meaning of the selected emotions before.

In respect to the generation of details (step 1) and the creation of idea (step 2) of Translate Game method, participants required more time to articulate characteristics related to the symbolic interactions. During the semi-structured interview participants commented that to think on the attributes of the product (either tangible or intangible) is a complex activity, since it requires to dramatize how the product will help (in this case) to have or improve a moment of conviviality between people (see Table 6.10); it is to visualize the product beyond its practical utility. In the evaluation of ideas (step 3) participants just presented the ideas, but the evaluation was not performed due lack of time.

Outputs of worksheets

Figure 6.37 presents the panorama of emotions created in study 3, showing that the emotions enchantment, inspiration, pride and kindness, were the never experienced emotions in the emotional analysis. Table 6.10 displays the results of Filter, Transform and step 2 of Translate Game method. The ideas generated in study 3 are presented afterwards.

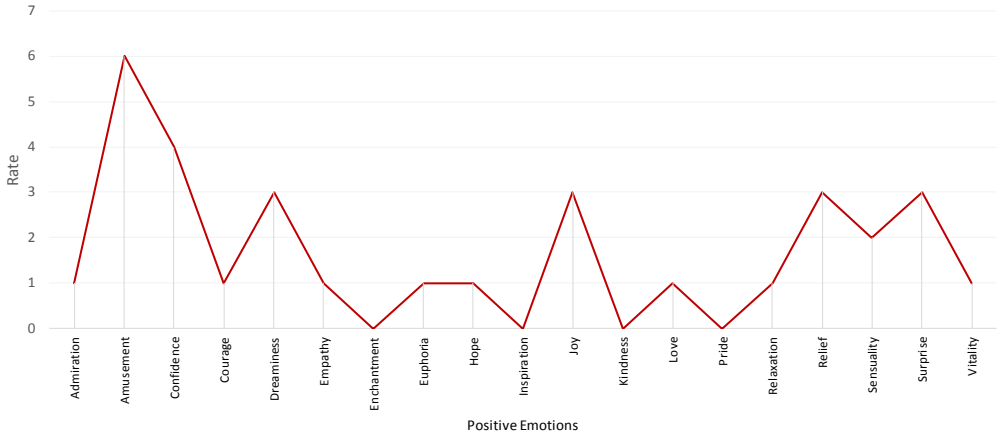


Figure 6.37. Panorama of emotions of corkscrews created in study 3.

Results of:	Group 1				
Filter Game	Positive emotions selected				
	Enchantment, Pride, Inspiration, and Kindness				
	Emotion from Radical Innovation				
Transform Game method	The selected emotions on the Human–Product Emotional Interactions				
	Aesthetic		Behavioural		Symbolic
	Kindness		Inspiration		Pride
	Enchantment		Kindness		Inspiration
			Pride		
	Perceived by the following senses of the human body:	To provoke the positive emotion of:	At the following time:	To provoke the positive emotion of:	Symbolising
	Touch	Kindness	Before using it	Inspiration	Conviviality
	Sight	Enchantment	While using it	Kindness	
			After using it	Pride	
Translate Game method	Details written in step 1				
	Sinuous shapes		Simplification of the final gesture (remove the cap)		Aphorism on wine
	Organic form		Low effort required in use		Inciting conversations
	Soft lines		Simple and elegant movements		Ornament object
	Neutral colours		Do not remove the cap to place it on the “Freestanding” table		Celebrate a friends, family or love reunion
	Warm touch				
	Impeccability sound on the mechanism		Bottle counter		
	Transparent packaging				

Table 6.10. Defining the process, study 3 - results of Filter, Transform and Translate Game methods.

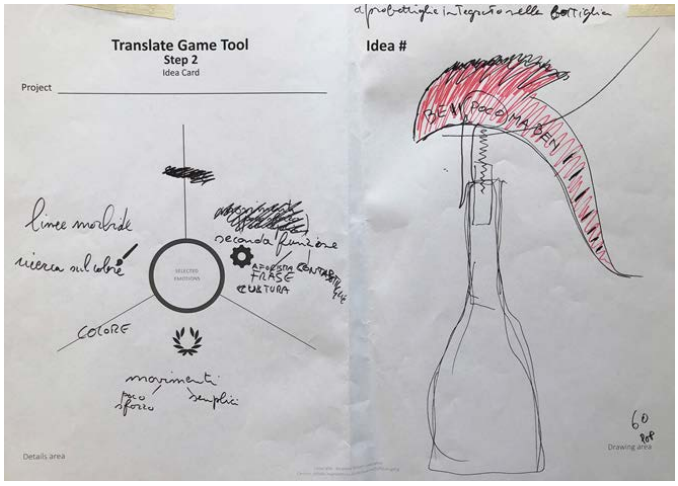


Figure 6.38. Defining the process, study 3. Idea 1.

The idea number 1 it is a corkscrew with bright colour, organic shape, and soft material to provoke tenderness to the touch. The organic shape helps the user to pull out the cork without effort. The body of the corkscrew conveys a message aimed to trigger a conversation between the people that are sharing the wine.

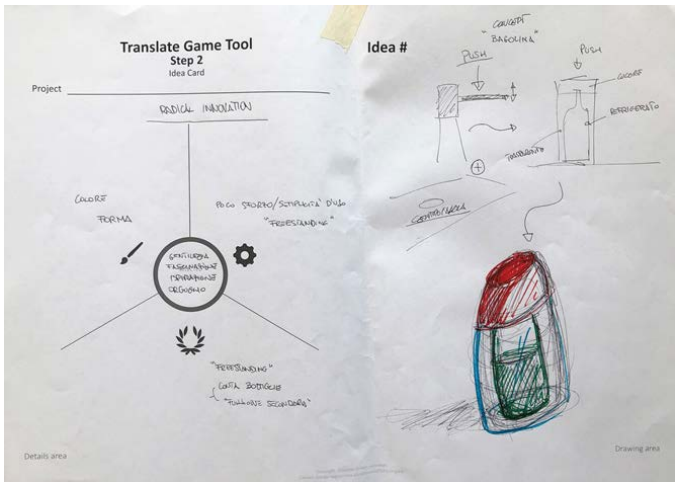


Figure 6.39. Defining the process, study 3. Idea 2.

The second idea presents a self-stand corkscrew which covers entirely the bottle, and in order to pull out the cork, the user needs to press the top part of the corkscrew. The top part of the corkscrew hides the mechanism and has bright colours to intensify the action of pressing; the bottom part is transparent to allow the bottle of wine to be the object of the attention.

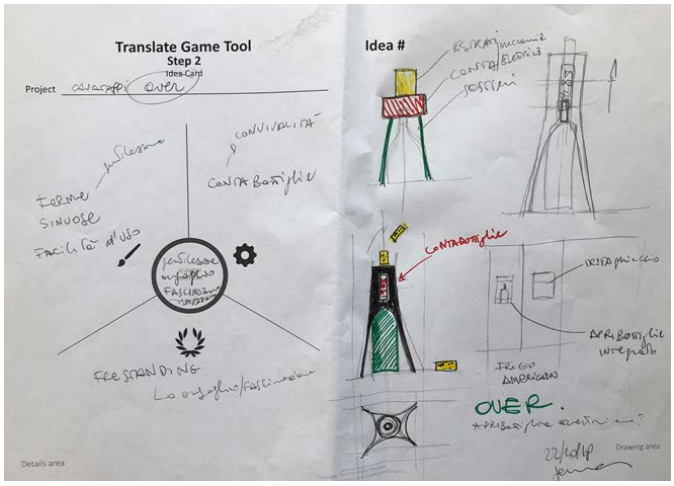


Figure 6.40. Definingthe process, study 3. Idea 3.

The idea number 3 is also a self-stand corkscrew. The corkscrew has a mechanism that counts the bottles it has opened; it is aimed to stimulate the user to celebrate every bottle opening. The physical configuration of the corkscrew is a combination of bright colour and strong structure.

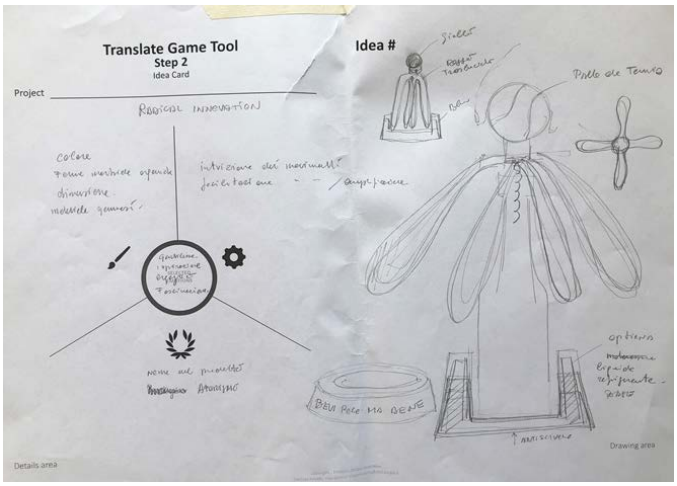


Figure 6.41. Defining the process, study 3. Idea 4.

The corkscrew of idea number four is an object of two pieces; a bottom piece to set the bottle that expresses a message; and the top piece that has the mechanism to open the bottle of wine. The corkscrew works with a humble movement of rotation, which elevates a handle that should be press in order to take the cork out. The two pieces integrated with the bottle of wine, pretend to be a piece of ornament while the people are drinking the wine.

Conclusion of study 3

The third study revealed that participants had different moments of reflective thinking. Prior to (or in order to) identify their emotional reactions participants were questioning themselves what the presented products represented to them, in order to identify what the product makes them feel. The same reflective thinking aroused in the Filter Game method after participants selected the emotions, what does the new product will represent to people and how does the new product will make feel people. The third phase of the process (idea generation) represented a challenge to the team, especially to formulate details to target the objective in the symbolic interaction. Participants mentioned that his circumstances did not represent an obstacle, but on the contrary, it was stimulating to identify one's own emotions and to use this reasoning to make decisions or find inspiration.

The Dots Game method, so far, has been useful to understand own and other's emotional reactions in relation to specific sample of products, to compare emotional experiences and to create the panorama of emotions in a simple and uncomplicated way. However, the workshop revealed the need to apply modifications to the guidelines in order to avoid getting the same rate in the positive emotions and to facilitate clear decisions when selecting the emotions.

This modification will be shown in the coming section, where the final version of Emotion-Driven Innovation process is presented.

6.1.4. Consolidating E-DI process – General conclusions to define the final version of the E-DI process

The professional experience acquired increases the designer's creativity (Christiaans, 1992). This suggests that the difference of experience plays a role to identify the advantages or limitations when using any design method. This situation has been confirmed in the last field studies.

The main feedback gained in the process development phase (Chapter 5) with novice designers was focused on evolving and refining the guidelines, visual design of tools and the time of execution of the five methods of E-DI. While the feedback gained in the validation of the process with experienced people in creative areas raised concerns in different aspects of the process, such as the categories of innovation or how participants felt executing the different methods of the process. The qualitative information gained in the three studies was categorised in two elements: 1) the phases of the process and 2) the outcome of the process.

Achieving the objectives of every phase

The application of Dots Game method in the first study some participants (3 out of 11) expressed that they felt the need to hear the emotional experiences of the other participants in order to perform the emotional analysis in Dots Game method. We comprehended better this fact in the second study, where participants emerged with questions to themselves about what is the perceived value that the presented products have for them, to be able to identify what the product makes them feel. It is recognizable, that Dots Game method stimulates reflective thinking. However, in order to ensure genuine participations, the guidelines and the way to facilitate the tools to the participants were modified.

Even though Filter Game method had demonstrated to be useful to define the emotional objectives for the new product, the first study showed that the method lacked orientation if the design team decides to select emotions that lie within the spectra of radical and incremental innovation. To this situation, the concept of MAYA design principle was added to the method.

The testing sessions to define the process uncover that the Translate Game method allows itemising selected emotions in the product design as much as the design team desires. This sort of flexibility allows the design team to structure thoughts regarding the new product idea.

It was confirmed in the three studies that the last phase of the process (idea generation) lacked time to allow participants express all the attributes of the ideas in the boards, especially those regarding the symbolic interaction.

Supporting emotion-focused idea generation

The application of the five methods revealed and demonstrated that behind the generation of the new product ideas, there is strong reflective thinking. The participants emerged and answered questions regarding the perceived value that the products have for them, including the sample of products used

to perform the emotional analysis in the early phase of the process and the new product idea. Reflective thinking was always linked to the emotional effects that the perceived value of a product can have for a person.

The formulation of new ideas was based not only to address the emotional intentions in how the product will perform its function or how the product will look; special attention was paid to the product attributes related to the symbolic interaction.

			+	-
Achieving the objectives of every phase	Feasibility Utility Usability	Objective 1: create a panorama of emotions to work with	The panorama of emotions was useful visual element to support the selection of emotions.	Some participants have difficulties to perform the emotional analysis individually.
			Emotional jobs statements were considered clear objectives when designing a product to provoke intended emotions.	The guidelines of Dots Game method can permit results of emotions with same number of rate. This circumstance can be an obstacle when selecting the emotions.
			The combination of the emotional analysis stimulated discussions of emotional experiences towards objects.	
			Dots Game method, stimulate reflective thinking; participants questioning themselves what the analysed products represent to them in order to identity the positive emotion.	
		Objective 2: define the emotional intentions of the new product	The concepts of radical and incremental innovation are useful to define the emotional intentions of the new product.	Filter Game method lacks information to guide the team in case the decision will be to select emotions that lie between radical and incremental innovation.
			In the application of Transform Game method teams completed the product design brief without needing to clarify indications and in the scheduled time.	
			The Filter Game method method provides good support to define directions for the new product.	
			Filter Game method made feel participants challenged and engaged with the process.	
			Transform Game method permits flexibility to itemize the emotional intentions as much as participants desired.	
		Objective 3: translate emotional intentions in new product idea	Translate game method stimulates participant's imagination and focused their creative thinking.	Lack of time to generate the idea
			The generation of ideas is considered effortless activity, due to all discussions made previously, and the feel of engagement with the process.	Participants required more time to generate product characteristics regarding to the symbolic interaction.
Supporting emotion focused idea generation		Utility	The created ideas go beyond the utility of the product.	
			In order to identify the emotional experience, E-DI process raised the question, what the product represents? and before to generate the new product ideas, what will the new product represent to people?. This circumstance stimulated deep reflection when performing the emotional analysis, when selection the positive emotions and when generating the new product ideas.	
			The new product ideas pursuing radical innovation are bolder ideas.	

Table 6.11. Synthesis of the results of the field studies.

6.1.5. E-DI process – the configuration for real design practices.

The results of the three field studies were used to define at "micro-level" the methods of the E-DI process to be applicable to in real design practice. The "micro-level" definition refers to apply modifications to the guidelines and the time of execution of the methods, in order to ensure that the methods will deliver the same benefits regardless of the different design teams to which the methods can be applied.

The application of the five methods, both in process development and process validation tests was carried out in a 4 hours' time, however, we decided to extend the time of the application of the five methods, to facilitate reflective and creative thinking, to enhance the exchange of opinions, and express the new product ideas. In the coming section, it is presented the final version of the five methods of E-DI process.

General upgrades

The time of execution of the workshop is defined in 7 hours' time divided in two days. There are two activities to perform before the workshop began; the first one concerns to Learning Game method, while the second one is related to the Dots Game method.

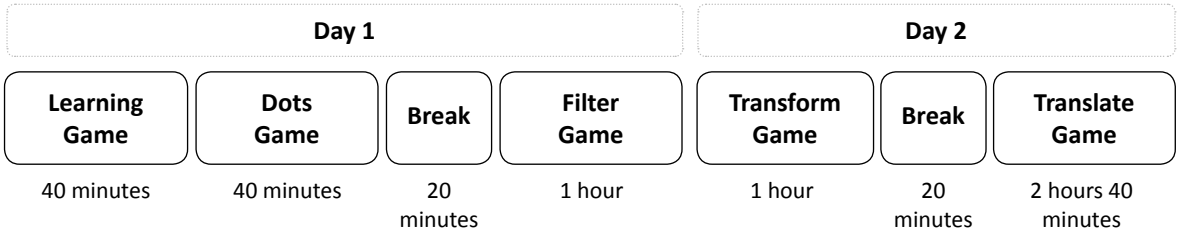


Figure 6.42. Distribution of the time of execution of the five methods of E-DI process.

Learning Game method

The tool

The emotion cards remained as they were presented in Chapter 4. The human–product emotional interactions are settled in an A4 format, as they were presented in Chapter 5 after the last study.

The guidelines

The indications to apply Learning Game method remained as they were established in the creation of the process. The activities 'Encounter the cards' and 'Share understanding' must be performed before the workshop. Both options of activity 'Prepare to create' must be performed in the workshop. See chapter 3 to recall the indications of the mentioned activities.

Figure 6.43. Learning Game card - Dreaminess.

Dots Game method

The tool

There are two matrix boards, one for every member of the team and one to combine the results of the emotional analysis of the entire team.

The guidelines

There were defined two options to use Dots Game method: 1) 'with dots' when is possible to apply the Dots Game method to more than 20 persons; 2) 'rating the dots' when the emotional analysis is performed for a short number of people.

Step 1: Identify the sample of products

In team select the products to analyse. The selection of the products depends on the strategic objective of the innovation project in which the E-DI process is performed. It is recommended to make the selection of the products before the workshop day.

Step 2: Reflect

Read carefully the definitions of the emotions and the emotional jobs to be done.

Step 3: Identify (Option 1 'with dots')

Using the individual matrix board of Dots Game method every member of the team has a maximum of 3 dots for every product. Every person must identify the emotions that the product makes to them experience and give a dot to the identified emotion(s). If the product does not elicit any emotion, the participant can report the null emotional reaction by given no dots to the product.

Step 3: Identify (Option 2 'rating the dots')

Using the individual matrix board of Dots Game method every member of the team has a maximum of three dots for every product. Every person must identify the emotions that the product makes to them experience and give a dot to the identified emotion(s). After identifying the emotions, the participant must indicate how strongly she or he has experienced the emotions by given a number from 1 to 3

(understanding 3 as the highest experience). If the participant only identifies 2 emotions the highest number will be 2.

Step 4: Count and combine (Option 1 'with dots')

Every member of the team has to count the dots for every emotion and combine the results in the matrix board of the team of Dots Game method.

Step 4: Count and combine (Option 2 'rating the dots')

Every member of the team must sum up the numbers that he or she has given to each emotion. The team must combine the individual results in the matrix board of the team.

Step 5: Exchange opinions

Every member of the team is invited to share their emotional experiences with the team and to express an opinion about the final results of the emotional analysis.

Note

The emotional analysis of the sample of products can be performed by a public audience if the team desires to have a robust analysis. However, the individual results must be combined to create one panorama of emotions.

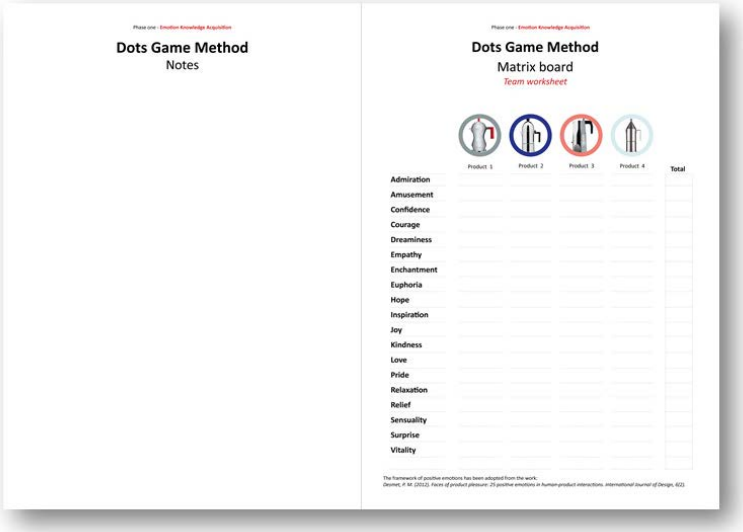


Figure 6.44. Dots Game method - tool.

Filter Game method

The tool

The circular board of Filter Game method has remained unchanged since study 1 of the validation process; where it was integrated the MAYA design principle to support the selection of emotions that are positioned between the incremental and radical innovation. The tool is designed only to work on a team.

The guidelines

Step 1: Place the emotions

The positive emotions must be placed according to the clock movement and starting from the most experienced emotion from the results of Dots Game method. The most experienced emotion must be placed in the first superior right place of the circular board.

Step 2: Visualize to discuss

Visualize the correlation of the results of the Dots Game method with the categories of innovation (Incremental, radical, and MAYA).

All members of the team are invited to discuss what will be the convenient direction in the market for the new product: to select the most frequent emotions and generate new product ideas to pursue incremental innovation; to select the most infrequent emotions and generate new product ideas to pursue radical innovation; or, to select the emotions that represent the mean of how the emotions are experienced and generate new product ideas to pursue MAYA design principle.

Step 3: Select and write the emotions

After selecting the convenient direction in the market (radical innovation, or incremental innovation, or MAYA), the team can select from 1 to 3 emotions; the selection of the emotions must be part of the same category of innovation and must be emotions that are placed sequentially together.

The team can write the selected emotions in the red circle of the circular board of Filter Game method. All members of the team are invited to express their opinion about the decision made.

Step 4: Discuss to share the same understanding

All members of the team must express what they understand each of one of the selected emotions. The entire team must exchange opinions until the team understands the emotions with the same understanding.

Figure 6.45. Filter Game method - tool.

Transform Game method

The tool

The structure and visual design of the board to elaborate the product design brief has remained unchanged since study 3 of process development, presented in Chapter 5.

The guidelines

Step 1: The emotions

In the red circle of the board write the emotions selected in the Filter Game method.

Step 2: The emotions in the human–product emotional Interactions

Place the selected emotions in the three situations of the human–product emotional Interactions. The team is invited to reflect when and why it is convenient to provoke the selected emotions.

Step 3: The emotional intentions in aesthetic interaction

The emotional impact in aesthetic interaction occurs when any of the senses of the human body perceive the product.

Step 4: The emotional intentions in behavioural interaction

The team is invited to Imagine when the product is being used; the user gives actions to the product performs its function (like to press a button) and the product reacts by executing its function. The emotional impact occurs through the specific characteristics of the product at communicating and executing its function.

The emotional impact in behavioural interaction could be trigger while the users starts to prepare the product to be used; the emotional impact can change or increase when the user is using the product to perform the function for what it was designed for; and the emotional impact, also, could be after the product has performed its main function.

Step 5: The emotional intentions in Symbolic interaction

The team is invited to think in all the attributes of the product (tangible or intangible) that will be related to the product like (price, logo, advertising, history, designer of the product, package, materials, etc.). The set of attributes related to the product could represent something significant to a person. The emotional impact in symbolic interaction occurs the attribute(s) of the product represent something to people, like a value, an idea, a belief a quality, a concept, etc.

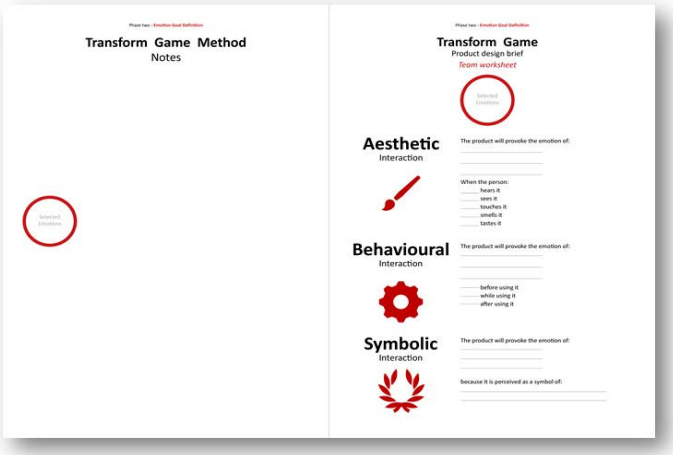


Figure 6.46. Transform Game method - tool.

Transform Game method

The tool

The structure and visual design of the boards to generate details for the new ideas, to create the ideas, and to validate the ideas have remained unchanged since study 3 of process development, presented in chapter 5.

The guidelines

Step 1: Generation of details (45 minutes)

Members of the team must work individually. The generation of details is based on the human–product emotional Interactions correspondingly with the product design brief created before.

The team is invited to focus their creative thinking in the human–product emotional interactions separately, by generating details first in the aesthetic interaction, then behavioral interaction, and finally to the symbolic Interaction. The team has 15 minutes to generate details in each interaction.

Step 2: Creation of Ideas (1 hora and 15 minutes)

The new ideas arise from the collection of details generated before. Members of the team must take the details generated in the previous step as the main input to generate new ideas.

Every person is invited to generate one idea individually.

Step 3: Selection of Ideas (40 minutes)

It is the assessment of the ideas supported by the product design brief created in the previous phase (Emotion Goal Definition). The indications to evaluate the ideas are very simple and are presented below:

- Set the ideas in a place that all members of the team can see them,
- Give a number to every idea,
- Every idea must be presented and explained to the team by the creator of the idea,
- In order to evaluate, every person must give a dot to the human–product emotional, interaction that the evaluator considers that the idea achieve the best,
- Count the dots and select the idea(s) that address the best the emotional intentions.

The following sections present the additional studies carried out after E-DI process has been evaluate.

6.2. Comparing E-DI process

This section presents a field study, in which E-DI process was compared with a contemporary design process in order to identify the factors that differentiate the it. We decided to compare the E-DI process with the design thinking process.

Through the field studies carried out both in the process development and process validation phases, we now can state that Emotion-Driven Innovation process is focused on generating few, but, strong new products ideas with enough characteristics that are based on a deep reflection on the meaning of specific emotions to achieve specific emotional effects. E-DI process stimulates the generation of new product ideas based on the skills, expertise, and crucially on the emotions of the people involved in the process. This condition defines E-DI process as inside-out process.

Design thinking on its nature is a user-centered approach; the products or services created on design thinking practices are based on continuous communication with users (Kristensson, Gustafsson, and Archer, 2004; Smith, Bossen, and Kanstrup, 2017). The purpose of innovation is driven by understanding the needs of users to generate a large number of ideas, to later identify the most suitable one to solve the problem that was identified before. (Verganti, 2017). This nature of practice has defined design thinking as an outside-in process. The mentioned facts were the major argument that drove the decision to compare E-DI process with design thinking.

Design thinking process has recently gained attention; nowadays it is defined as an approach to deal with different problems in many professions (Dorst, 2011; Kummitha, 2019). The three pillars that define design thinking process are understanding, dreaming, and building (Kummitha, 2019). The understanding pillar refers to the deep analysis of the user the user experience in order to identify the problem to be solved. The dreaming pillar is defined as the stage where the imagination of the design team plays an important role to create ideas for the identified problem. The third pillar consists of two stages, prototyping and presenting. Prototyping develops the ideas until the most suitable solution is found; while presenting is the stage where the customers can enjoy the benefits of the product or service developed (Bauer & Eagen, 2008; Kummitha, 2019).

The comparison study consisted of two sessions: 1) a design thinking process session and 2) an E-DI process session. In order to identify the differentiating factors of the E-DI process, both sessions had the same design assignment and involved the same people. The group of people consisted of an expert in the process of innovation in product development, a service design student, energetic engineer, and a robotics engineer. The selection criteria for these participants was based on configuring a small group of people who have had no experience with any of the processes, to ensure that feedback will not be driven by past experiences with any of the process.

The design thinking session was directed by the design thinking facilitator Serena Leonardi; she has four years of experience as a facilitator of DT and has been working as a user experience designer in an international company. Serena applied design thinking crash course standard procedure (DSchool, 2018).

The two workshops were divided into three sections: 1) the learning section corresponded to the acquisition of knowledge; where the activities of emotion knowledge acquisition phase of E-DI process and the understanding pillar of the design thinking process were carried out. 2) The defining section was concerned to define the objectives for the new product; this section corresponded to the emotional goal definition phase of E-DI process and the definition of the objective in the understanding pillar of DT process. And 3) the ideating section aimed to generate ideas to address the pre-defined objectives; this section held the last phase of E-DI process and the idea generation of the dreaming pillar of DT process.

In the comparison study the usability and utility are the criteria that has been evaluated. The assessment is based on the participants feedback regarding the elements that have facilitated the achievement of the objectives of each phase and the difficulties that have addressed during the application of both processes, and the outcomes (the ideas) generated in the two sessions.

The design assignment for the two sessions was the following:

'Design a new moka pot to provoke positive experiences to the user and/or customer. The new moka pot must provoke positive experiences to the person that is preparing the coffee and/or to the people that is involved in the moment of drinking the coffee'.

<table>
<tr><td>Design assignment</td><td colspan="6">Design a new moka pot to provoke positive experiences to the user and/or customer. The new moka pot must provoke positive experiences to the person that is preparing the coffee and/or to the people that is involved in the moment of drinking the coffee.</td></tr>
<tr><td></td><td colspan="2">Learning</td><td colspan="2">Defining</td><td colspan="2">Ideating</td></tr>
<tr><td rowspan="3">Design Thinking process</td><td>Methods used</td><td>Purpose</td><td>Methods used</td><td>Purpose</td><td>Methods used</td><td>Purpose</td></tr>
<tr><td>Interview for Empathy</td><td>Gain empathy with the user</td><td rowspan="2">Point-of-View</td><td rowspan="2">Define the problem that the user needs to be solved</td><td rowspan="2">Brainstorming</td><td rowspan="2">Generate as many ideas as possible to solve the problem identified</td></tr>
<tr><td>Story Share-and-Capture</td><td>Identify users' needs and wishes</td></tr>
<tr><td rowspan="2">Emotion-Driven Innovation process</td><td>Learning Game</td><td>Introduce vocabulary of E-DI process</td><td>Filter Game</td><td>Select a short list of positive emotions to generate the new product ideas</td><td rowspan="2">Translate Game</td><td rowspan="2">Generate emotion-focused product ideas</td></tr>
<tr><td>Dots Game</td><td>Perform an emotional analysis of existing products in the market</td><td>Transform Game</td><td>Elaborate a product design brief</td></tr>
</table>

Table 6.12. Phases and methods of DT and E-DI sessions.

6.2.1. Outside-in process

The Design Thinking workshop started by introducing the process, the different methods to be applied in the session, and the general objective of the session. After, it was giving the design assignment to the participants. This section presents the outputs of the DT session.

Learning section

In the learning section participants elaborated an interview with the aim to obtain information from the user of the moka. Participants discuss the design assignment to elaborate the questions of the interview. The interview was composed of questions related to the use of the moka (example, how easy it is to clean the moka? and Where the moka is used to prepare the coffee (gas or electric cooker)?), the appearance of the moka (example, which is the preferred size of the moka? And If the user would like to

customize the moka?), also the questions were related to the sales point of the moka. The interview was conducted with 8 people.

The second method (capture findings) was aimed to analyse the answers given by responders and identify in a few sentences with main the insights of the information. From the sample of moka users, it was identified that they need a moka easy to use and most important, easy to clean. The responders did not consider important the brand of the moka, but the quality and the price of it were significant attributes to the responders.

The desires of moka users were linked to what the experience of making and drinking coffee represents to them. The responders stated that the preparation of coffee with moka should represent tradition, home, and passion. In the experience of drinking a coffee the moka is not the most important element, however, the perfume of the coffee, the sound when the coffee is ready, and the taste of the coffee are important elements to create a pleasant experience, and the moka can have a big influence on these three elements.

Defining section

After participants discussed the answers of the moka users, the definition of the problem to solve was the following: to help the moka users to prepare the coffee in a practical way and simplify the cleaning of the mocha; focusing also to help the user to prepare the coffee according to the variety of it, in order to enhance the taste and smell of the coffee.

Ideating section

Considering the defined problem participants created 5 ideas that are explained below.

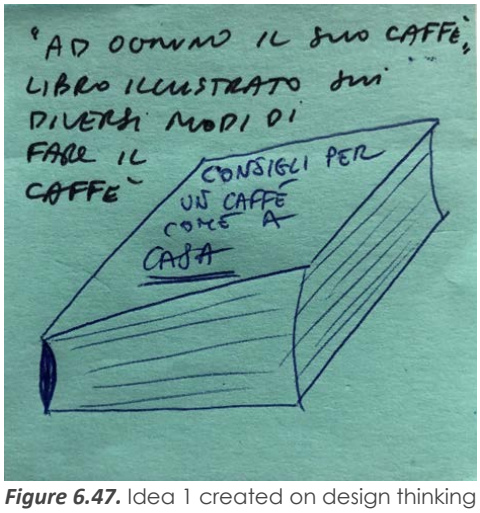


Figure 6.47. Idea 1 created on design thinking session.

The idea 1 was an accessory that can be sold with the moka or individually; it is a book with instructions to prepare different types of coffee with the moka and teach the users of the moka to enhance the flavour of the different varieties of coffee. The different types of coffee are represented by characters in the book (i.e. ristretto, lungo, expresso, etc.).

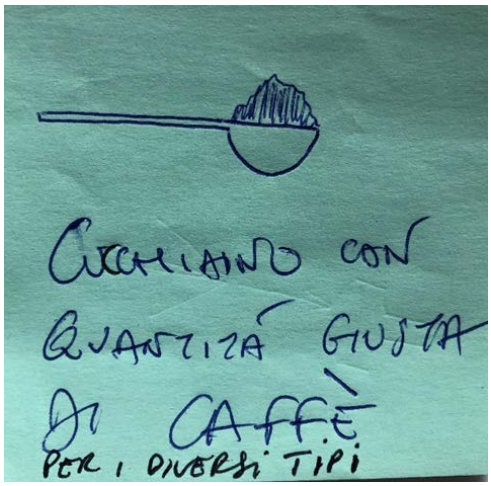


Figure 6.48. Idea 2 created on design thinking session.

The idea 2 is an accessory, that can be included with the moka, or can be sold apart. It is set of spoons to indicate the exact quantity of coffee according to the type of coffee that the user is preparing.

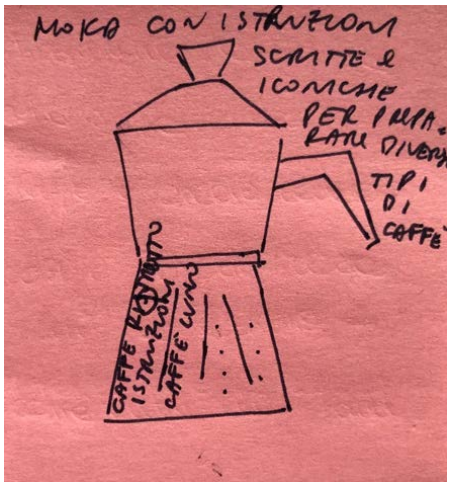


Figure 6.49. Idea 3 created on design thinking session.

The idea number 3 preserves the original shape of the moka, but it includes instructions in the faces of the bottom part of the moka, regarding to the quantity of coffee, water, and time to prepare different types of coffee. The instructions are aimed to teach the user to prepare different types of coffee.

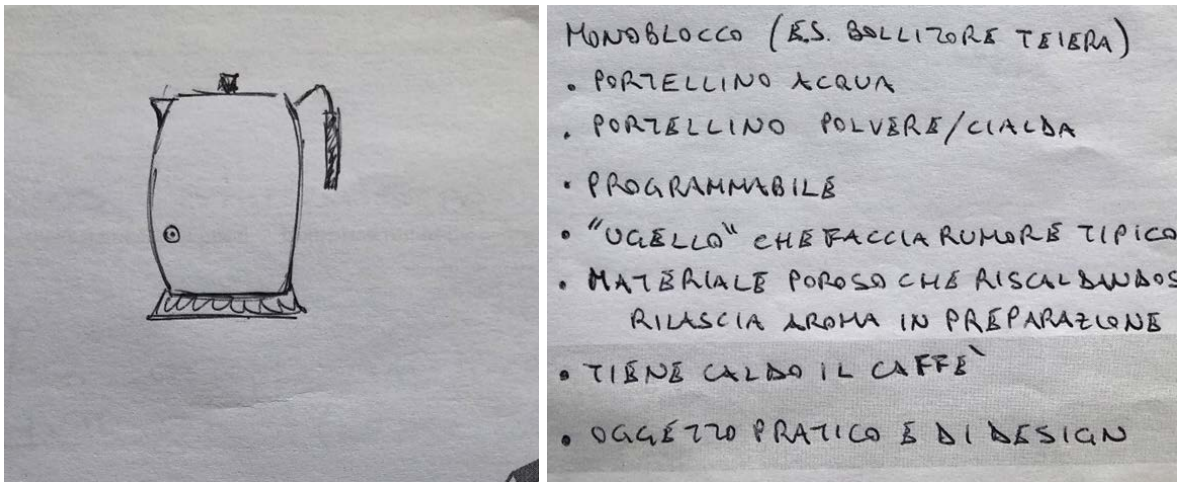


Figure 6.50. Idea 4 created on design thinking session.

The idea 4 presents a moka in a monobloc design; it has space for the water and the coffee. The moka can be used in electric and gas cooker; but also, it can be connected directly to the electricity and program the time that the user wants to enjoy a coffee. The moka, preserves the sound that a traditional moka makes when the coffee is ready. Some parts of the moka are made with a porous material to emanate the perfume of the coffee when it is heating up.

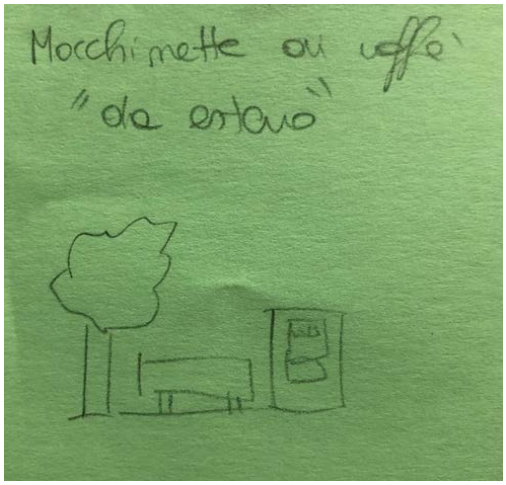


Figure 6.51. Idea 5 created on design thinking session.

The idea 5 is to create a coffee machine for outdoors. The coffee machine is aimed to prepare coffee with the same quality as a coffee made at home, preserving the smell and taste of a coffee prepared in a moka. The coffee machine will be integrated in the environment without subtracting the beauty of the surroundings. The coffee machine will offer a moment of pleasure when enjoying a coffee in an open space.

6.2.2. Inside-out process

After introducing the E-DI process and the objectives of every one of its phases to the participants, it was giving the same design assignment of the workshop.

This section presents the outputs of E-DI session.

Learning section

The section began by performing the three activities of Learning Game (1,2,3). Then, participants perform the emotional analysis of four mokas of Alessi (see figure 6.52). The most often experienced emotions by participants were confidence, enchantment, and inspiration; the less often experienced dreaminess, sensuality and euphoria; and the never experienced were love, relief, empathy and hope. Figure 6.53 presents the panorama of emotions of the sample of mokas.

Figure 6.52. The sample of products presented to perform Dots Game.

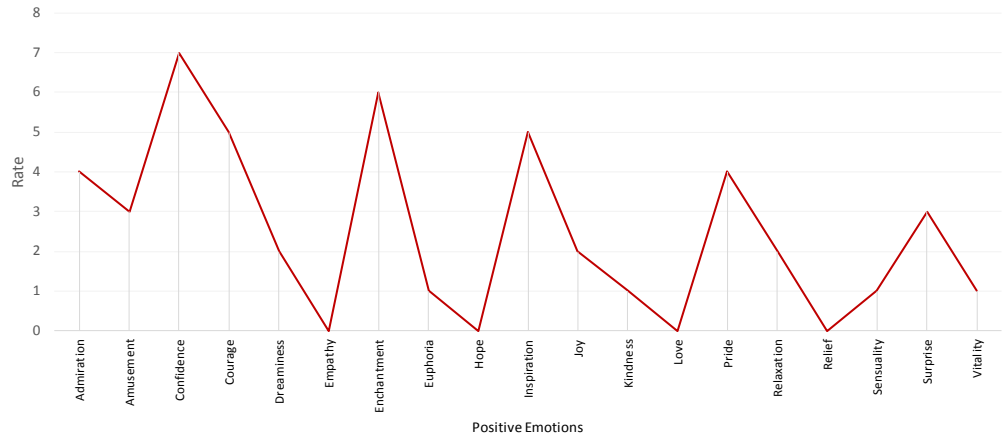


Figure 6.53. Panorama of emotions of Alessi mokas.

Defining section

The team decided to pursue radical innovation; the emotions selected from this spectrum were love, relief, empathy, and hope. The product design brief was elaborated as follows. For aesthetic interaction participants considered important the emotions of hope, empathy, and love; in behavioural interaction the emotions relief before, while and after having used the product, and love and empathy while using the product. In the symbolic interaction participants chose the emotions relief, hope, and empathy to represent the value of sharing.

Ideating section

Through the application of Translate Game method participants generate details (step 1 of Translate Game method) that were used to create the ideas. The generated details are presented in Table 6.13 the ideas created are presented afterwards.

<table>
<tr><td rowspan="3">Filter Game</td><td colspan="5">Positive emotions selected</td></tr>
<tr><td colspan="5">Love, Empathy, Hope, and Relief</td></tr>
<tr><td colspan="5">Emotions from Radical innovation</td></tr>
<tr><td rowspan="11">Transform Game method</td><td colspan="5">The selected emotions on the human–product emotional Interactions</td></tr>
<tr><td colspan="2">Aesthetic</td><td colspan="2">Behavioural</td><td>Symbolic</td></tr>
<tr><td colspan="2">Love</td><td colspan="2">Inspiration</td><td>Pride</td></tr>
<tr><td colspan="2">Empathy</td><td colspan="2">Kindness</td><td>Inspiration</td></tr>
<tr><td colspan="2">Hope</td><td colspan="2">Pride</td><td></td></tr>
<tr><td>Perceived by the following senses of the human body:</td><td>To provoke the positive emotion of:</td><td>At the following time:</td><td>To provoke the positive emotion of:</td><td>Symbolising:</td></tr>
<tr><td>Touch and smell</td><td>Empathy</td><td>Before using it</td><td>Relief</td><td>Sharing</td></tr>
<tr><td>Hearing</td><td>Hope</td><td>While using it</td><td>Relief, Love, and Empathy</td><td rowspan="2"></td></tr>
<tr><td>Sight</td><td>Love</td><td>After using it</td><td>Relief</td></tr>
<tr><td rowspan="11">Translate Game method</td><td colspan="5">Details written in step 1</td></tr>
<tr><td colspan="2">Round shape</td><td colspan="2">At the touch of a button, it does everything</td><td rowspan="2">The moka has a special sign for the customer</td></tr>
<tr><td colspan="2">Traditional shape of moka</td><td colspan="2">The use have to follow simple steps</td></tr>
<tr><td colspan="2">Slick and circular</td><td colspan="2">With timer</td><td rowspan="2">The moka has a message written in a wall</td></tr>
<tr><td colspan="2">For it to work, it needs to feel the fingers of the user</td><td colspan="2" rowspan="2">The moka will communicate to the friends when you are making coffee</td></tr>
<tr><td colspan="2">Opaque material that gives the feeling that the moka is always clean</td><td rowspan="5"></td><td rowspan="3">Marketing based on the placer of sharing a cu of coffee</td></tr>
<tr><td colspan="2">The moka can serve two coffees at the same time</td></tr>
<tr><td colspan="2">The moka will emanate a scent of cafe even without having prepared it</td><td rowspan="3"></td></tr>
<tr><td colspan="2">A packaging that smiles at the moment of purchase</td></tr>
<tr><td colspan="2">Soft rubber handle</td></tr>
</table>

Table 6.13. Results of Filter, Transform, and Translate Game methods.

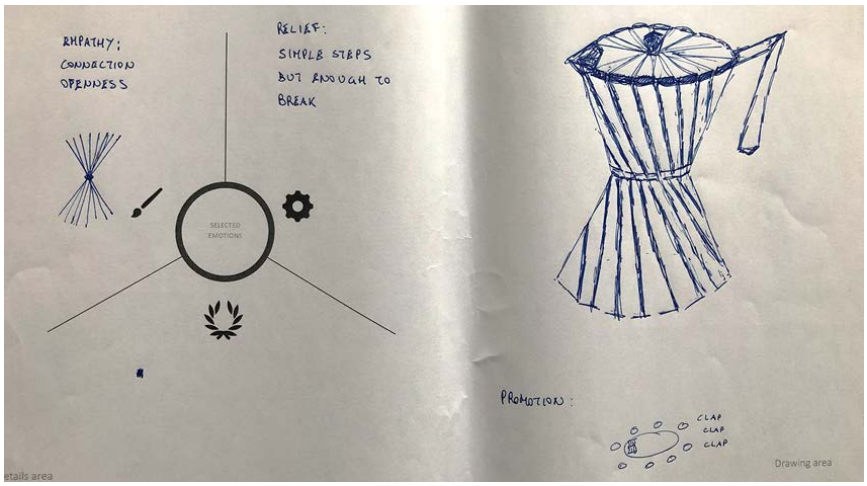


Figure 6.54. Idea 1 created on E-DI session.

The idea 1 preserves the traditional shape of moka. The moka has a mechanism that allows the body of the moka to expand to prepare different amounts of coffee. The mechanism works by rotating the two parts of the moka, this gesture produces a sound that indicates the number of cups of coffee that can be prepared. With this feature the user can prepare coffee for him or her and company if desired.

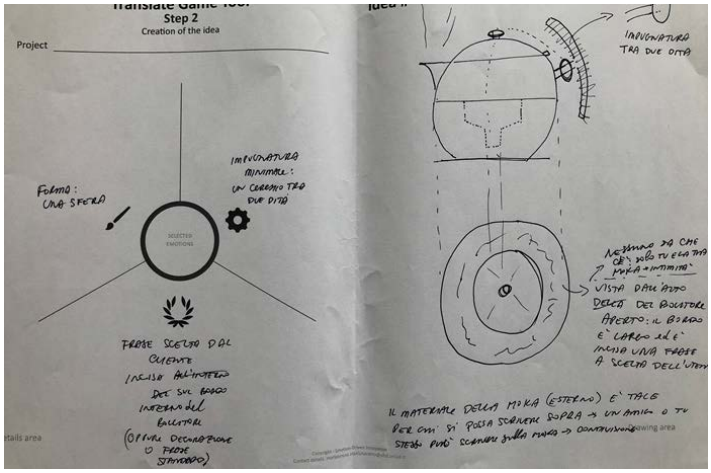


Figure 6.55. Idea 2 created on E-DI session.

Idea 2 presents a moka with a round shape, where the user or friends of the user can write messages to each other. The interior bottom part of the moka can be personalized with a message, only for the direct user, it could be a goal, a message of love, a reminder, etc. The sharing is between the moka that holds a secret message for the user and the user.

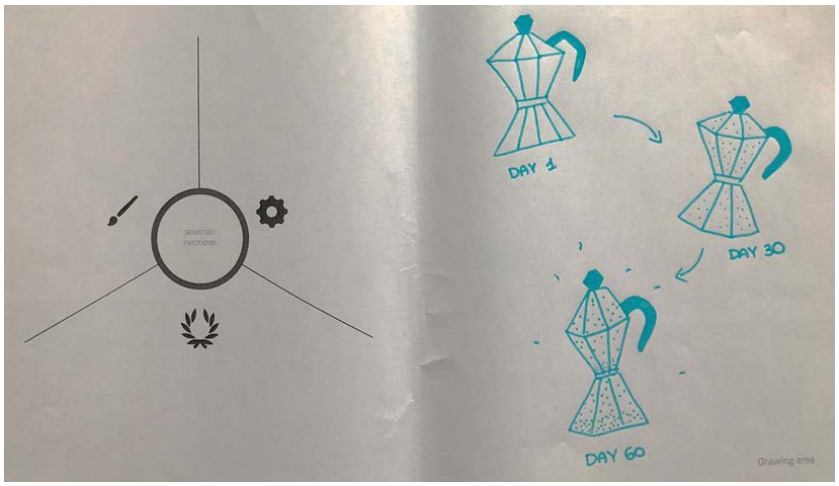


Figure 6.56. Idea 3 created on E-DI session.

The idea number 3 is a moka with the traditional shape and mechanism, however the moka is made with a material that changes over the time. The change of the moka seeks to represent how human bodies change over time. The moka will change as the user will change; as much old the product as much stronger will be the bond with the user. This feature is contrary to the practice of replacing products when they become old. The creator of this idea mention that the value of sharing here is 'sharing time'.

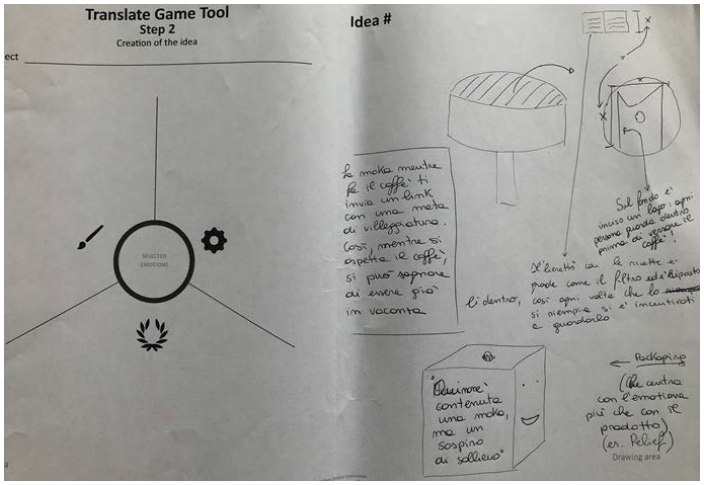


Figure 6.57. Idea 4 created on E-DI session.

Idea 4 is based on details related to the moka. The package of the moka is designed to convey what the experience of drinking coffee could represent (a moment to relax, a key-activity during the day, conviviality, etc.), instead of directly presenting the product. The filter of the moka contents a message to the user, before the user fill the filter with the coffee her o him will read the message that is inside. The message is related to the reason of purchase (a moment to relax, a key-activity during the day, conviviality, etc.) to share the idea of what the coffee drinking experience means to different people.

6.2.3. Comparing the processes

This section presents the feedback given by participants.

Learning section

Regarding DT session participants mentioned that the entire process is easy to learn, understand, and perform. Participants mentioned that the interview was useful and inspiring, since the interviewees provided information that the participants would not have considered important. However, even though the participants fully discussed the design assignment to structure the interview, they did not feel confident about the real effectiveness of the interview. Participants expressed they felt 'lost' during the formulation of the questions, which made them consider that the interview didn't have a strong basis.

In E-DI session participants expressed that to learn each of the nineteen positive emotions was difficult to address in one session. Participants also expressed that analysing the products with their emotions was a very personal interaction, which made them feel immersed and captivated by the process. But at the time of teamwork, personal involvement was lost to a certain degree. Participants mentioned that they enjoyed analysing products from an emotional point of view, and they were pleased to see that the analysis was useful to keep learning about the nineteen positive emotions and to use the information in the following phases of the process.

Defining section

Defining the problem was an easy task for participants due to DT encouraged team members to exchange ideas. The participants commented that it was easy to define the needs and desires of users through dialogue. The participants also commented that although the objectives (needs and desires of the user) of the new product are based on the analysis of the interviews, they were not sure if the needs and desires were the most relevant for the user, since the analysis was based on their professional and personal reasoning.

As far as E-DI is concerned participants felt that the process is more complex to understand at the first attempt. However, participants considered that the relationship of the occurrence of emotions in the product sample with the categories of innovation is a solid strategy of decision.

Ideating section

Participants expressed that due DT is easy to understand and go through the different phases, it did not represent any difficulty to complete the final section, and moreover it was stimulating. Participants also mentioned that as the ideas are very much driven by the needs of the people, they considered the ideas useful to address the needs and desires of the user, but also, they considered the new ideas with a low level of originality.

The participants also mentioned that at the beginning of the session when the design assignment was indicated, they created ideas in their mind. And even though the ideas they generated were based on the user needs, the ideas they had thought at the beginning remained throughout the process and

changed to some degree in the different moments of the session.

The ideas generated in the E-DI session were considered by the participants as being more concrete ideas. The participants mentioned that the complexity of the different sections of the process made them reflect on each of the decisions made during the process. Thanks to the mentioned situation participants did feel committed to the process and in some way curious to see the result.

Even though participants had already generated ideas with the same theme (previous session with DT process) and during the time between the workshops they had conceived other ideas in their minds, participants expressed that the new ideas came out with unexpected details. Participants mentioned that due to fact that the process made them focused on the small list of emotions, set them to think on the situations that they have been experienced the selected emotions, and somehow transpose those experiences into the creation of a new object. Participants considered the ideas created with a higher level of originality.

Participants mentioned that to come out with new ideas of mokas was not easy, due to the moka is an iconic product to Italians. In fact, this situation was verified by analysing the ideas created. Ideas 1 and 2 generated in the DT session are accessories for the moka. Idea 3 is a traditional moka with instructions to teach the user how to prepare different types of coffee and enhance its smell and taste. The idea 4 is a moka that integrates technology, this fact meets the needs and desires of a practical use of the moka, however the moka loses character with new features.

The idea number 5, is a completely different product; the idea meets the needs of the user. However, the moka user may not be attracted by this new product, due to the user indicates that he or she wants to be more practical when cleaning the moka, insinuating that he or she wants to continue brewing his coffee with a moka.

As far as E-DI ideas is concerned the idea 1 preserves the iconic configuration of the moka but integrating a sophisticated mechanism that gives the user the freedom to share the coffee drinking experience if desired. The strong point of idea 2 is the secret message on the wall that joins the two parts of the moka. The message that the user can personalize at the time of purchase, gives meaning to the product and the time the product is used.

Idea number 3 is a moka that maintains both the mechanism and the traditional form of the moka. Idea 3 is characterized by material that changes over time. This product idea represents how the human body changes over time, and the moka accompanies that change 'the moka changes with me' . The older the product the more beautiful it becomes. This feature is intended for the user to create a strong bond with the product and change the habit of replacing objects when they become old.

Idea number 4 could be judged as the weakest. Idea 4 aims to highlight the reason for drinking coffee by integrating a message into the filter and designing a package that conveys the same message.

In conclusion, DT process was easy to understand, learn and perform, and the ideas generated were considered useful to address the identified needs of the user. As for ideas generated with E-DI, the ideas re-interpret the product to give meaning to the product itself and to the use of the product (not because of the utility of the product, but because of what it may represent to use that product). Table 6.14 summarises the main findings of the comparison study.

This section presents a study, in which E.D was compared with a contemporary design process in order to identify the factors that differentiate the E-DI process. We decided to compare the E-DI process with the design thinking process.

	Learning	Defining	Ideating	General outcome
Design Thinking process	The entire process was easy to learn, understand, and perform	DT encouraged team members to exchange ideas.	The generation of ideas was stimulating to participants	Ideas are useful to satisfy the needs and desires of the user
	There was lack of bases for the formulation of the interview	It was easy to define the needs and desires of users through dialogue	The ideas were considered useful to address the most relevant needs and desires of users	
	There was no confidence in the effectiveness of the interview	The definition of needs and desires was influenced by both personal and professional reasoning of the team members.	As the ideas were very much driven by the needs of the people, the new ideas were not considered with a high level of originality	
		The effectiveness of the interview analysis was questioned by participants	The process did not break with the configuration of preconceived ideas	
Emotion-Driven Innovation process	The process was complex to understand	The process has a solid decision-making strategy	The ideas were considered concrete ideas	Ideas are new interpretations of products
	There was a personal involvement with the process	The complexity of the process stimulated the participants to reflect deeply on each of the decisions made during the process	The ideas were considered with a higher level of novelty	
	The participants considered the panorama of emotions as a useful element in decision making		The process broke with the configuration of preconceived ideas	

Table 6.14. Main findings of the comparison study.

6.3. The correlation of the Filter Game and Translate Game methods.

One of the principal concerns that raised in the literature review was the lack of methods supporting the objectives of Goal Definition phase in the front end of innovation; as it is the phase that brings the parameters to formulate the new product ideas. To tackle this matter Filter Game method was created.

Filter Game method was designed to support strategic decisions when selecting positive emotions to design a new product. Previous studies showed that Filter Game method has stimulated decisions based on a deep reflection of what the selection of certain positive emotions can represent in the design process and in the final result "the new product".

The visual design of Filter Game method correlates the results of Dots Game method (how the nineteen positive emotions are experienced in a sample of products) with the category of innovations (incremental and radical innovation, and MAYA design principle). In Filter Game method the selection of the positive emotions is based on selecting the category of innovation that the design team wants to pursue; by selecting the category of innovation, the positive emotions to design the new product are identified.

Filter Game method suggests that the selection of frequent emotions in the emotional analysis of products on the market stimulates ideas aimed at incremental innovation and that the selection of infrequent positive emotions in the emotional analysis stimulates ideas aimed at radical innovation. This clear structure of correlation (positive emotions and categories of innovation) has been the trigger for strategic decisions.

The study presented in this section focused on exploring the relationship between the selection of frequent or infrequent positive emotions (outcome of Filter Game method in the 2nd phase of E-DI) with the level of novelty of the ideas generated based on the pre-selected emotions (outcome of Translate Game method in the f 3rd phase of E-DI). Figure 6.58 presents the structure of the study. We decided to conduct an exploratory study, since it is useful when not enough is know about certain topic and it is valuable in deciding when further research is worthwhile or not (Gray, 2013).

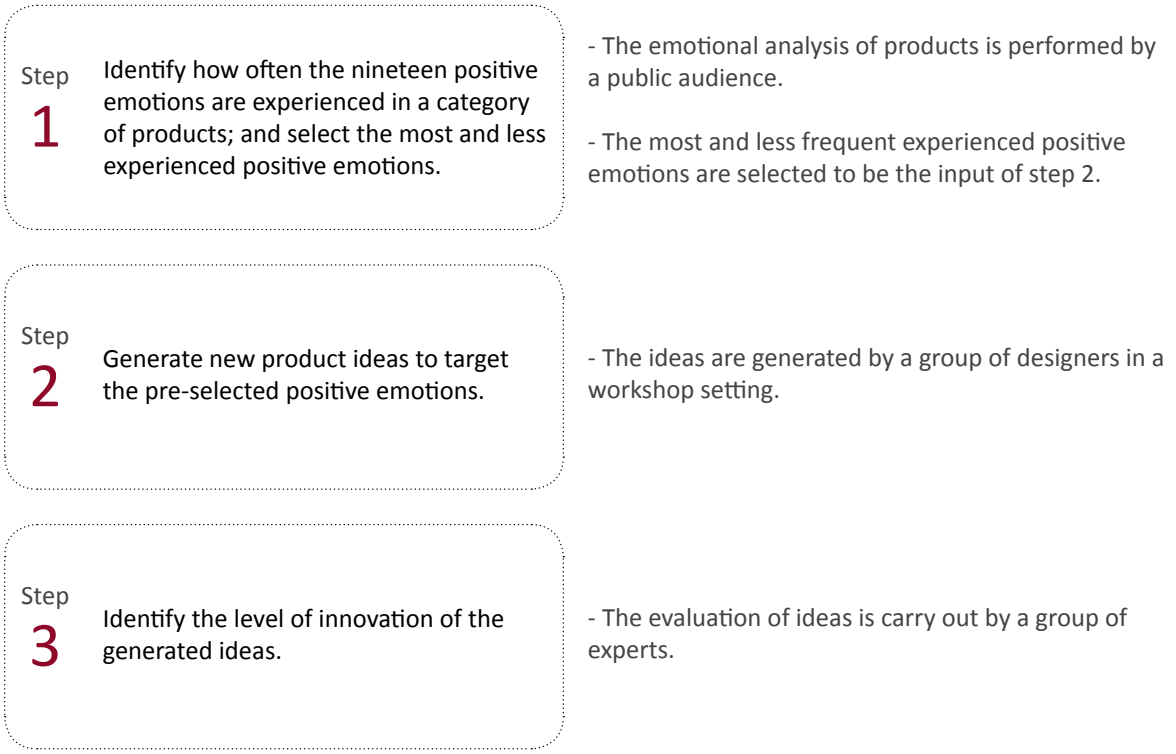


Figure 6.58. Structure of the exploratory study.

6.3.1. The frequency of positive emotions in a sample of products

The sample of products to perform the emotional analysis are 6 corkscrews highly representative in product design and belong to two well-known companies in the design of wine tools: 1) Alessi is an Italian houseware and kitchen utensil company, manufacturing and marketing everyday items. Alessi is known for involving designers in its innovation process, where the radical innovation of their products plays a significant role in its competitive advantage (Verganti, 2003). And 2) L'Atelier du Vin is a French company which is dedicated to the design and production of wine tools and interior wine architecture since 1926. The L'Atelier du Vin products are designed for professional and amateur users (L'Atelier, 2019).

The sample of corkscrews was presented to a public audience through a survey. The online survey started with a short introduction that explained the general objective of the study. The first part of the online survey introduced the framework of nineteen positive emotions and the corresponding emotional-jobs-to-be-done, in order to sensitise the responders to report their emotional reactions. Afterwards, every corkscrew was introduced to the responders with several images, a video of use, and a description of the product. Responders were asked to select from 0 to 3 positive emotions. By providing this indication we seek that responders select the positive emotions genuinely with what the corkscrew has provoked them. In the case that the corkscrew has not provoked any emotion, the responders could report the null emotional reaction.

The survey was designed to be filled online and individually and the participants could respond in Italian or English. The survey was answered by 105 responders; 26.7% filled out the questionnaire in Italian, and 73.3% in English. The panorama of emotions of every corkscrew is presented below, as well as the summary of all the emotional analysis.

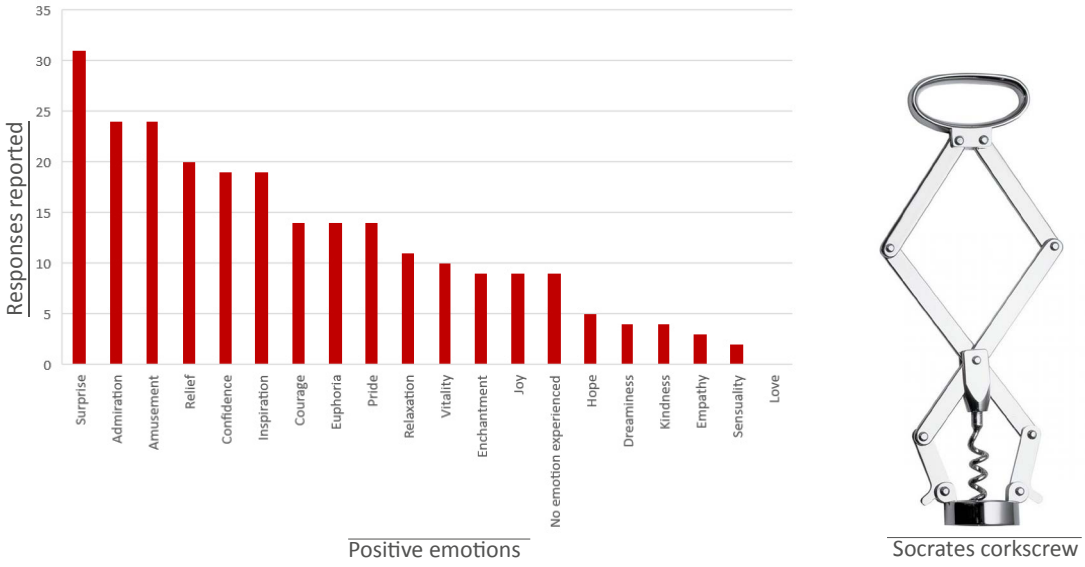


Figure 6.59. Panorama of emotions of the Socrates corkscrew of Alessi.

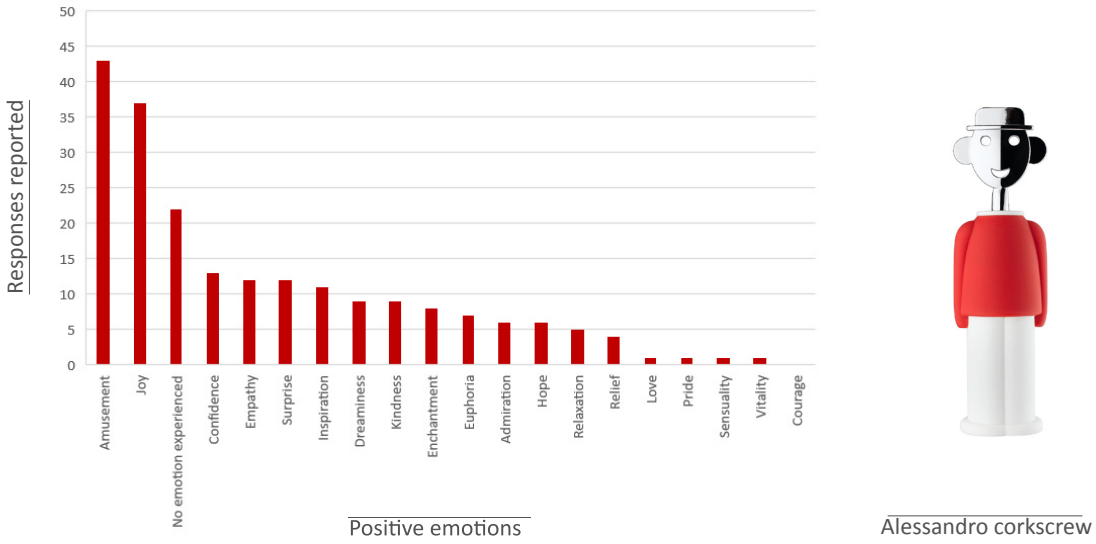


Figure 6.60. Panorama of emotions of the Alessandro corkscrew of Alessi.

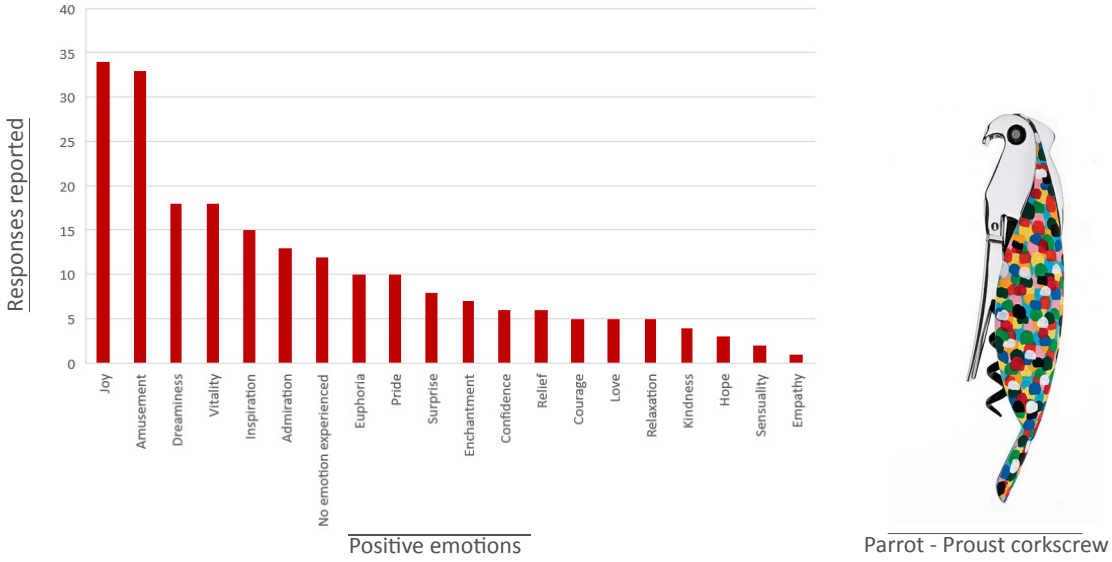


Figure 6.61. Panorama of emotions of the Sommelier corkscrew – Parrot corkscrew of Alessi.

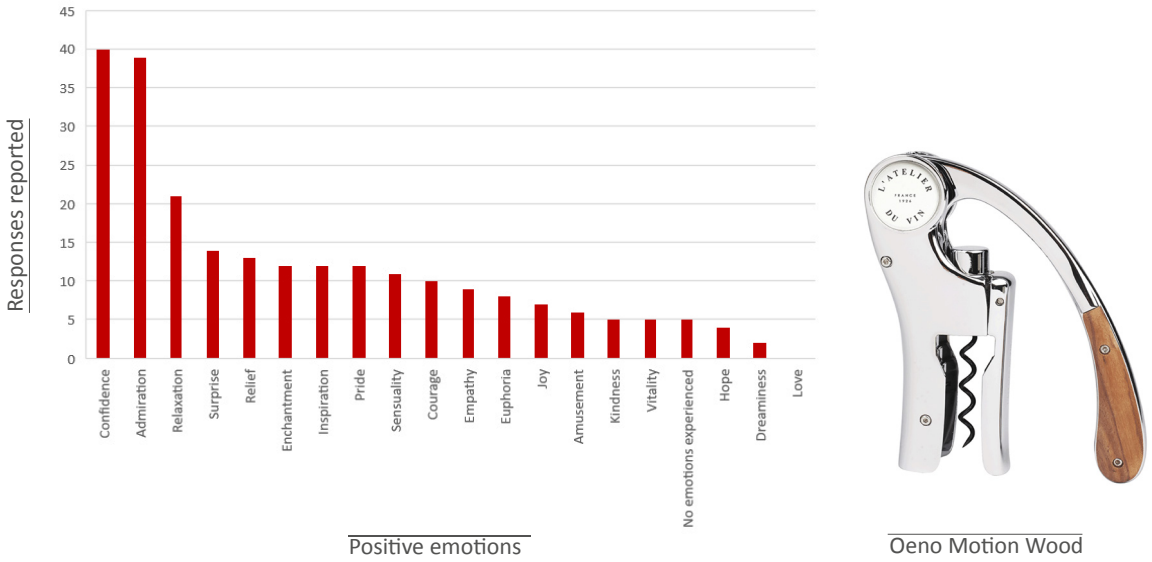


Figure 6.62. Panorama of emotions of the Oeno Motion Wood corkscrew of L'Atelier du Vin.

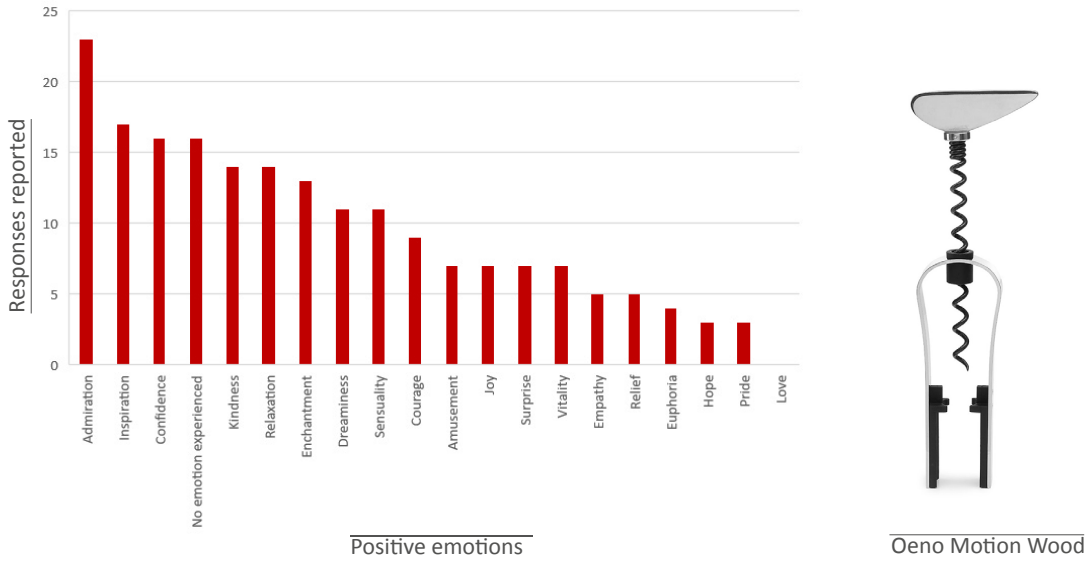


Figure 6.63. Panorama of emotions of the Chic Monsieur corkscrew of L'Atelier du Vin.

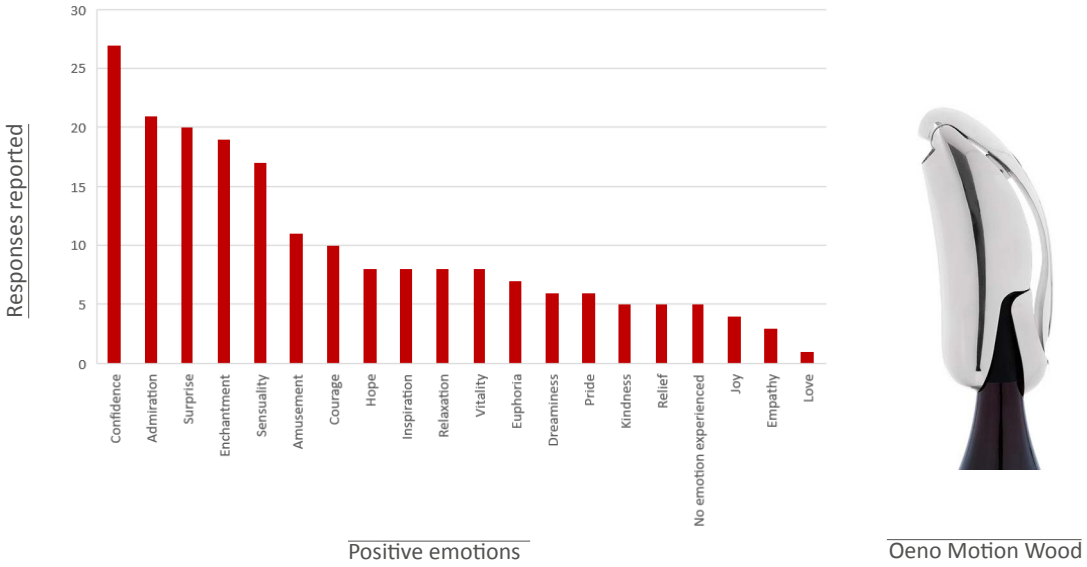


Figure 6.64. Panorama of emotions of the L'Artiste corkscrew of L'Atelier du Vin.

The combination of the emotional analysis of the six corkscrews is presented in Table 6.15. The positive emotions that were reported experienced more often by the corkscrews were: admiration, amusement, confidence, and joy. The positive emotions that were reported least often experienced were: love, hope, empathy, and kindness.

The positive emotions selected to generate the new corkscrew emotion-focused product ideas were the two most experienced (admiration and amusement), two less experienced (love and hope).

Positive emotions	Corkscrews						Responses reported
	Socrates	Alessandro	Sommelier corkscrew - Parrot	Oeno Motion Wood	Chic Monsieur	L'Artiste	
Admiration	24	6	13	39	23	21	126
Amusement	24	43	33	6	7	11	124
Confidence	19	13	6	40	16	27	121
Joy	9	37	34	7	7	4	98
Surprise	31	12	8	14	7	20	92
Inspiration	19	11	15	12	17	8	82
Enchantment	9	8	7	12	13	19	68
Relaxation	11	5	5	21	14	8	64
Relief	20	4	6	13	5	5	53
Courage	14	0	5	10	9	10	48
Dreaminess	4	9	18	2	11	6	50
Euphoria	14	7	10	8	4	7	50
Vitality	10	1	18	5	7	8	49
Pride	14	1	10	12	3	6	46
Sensuality	2	1	2	11	11	17	44
Kindness	4	9	4	5	14	5	41
Empathy	3	12	1	9	5	3	33
Hope	5	6	3	4	3	8	29
Love	0	1	5	0	0	1	7
No emotions experienced	9	22	12	5	16	5	69

Total number of responses reported	1294
Positive emotions selected to generate new emotion-focused product ideas	
Most frequent experienced emotions	Admiration and Amusement
Less frequent experienced emotions	Love and Hope

Table 6.15. The shared view of how the nineteen positive emotions are present in the selected sample of corkscrews.

6.3.2. Generating new product ideas applying frequent and infrequent emotions.

The second step of the exploratory survey was carried out in collaboration with the consultancy company T2i involving the participation of 10 product designers. The people involved in the idea generation session was not informed about the results of the previous step. The group of people was divided into two teams: Team 1 had the assignment to design a new corkscrew to provoke admiration and amusement; team 2 had the assignment design for love and hope.

The workshop started by introducing the objectives of the study followed the Learning method which introduced three key concepts of the vocabulary of the E-DI process. The Dots, Transform and

Translate method were also executed by the participants. Filter Game method was discarded from the workshop since the emotions were selected deliberately from the results of Dots Game method conducted in step 1 of the study. The generated ideas and their descriptions are presented below.

Ideas generated to provoke admiration and amusement.

Idea 1 'Equal'

Aesthetic interaction: it is symmetrical corkscrew in monochromatic metal with curved and sensual shape.

Behavioural interaction: the use is simple and traditional, has the metal spiral hidden in the body and is used manually. The two ends of the object are used to open bottles with a metal cap.

Symbolic interaction: the symmetry and double use of the corkscrew represent equality and conviviality.

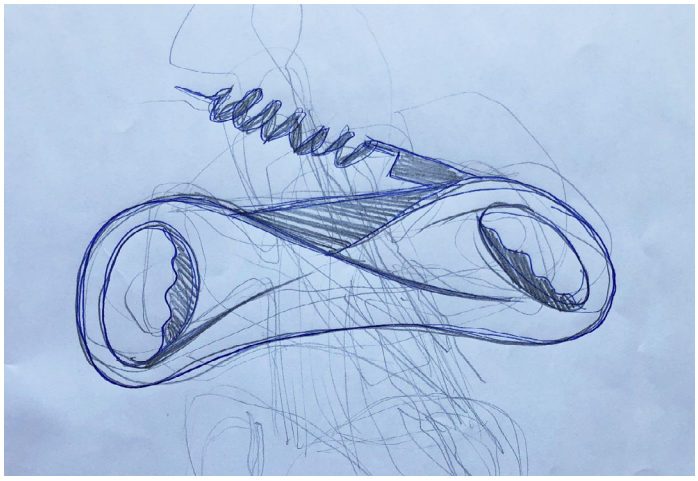


Figure 6.65. Idea 1 designed to provoke admiration and amussement.

Idea 2 'The rabbit'

Aesthetic interaction: it is a rabbit-shaped corkscrew, which can be sold in different colours.

Behavioural interaction: to open the bottle the user must press the 'ears' of the rabbit to make the metal spiral get into the cork and the user can take it out of the bottle.

Symbolic interaction: it is a corkscrew to play with it when you open the bottle.

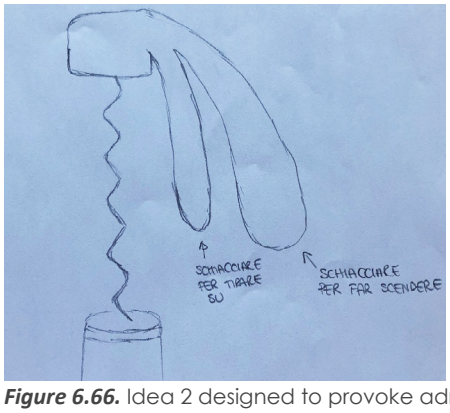


Figure 6.66. Idea 2 designed to provoke admiration and amussement.

Idea 3 'Stappator 3000'

Aesthetic interaction: it is an electric corkscrew. The shape of the corkscrew is a cylinder which covers the mechanism. The external material is metal.

Behavioural interaction: the corkscrew is placed on top of the bottle the user only needs to press a button to operate the corkscrew mechanism and open the bottle. It has a battery that can be charged with a USB cable.

Symbolic interaction: it is a corkscrew that is used and stored, the packaging is designed to be reusable and keep the corkscrew for its useful life.

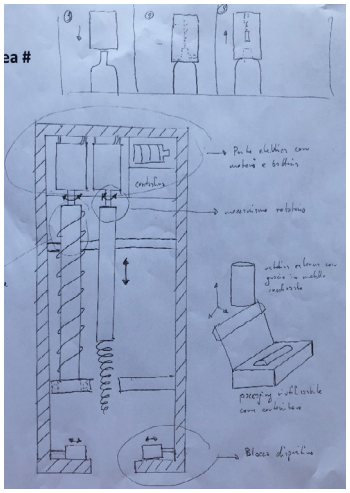


Figure 6.67. Idea 3 designed to provoke admiration and amussement.

Idea 4 'Hello'

Aesthetic interaction: it has a fixed arm with the 'hand' that is used to open bottles with a metal cap. The other arm is the lever, which when in use simulates a boy waving.

Behavioural interaction: to open the bottle, the user must place the corkscrew on top of the bottle and when pressing and lifting the lever the cork will come out of the bottle.

Symbolic interaction: it is a corkscrew that represents a boy who calls friends to share a moment.

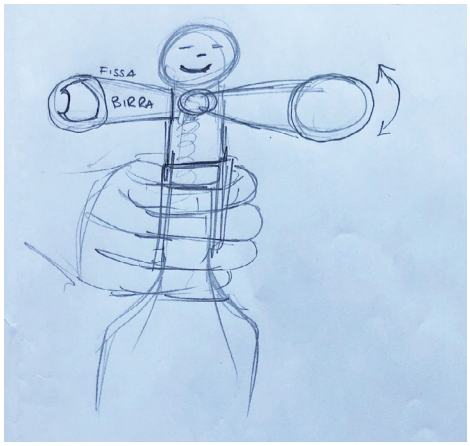


Figure 6.68. Idea 4 designed to provoke admiration and amussement.

Idea 5 'The story'

Aesthetic interaction: the corkscrew is composed of four pieces: 1) the bottle of glass that contains the opener in its interior while it is not being used, 2) the base serves to keep the bottle standing 3) the parchment can tell the story of the region where the corkscrew was made or it can be personalized and tell a personal story, and 4) the opener.

Behavioural interaction: in order to open the bottle, the user has to introduce manually and with a rotary movement the spiral of the corkscrew and then remove it from the bottle.

Symbolic interaction: the corkscrew is designed as an ornament piece, to present it as an important piece in the house, not for what the object might represent, but for the story it can tell.

Figure 6.69. Idea 5 designed to provoke admiration and amussement.

Ideas generated to provoke love and hope

Idea 1 'Excalibur'

Aesthetic interaction: it is a corkscrew in shape of a ring made in stainless steel, that on the inside has a plastic membrane that makes it adhere to the bottle.

Behavioural interaction: it is an electric corkscrew, the user must place it in the top of the bottle and press a button to activate the vibration of the ring, the vibration will make the cork come out to a point that the user can gently remove by hand.

Symbolic interaction: it is a corkscrew to call the attention of the guests while opening the bottle of wine and put them in a mood to enjoy the moment.

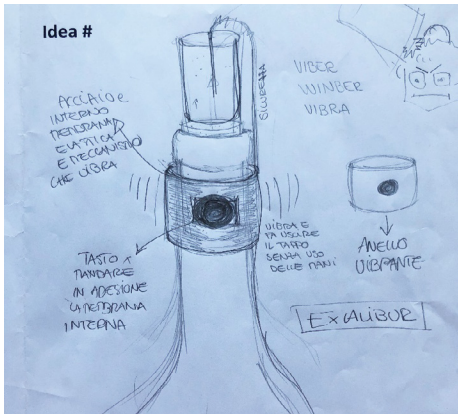


Figure 6.70. Idea 1 designed to provoke love and hope.

Idea 2 'Easy things are not fast'

Aesthetic interaction: it is a corkscrew with a rounded shape. The combination of wood with the organic shape alludes to nature.

Behavioural interaction: in order to open the bottle of the wine, the user only needs to operate the corkscrew with one hand. The handle works with a simple gesture of pressure, the user needs to repeat the gesture as many times as necessary to be able to open the bottle.

Symbolic interaction: the kindness of the shape pursues to empower women (mainly) to be the ones to open the bottle of wine.

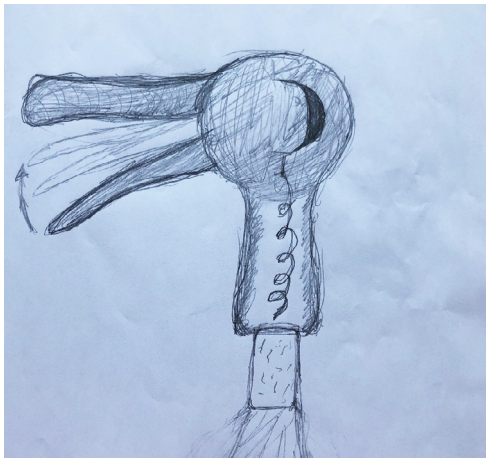


Figure 6.71. Idea 2 designed to provoke love and hope.

Idea 3: 'Abraccio (Hug)'

Aesthetic interaction: it is a corkscrew with soft and round shapes simulating two bodies hugging.

Behavioural interaction: the user must separate the two 'bodies' that hide the metal spiral. To be able to open the bottle the user must introduce the metal spiral manually and with a rotary movement, the spiral will be introduced in the cork and will remove the cork from the bottle. The deeper the spiral in the cork the closer the two bodies will be; at the end, the two bodies will contain in their "hug" the cork when it is out.

Symbolic interaction: it is a corkscrew that celebrates love and unity.

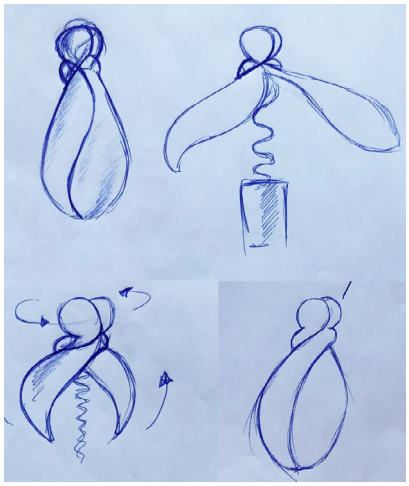


Figure 6.72. Idea 3 designed to provoke love and hope.

Idea 4 'Marco'

Aesthetic interaction: it is a 'tuning fork' corkscrew in the form of a question mark. You can place it in the centre of the table and ring it to start a toast.

Behavioural interaction: the corkscrew is composed of two pieces: the question mark that in the final part has the metal spiral, and a base to support it when not in use. The use is basic, the user must insert the metal spiral into the cork and remove it with a little effort

Symbolic interaction: it is a corkscrew to open 'conversations. The designer explained that the question mark is to stimulate the curiosity of the guests, or to stimulate games of questions and recreate a moment of intimacy.

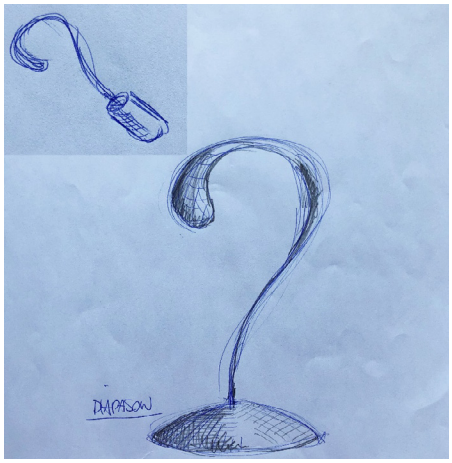


Figure 6.73. Idea 4 designed to provoke love and hope.

Idea 5 'Pop-Drop'

Aesthetic interaction: the corkscrew takes the shape of a drop. It is composed of two parts of metal: one shiny metal and one satin metal. It is designed to be placed as a piece of ornament on the table.

Behavioural interaction: to open the bottle, the user must press the satin metal part.

Symbolic interaction: the corkscrew is designed to elegantly hide the mechanism, create expectation and cause surprise when the cork comes out.

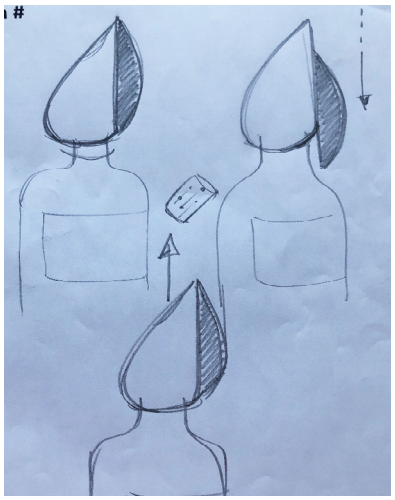


Figure 6.74. Idea 5 designed to provoke love and hope.

6.3.3. Identifying the level of innovation

The ideas generated were presented to a panel of experts made up of 10 people: 6 design experts from Instituto Tecnológico y de Estudios Superiores de Monterrey (Monterrey Institute of Technology and Higher Education (Mexico), 2 design researchers from university of Aveiro (Portugal), 1 expert of innovation management of University of Padova (Italy), and 1 Mexican professional designer.

The ideas were presented through an online platform to each of the experts to perform a qualitative analysis; the presentation included the drawings and the details on the human–product emotional interactions of each idea. In the online platform the experts were able to indicate the level of innovation of the ideas applying a scale from 1 to 5; where the number 1 was representing incremental innovation and number 5 was representing radical innovation. The corkscrews used in step 1 of the study were presented to the experts to be considered as a baseline for the qualitative evaluation.

The group of experts was not informed about the results of the first step of the study, nor that the ideas were generated to provoke two groups of different positive emotions.

At the time of the evaluation the researcher was present via skype; in order to accompany each of the experts explaining the purpose of the study, the steps of the study and mainly each of the ideas. The results of the qualitative assessment is presented in Table 6.16.

		Idea		Experts										Score
				1	2	3	4	5	6	7	8	9	10	
Ideas to provoke the emotions:	**Admiration and Amusement**	Equal	The assessment given	1	3	1	2	1	2	1	2	1	1	15
		The rabbit		2	3	2	2	1	1	3	2	3	1	20
		Stappator 3000		3	3	3	3	2	4	3	3	1	1	26
		Hello		1	3	1	2	1	2	1	1	2	1	15
		The story		1	2	2	1	1	3	2	2	2	4	20
	Love and Hope	Excalibur		5	4	4	5	4	4	4	4	5	4	43
		Easy things are not fast		3	5	2	3	4	3	5	4	2	4	35
		Abraccio (Hug)		2	3	2	3	4	2	3	2	5	4	30
		Marco		5	2	5	2	3	4	3	4	4	5	37
		Pop-drop		5	5	5	3	3	5	5	2	5	3	41

Table 6.16. Qualitaitve assesment giveen by the experts.

In order to represent the level of innovation of every idea, the total evaluation of each idea was translated into a percentage; where 0% represents incremental innovation and 100% represents radical innovation[14] (see Figure 6.75).

[14] Level of innovation = (score - minimum possible score) / (maximum possible score - minimum possible score) * 100

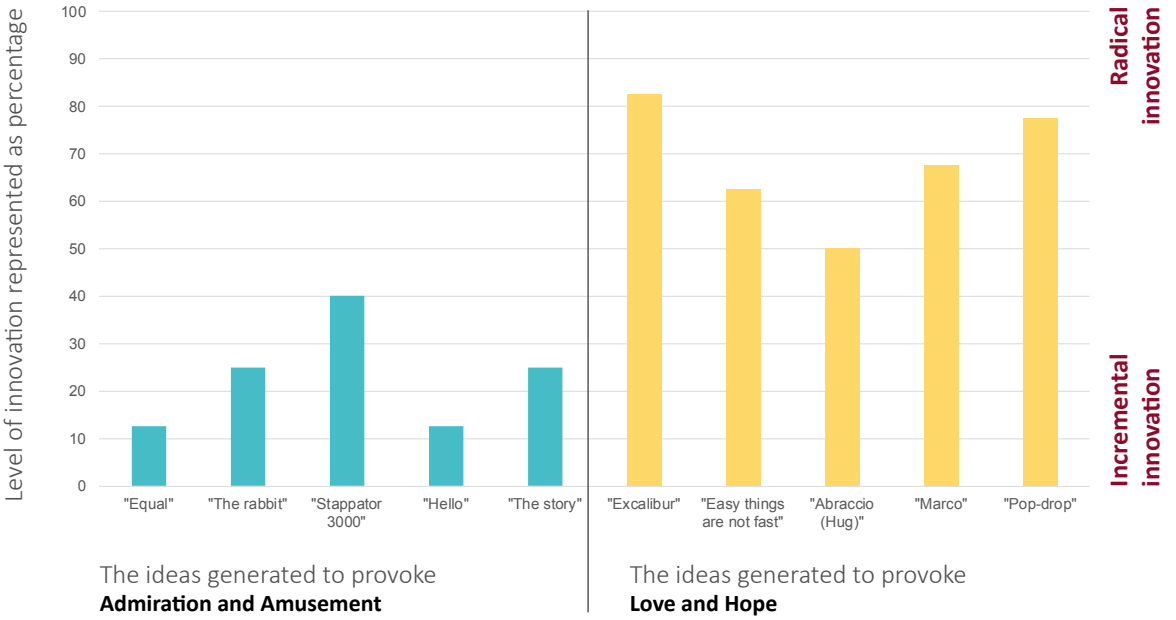


Figure 6.75. Level of innovation of the ideas generated.

The aim of the study was to explore the relationship between the selection of frequent or infrequent positive emotions in the sample of products currently present on the market (output of Filter Game method in the 2nd phase of E-DI) with the level of novelty of the ideas (output of Translate Game method in the 3rd phase of E-DI).

The results of the third study of the E-DI validation process has emphasized the value in the visual design of Filter Game method. Considering the qualitative assessment given by the experts we can state that the frequent positive emotions (admiration and amusement) stimulated ideas with similar characteristics to the characteristics of the products applied to perform the emotional analysis. The new ideas are similar either in the use or in its physical configuration. For example, of the idea 'Hello' is clearly similar to the 'Alessandro' corkscrew.

Regarding the ideas generated to provoke the infrequent emotions (love and hope), it is possible to read in the results of the qualitative assessment that, those ideas were considered with a higher level of innovation. Even though none of the ideas reached the maximum evaluation score, all the ideas surpassed an average evaluation. According to the opinion of the experts the ideas have resulted in more daring propositions, whether in form, use or meaning. As an illustration, the idea 'Marco' is a corkscrew that intents to stimulate conversations between people who are sharing the bottle of wine.

However, the study has a strong limitation, it is necessary to repeat the experiment in order to make these affirmations more robust. Even though the results of this first exploration stressed the value of the visual design of Filter Game method, the ideas evaluated are the outcome of one workshop, and different proposals may be generated with a different group of designers. With the help of more studies applying the same structure, a considerable quantity of ideas can be analysed to gain data to boost the results of this first exploration.

6.4. Chapter conclusions

The fourth phase of the process research methodology was aimed to validate the process with professionals that represent a typical profile of an interdisciplinary product development team in real design practice. Three studies were carried out in the process validation to define the E-DI process (at a micro level) to be applicable in a consultancy project or design firm. Two additional studies were performed after E-DI process was evaluated: 1) to compare E-DI process with a contemporary design process in order to identify the factors of differentiation of E-DI process; and 2) to explore the relationship of the output of Filter Game method (the selected emotions) with the output of the Translate Game method (the ideas generated), this third stage was conducted to validate the visual design of the Filter Game method.

Defining E-DI process

The studies carried out to consolidate the process uncover three main weaknesses of E-DI process. Concerning the Emotion Knowledge Acquisition, the guidelines of the Dots Game method allowed to have results where different emotions had the same score in the emotional analysis of the products. This situation could hinder the selection of emotions in the next phase of the process. Regarding Emotion Goal Definition, the guidelines of Filter Game method lacked indications and information in case the team decided to select emotions that lie between the spectrum of incremental innovation emotions and the spectrum of radical innovation emotions. Lastly, in the Idea Generation, the principal weakness was related to the lack of time to generate ideas.

The mentioned weaknesses were tackled for the final definition of the E-DI process. The guidelines of the Dots Game method were modified in order to avoid results with different emotions with same score. In the Filter Game it was integrated the concept of MAYA design principle as category of innovation. MAYA (most advanced yet acceptable) combines a correlation between novelty and typicality (Hekkert, Snelders, and Van Wieringen, 2003). Regarding Idea Generation, the general modifications in E-DI process allowed to establish a more adequate time to generate the ideas.

Comparing the E-DI process

In the comparison study, the E-DI process was confronted with the Design Thinking (DT) process (design thinking crash course standard procedure). The outcomes of DT process are based on continuous communication with the users (Kristensson, Gustafsson, and Archer, 2004; Smith, Bossen, and Kanstrup, 2017), that is the reason why is know as outside in process. The E-DI process stimulates the generation of new product ideas based on the skills, expertise, and crucially on the emotions of the people involved in the process. This was the main motivation to compare E-DI process with DT.

Two sessions (DT and E-DI) were carried out where the participants (who had no experience with any of the processes) had the same design assignment. The main differentiating factors of the E-DI process found in the comparison study were:

1. Emotion Goal Definition phase, the participants feel engaged with the process, by performing the emotional analysis of a sample of products.
2. Emotion Goal Definition phase, the correlation of the results of the emotional analysis with the categories of innovation, and the structure of the Transform Game method stimulated deep reflection in each of the decisions. A situation that participants considered supported a solid decision-making strategy.
3. Idea Generation phase, the process broke with the configuration of preconceived ideas

The main objective of E-DI process is to generate emotion-focused product ideas. The comparison study has demonstrated that under the guidance and use of the methods of E-DI process that the generated ideas are new interpretation of products.

Exploring the relationship of selected emotions with the level of novelty of the ideas

The exploratory survey was composed of three steps. The first step was aimed to identify the panorama of emotions of a sample of products present in the market; an exploratory survey was conducted to 105 people. From the results of the exploratory survey we selected the two most frequently experienced emotions and the two less frequently experienced emotions. The second step of the study, the pre-selected emotions were used the design the new product ideas. A workshop was conducted with 10 designers, the group was split into two teams; the team 1 design the new product ideas applying the frequent emotions; team 2 instead applied the infrequent emotions. The third step, a group of experts was responsible for analysing qualitatively the ideas generated and evaluating the level of innovation of each one.

The results of the qualitative evaluation showed that ideas based on frequent emotions were considered within an incremental innovation. The ideas based on infrequent emotions were considered by the group of experts as ideas directed towards radical innovation. This result, although from a single study, is relevant, since it emphasizes the value of the structure of the Filter Game method. The Filter Game method works in a crucial phase of the E-DI process (Emotion Goal Definition) since in this phase the parameters to generate new product ideas are determined.

7 General discussion

A process to support the product development team to envision emotion-focused new product ideas has been created, developed and evaluated, adopting the research methodology proposed by Platts (1993). This chapter looks back at the key findings of the research and presents an analysis of the usefulness of the Emotion-Driven Innovation process (E-DI).

7.1. From systematic literature review to the creation of Emotion-Driven Innovation process

The fundamental reason for the development of this research focuses on how the knowledge of positive emotions can be applied strategically and systematically in the design of new products aimed at innovation. To identify the key support that professionals interested in designing products with emotional value need, a systematic literature review was conducted to discover state-of-the-art methods that support the creation of products with emotional value. We identified and analysed 22 useful methods in emotional design practice. The methods were analysed, applying an innovation process model as a reference.

The innovation process model was structured according to the relevant literature (Eppinger & Ulrich, 2015; Gaubinger & Rabl, 2014; Iansiti, 1995; Khurana & Rosenthal, 1998; Koen et al., 2001; Murphy & Kumar, 1997; Russell & Donald, 2008; Terwiesch & Ulrich, 2009; Verganti, 2009). The innovation process model consisted of two main areas. First, the front end of innovation (FEI), which is composed of three main components: 1) knowledge acquisition on the evolution of the markets and technologies, 2) goal definition to define the 'problem to solve' and select the search area and 3) idea generation to identify exceptional innovation opportunities. Second, the back end of innovation (BEI), which is composed of two main components: 1) a concept definition phase, where alternative product concepts are generated and selected for further development and testing, and 2) an implementation phase, where product and process engineering takes place

The usefulness of every method in the innovation process model was identified by analysing the objective and the way to apply each method. The main challenges faced by professionals when designing products with emotional value emerged from the analysis.

The main challenge that arose from the analysis was that the methods did not offer systemic support for the FEI, BEI or entire innovation process model. The methods were useful for only one component of the innovation process model.

Another important finding was that the majority of the methods were useful in the BEI process. Due to this fact, we decided to design a new front-end model to generate emotion-focused new product ideas; it was named emotion-driven innovation.

The objectives of the E-DI process were aligned with the research questions that emerged from the systematic literature review. Each objective corresponds to one component of the front end innovation model.

1. To develop the competence of emotional granularity (knowledge acquisition).
2. To support the strategic definition of the emotional intentions of the new product (goal definition).
3. To translate the emotional intentions into strong and meaningful emotion-focused new product ideas (idea generation).

The E-DI process is composed of three phases, each of which is operational with specific methods. Each designed method is composed of a tool, a set of guidelines and an interaction pattern (see Figure 7.1).

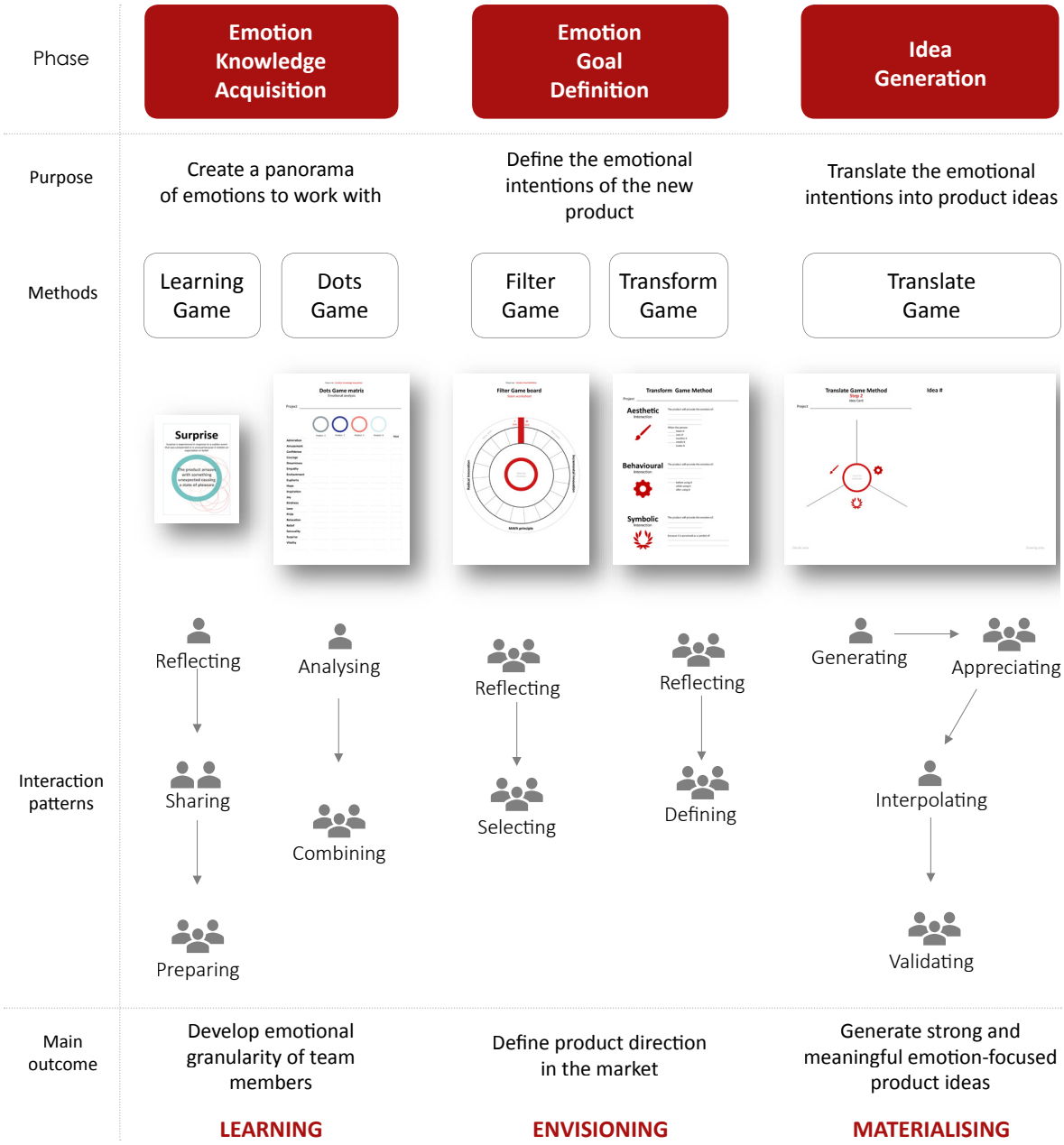


Figure 7.1. Emotion-Driven Innovation process

7.2. Strengths and weakness of Emotion-Driven Innovation process

The prototype of the E-DI process was experienced by graduate design students with and without professional experience as product designers to develop the process. Four studies were carried out. At the end of each study, modifications were applied according to the results of each study (see Chapter 5).

After developing the process, the validation was carried out. Three field studies were performed, involving professionals who represented a multidisciplinary team of design and product development in real design practice (see Chapter 6). The sections below articulate the three phases of E-DI and present the main results as well as the research limitations.

Developing the competence of emotional granularity[15]

Emotional granularity is the ability of an individual to accurately and specifically interpret and articulate his or her emotional states and those of others (Lindquist & Barrett, 2008). In this thesis, the development of this competency requires the ability to understand and differentiate emotions to be able to predefine the positive emotions and generate new ideas to target those emotions.

With this aim, I designed a method (the Learning Game method) that contains a framework of positive emotions, the 'emotional job' that a product must do to provoke 'the emotion' and the situations in which a product can be the cause of emotions. The learning game method was designed to support the entire path of the E-DI process – that is, to perform the emotional analysis of products, select the positive emotions and generate new product ideas. The field studies carried out both in the development and validation of the process showed that one of the main elements that helped the participants to understand and discern among the 19 emotions was the concept 'emotional jobs'. The emotional jobs had helped the participants to identify emotional experiences that are driven by products, compare different emotional experiences that people can have towards the same product and understand how other people can experience the same emotion with a different product.

Human emotions are a complex phenomenon. Emotions are intentional affective states. For an emotion to occur, people evaluate events that may be considered relevant to a person (Coppin & Sander, 2016). We cannot underestimate the complexity of the development of emotional granularity by presenting the framework of emotions, emotional jobs and the human–product emotional interactions in a single format. Future development of E-DI should incorporate different tools (apps, websites, different cards, etc.) to introduce the three key concepts. Different people have different ways of learning and understanding new concepts. The presentation of the three key concepts should be effective in helping different people develop the competence of emotional granularity.

Defining emotional intentions for the new product[16]

One of the main findings of the systematic literature review was the lack of methods supporting the strategic selection of emotions to design a new product. Buijsa and Valkenburg (2003), as well as Roozenburg and Eekels (1995), stressed the importance of defining the principal objective of the product

[15] Referring to research question 1: How can product development teams develop the competence of emotional granularity?

[16] Referring to research question 2: How can product development teams be strategically supported in defining the emotional intentions of the new product?

before generating ideas. I designed the Filter Game method to support the strategic selection of positive emotions for the new product and the transform game method to itemise the selected emotions in a product design brief.

The strategy of the filter game method is the correlation of the results of the emotional analysis of products with the categories of innovation (the incremental, radical and MAYA (most advanced yet acceptable) design principle). The field studies demonstrated that this correlation supported the definition of a clear vision of the objectives for the new product. The filter game has encouraged deep reflections of what the emotions signify for the team, each team member and the potential customer and/or users and what kind of impact the selected emotions could have on the new configuration of the new product. Regarding the transform game, this method has supported systemic thinking by providing a structure that allows people to think of how emotions can have more impact on certain interactions with the product.

The E-DI process was evaluated by many professionals who are involved in design projects, and the feedback gained from those testing sessions helped to define the E-DI process, which could be applied in real design practice. However, the E-DI process was tested through field studies on fast-paced sessions (workshops). A workshop is considered as an appropriate method to observe design practice in a comparable way (Blessing & Chakrabarti, 2009). This fact reveals the second limitation of the research. Considering the importance of defining the design objectives before generating any solution, both the filter game method and translate game method need to be experienced under the conditions and needs of a design firm in a design project with different project schedules and different product complexities. This can open up future research opportunities to develop 'flexible' approaches that can be adapted to the different needs and conditions that a company or design firm may face during an innovation project

Generating emotion-focused new product ideas[17]

The main goal of the idea generation phase of the E-DI process is to generate a few and strong emotion-focused new product ideas. The ideas generated during the testing session presented product characteristics from every human–product emotional interaction targeting specific emotions. The translate game method has stimulated both convergent and divergent thinking. The method allowed participants to express all the thoughts related to addressing the selected emotion. Also, the translate game method supported the creation of a new idea by synthesising the inspirations created before.

This research project introduced five methods to support the generation of emotion-focused product ideas. The methods helped to understand emotions, analyse products from an emotional perspective, strategically select emotions to generate new product ideas and create new emotion-focused product ideas. However, none of the methods presented examples of products or attributes of products addressing specific emotions applying the vocabulary that the E-DI process presents. A database of

[17] Referring to research question 3: How can product development teams be guided to generate strong and meaningful emotion-focused product ideas (thick ideas)?

products triggering specific emotions using the vocabulary of the E-DI process could be useful to foster idea generation activity. To address this concern, a qualitative observation was initiated to identify the emotional design factors of contemporary products.

Qualitative observation was performed using a phenomenological approach. A phenomenological approach allows the generation of knowledge, based on interpretations and descriptions, where the responsibility of the researcher is to construct descriptions of his or her interpretation of the object of the study (Gray, 2013). The framework of 19 positive emotions and emotional-jobs-to-be-done were used as key elements on which the interpretations were based. The definitions of emotions were applied as general support of the study. The sentences of the emotional-jobs-to-be-done were used to extract variables from the configuration of the products to shape the descriptions and identify the emotional design factors of the products.

To select the samples, we applied the criterion of selecting products highly representative of design innovation. To ensure the samples are of good quality, products from Red Dot Award Product Design (in the category Best of the Best of the Year 2017) and Compasso D'Oro (2014 and 2016 editions) were chosen.

The output of the qualitative observation aims to introduce the vocabulary and support the idea generation activity of the E-DI process. It presents one awarded product for every positive emotion. Figures 7.2 and 7.3 present two analysed products of this first attempt and the rest of the qualitative analysis is presented in Appendix D. This new material still has to be tested to verify if it adds value to the process of generating ideas.

<table>
<tr><td>Positive Emotion</td><td colspan="2">Emotional-job-to-be-done by the product</td></tr>
<tr><td>Relief</td><td colspan="2">The product helps to get rid of a state of physical or mental stress</td></tr>
<tr><td colspan="3">Product</td></tr>
<tr><td>Type of product</td><td>Ski Jacket</td><td rowspan="5">  </td></tr>
<tr><td>Product name</td><td>Icon</td></tr>
<tr><td>Source</td><td>Red Dot Award Product Design - Best of the Best 2017</td></tr>
<tr><td>Designed by:</td><td>Katrine Jopperud</td></tr>
<tr><td>Brand/Company</td><td>Helly Hansen AS</td></tr>
<tr><td colspan="2">Interpretation</td><td>Emotional Design Factors</td></tr>
<tr><td colspan="2" rowspan="2">Icon jacket is an exceptional product, it was designed thinking about the different weather conditions that a skier can face. Icon offers possibilities for temperature regulation; So, no matter the weather conditions, the jacket will keep you dry, cold or warm Depending on what you need.
Besides this outstanding and comforting characteristic, the designer of Icon thought about the importance of being connected wherever you are; the jacket has a "life pocket" to protect mobile phones from cold weather conditions, helping to maintain the battery life for longer.</td><td>No matter the weather conditions, materials of the jacket will keep you dry, cold or warm depends what do you need</td></tr>
<tr><td>Icon jacket has a pocket to protect mobile phones from cold weather conditions, helping to keep up the battery life span for longer</td></tr>
</table>

Figure 7.2. Positive emotion of relief – description and emotional design factors of ski jacket.

Positive Emotion	Emotional-job-to-be-done by the product	
Kindness	**The product stimulates feelings of delicacy and tenderness**	
Product		
Type of product	Robot for Early Childhood Education	
Product name	Pudding BeanQ	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Yi Chen, Feizi Ye, Tingting Xue, Bin Zheng, Haichen Zheng, Yong Zheng, Jian Sun, Ye Tian, Xue Mei, Fan Li	
Brand/Company	Intelligent Steward	
Interpretation		**Emotional Design Factors**
Pudding BeanQ is a learning smart robot, designed to create a healthy life mindset and behaviours in small children. The smart robot is a tool for kid's early education; it has four main purposes: 1) for children of 2 to 4 years old, English teaching, 2) for children of 4 to 6, preschool to elementary school education, 3) for children of 4 to 6 years old, elementary school education, and 4) video conversation smart snapshot. The four main functions of the robot accompany the children while they are growing, it does not isolate the kids from the real world, on the contrary, Pudding BeanQ motivates kids to be curious and adventurous and the parents are part of the interaction. The meaning of "growing" is reflected in the physical appearance of the robot due its form of a bean, symbolizing the early development of children. The aesthetic design is aimed to invite children to play with it; Pudding BeanQ has a soft and liking skin, round and friendly shape, and empathic facial expressions. Pudding BeanQ contributes to the well-being of the children by potentializing their intellectual development, but in a fun, tender and safe way.		Soft and liking skin Round and friendly shape Empathic facial expressions The robot contributes to the well-being of the children by potentializing their intellectual development The robot does not isolate the kids from the real world, on the contrary, it motivates kids to be curios and adventurous and the parents are part of the interaction.

Figure 7.3. Positive emotion of kindness – description and emotional design factors of the robot for early childhood education

To conclude, table 7.1 presents a comparison between the 8 methods founded in the systematic literature review focused in the front end of innovation process (see Chapter 3) with the Emotion-Driven Innovation process.

Name	Framework of emotions	Front End of Innovation		
		Opportunity Generation Process		
		Knowledge Acquisition	Goal Definition	Idea Generation
Multi-Dimensional Scaling (MDS) Interactive (Stappers & Pasman, 2000)	-	It creates clusters of products applying subjective judgments (like the personal taste) to the products. It supports the acquisition of knowledge by categorizing products either by market success, technology approach or any other category	-	-
EmoCards (Desmet & Overbeeke, 2001)	-	It permits to generate knowledge about emotional responses.	-	It facilitates the generation of ideas by collage created before.
The [product & emotion] Navigator (Desmet P. , 2002) (Desmet & Hekkert, 2002)	-	It is an anecdotal database of 250 photos of products that elicit emotions	-	It is considered as a source of knowledge that can stimulate the imagination of people at generating new ideas
RealPeople (Porter, Porter, & Chhibber, 2007)	-	It is a database method that contains information from a survey of 682 persons about people attitudes towards functionality, usability, product pleasure, and product preferences	-	-
Emotion Rainbow (Desmet, 2012)	X	Presents information about 25 positive emotions in relation with products, such as: how the product could elicit the emotions: by the product itself, by using the product, by seeing someone using the product by owning the product or by the designer of the product.	-	The examples of products presented in the database can stimulate the generation of ideas.
Emotion Capture Cards (ECC) (Okaramanli, Fokkinga, Desment, Balkan, & Eapen, 2013)	X	The ECC method is an approach to generate accurate emotional reactions of specific consumers with particular products and situations	-	-
Positive Emotional Granularity (PEG) Cards (Desmet, 2012)	X	Every PEG card provides information sch as the definition of one positive emotion type, the category of the emotion, related words and images of people expressing behavioural manifestations of the corresponding emotion	-	It aims to facilitate the generation of large quantity of ideas
Negative Emotion Typology (Emotiontypology, 2017)	X	It is a data base providing information of 36 negative emotions.	-	-
Emotion- Driven Innovation Process	X	It presents method to introduce the framework of 19 positive emotions with their emotional-job-to-be-done by a product, and the Human-Product Emotional Interactions	It provides a method to strategically define the emotional intentions of the new product. The method correlates the results of the panorama of emotions with the categories of innovation (radical, incremental and MAYA design principle)	It stimulates the divergent thinking by providing a technique to generate details of products to address the product design brief created before applying the human-product emotional interactions.
		It presents a method to discover the panorama of emotions, which is the shared view of how the nineteen positive emotions are experienced in a selected sample of the products present in the market.	It transforms the emotional intentions into a design brief through the method Transform Game	It stimulates convergent thinking by providing a technique to synthesise the details generated before into a new emotion-focused product idea.

Table 7.1. Comparing E-DI process with the 8 methods analysed in the systematic literature review focused on the front end of innovation

7.3. Emotion-Driven Innovation process and the objectives of Positive Design

According to Sirgy and Wu (2009), subjective well-being can only be reached with a balance of satisfying basic needs and growth needs. Desmet and Pohlmeyer (2013) proposed a framework to contribute to the subjective well-being which is composed of three elements: pleasure, virtue and personal significance – the framework of positive design.

This framework focuses on formalising the contribution that design can make to the development of people's well-being. Design for pleasure stimulates momentary pleasure that a person can have through the interaction with a product, design for virtue refers to the happiness that arises from virtuous behaviours stimulated by the interaction with a product and design for significance inspires happiness that can emerge from products that connect to the values and goals that are relevant to people (Desmet & Pohlmeyer, 2013).

The main contribution to positive design comes from the structure of E-DI; it can stimulate a mental model to generate new product ideas with the potential to contribute to the Positive Design objectives. The structure of the E-DI process presents a specific vocabulary to apply the knowledge of positive emotions when designing a new product, and five methods with tools, guidelines and behavioural patterns. The behavioural patterns are the ways to execute a specific activity (i.e., reflecting), applying a specific input (the panorama of emotions) to help to deliver a specific outcome (to support the selection of the positive emotions). Both the input and the outcome of the activity are elements that are related to either the positive emotions, emotional experiences caused by products, the impact of positive emotions for users or consumers or the meaning of emotions for the team members and the team. See Figure 7.4.

This process structure is composed of a well-articulated sequence of 13 behavioural patterns; moments of interactions either individually, in pairs or in team. The structure stimulates deep reflection on positive emotions and the difference between the positive emotions. Most importantly, people reflect on the impact that a product designed to provoke positive emotions can have on people. The sequence of behavioural patterns of E-DI fosters the probability to generate ideas that will be able to address the objectives of positive design: design for pleasure, design for virtue and design for personal significance.

In order to identify how the attribute of the ideas generated during the testing sessions of E-DI process, all the ideas were analysed taking into account the sketch and the description given by participants. Table 7.2. presents the summary. Three ideas are shown for illustration in Figure 7.5.

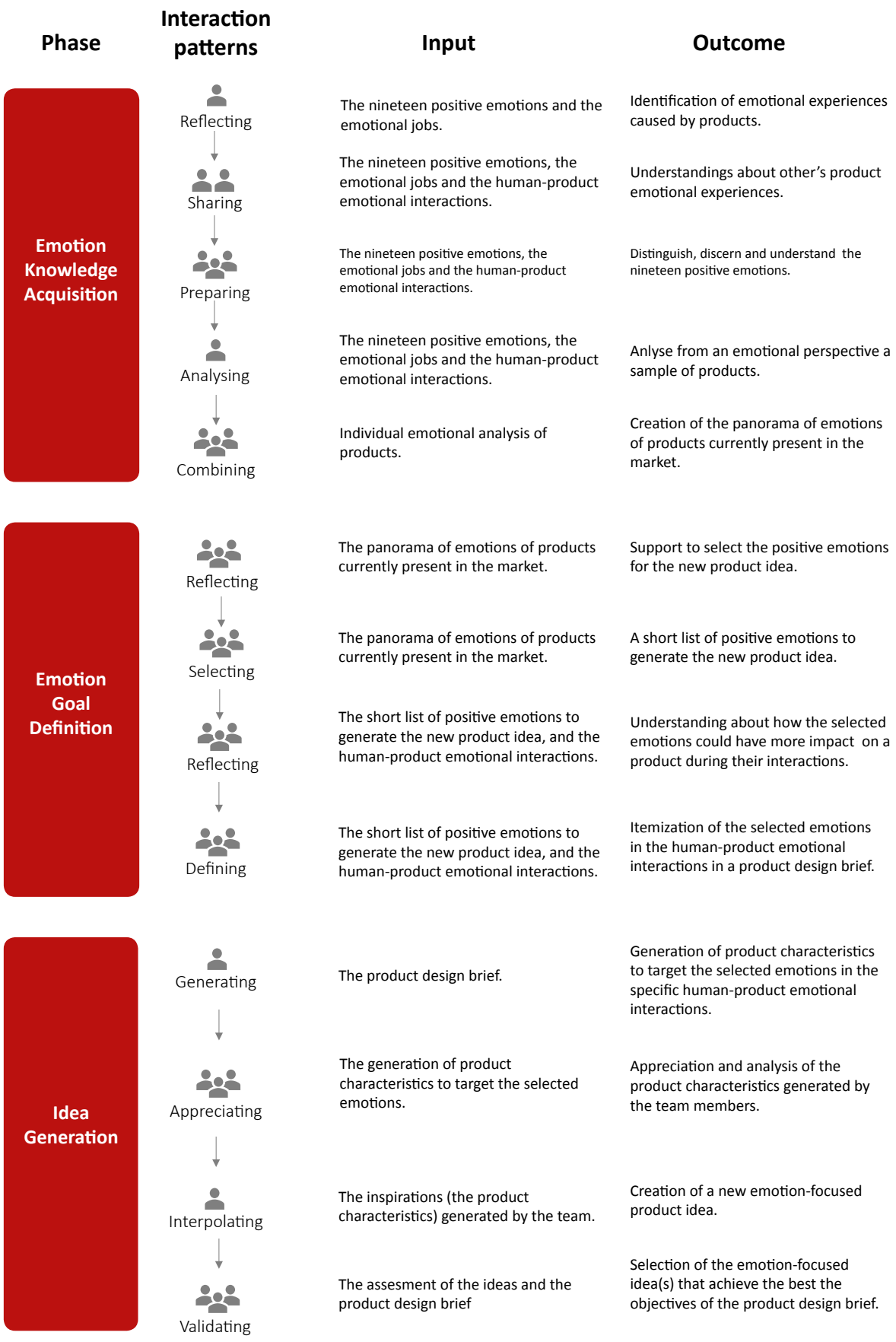


Figure 7.4. Behavioural patterns of E-DI process.

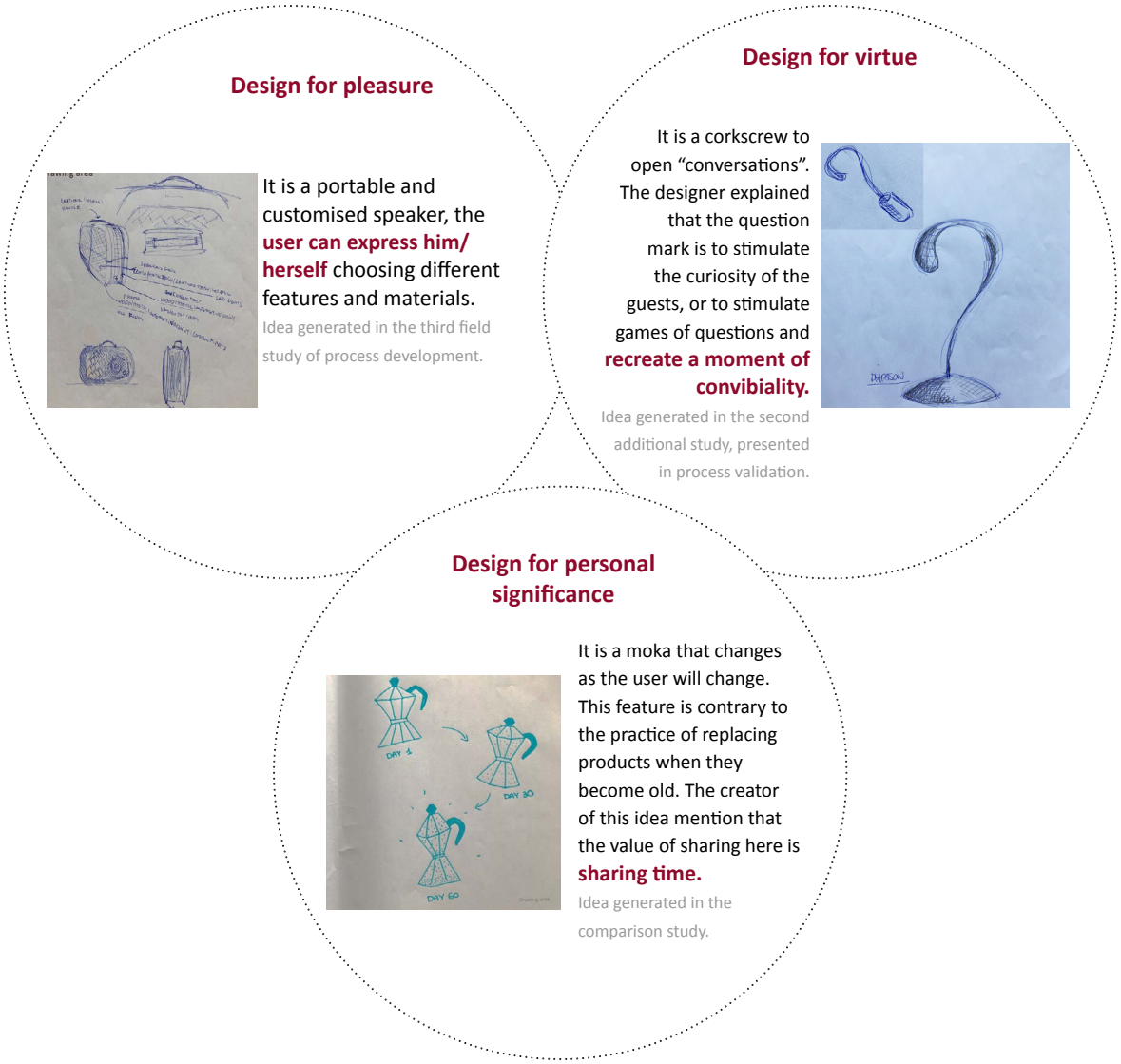


Figure 7.5. Three ideas targeting objectives of the objectives of Positive Design.

			Idea	Positive Design framework			
				Design for pleasure	Design for virtue	Design for personal significance	Not applicable
Process development phase	Study 3		1				•
			2				•
			3	•			
			4	•			
	Study 4		1	•			
			2	•			
			3	•			
			4	•			
			5	•			
			6	•			
			7	•			
Process validation phase	Study 1	Group 1	1	•	•		
			2	•	•		
			3		•		
			4		•	•	
			5		•		
			6	•			
		Group 2	1	•			
			2	•			
			3	•		•	
			4	•			
			5	•			
	Study 2	Group 1	1				•
			2	•			
			3	•			
			4	•			
			5	•			
			6	•			
		Group 2	1	•			
			2	•	•		
			3	•			
			4	•			
			5	•	•		
	Study 3		1	•	•		
			2	•			
			3	•			
			4	•			
Additional studies	Comparison study		1	•	•		
			2	•	•	•	
			3	•	•	•	
			4	•	•		
	Exploratory study	Ideas generated to provoke admmiration and amusement	Equal	•	•		
			The rabbit	•			
			Stappator 3000	•	•		
			Hello	•			
			The story	•		•	
		Ideas generated to provoke love and hope	Excalibur	•			
			Easy things are not fast		•	•	
			Abraccio	•			
			Marco		•	•	
			Pop-drop	•			

Table 7.2. Summary of all the ideas in relation to the objectives of the positive design.

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Appendices

A. Methods analysed in the systematic literature review

<table>
<tr><td>Name</td><td colspan="6">Software Usability Measurement Inventory (SUMI)</td></tr>
<tr><td>Reference</td><td colspan="6">Kirakowski, J., & Corbett, M. (1993). Software Usability Measurement Inventory (SUMI). British Journal of Educational Technology, pp. 210-212.</td></tr>
<tr><td>Web reference</td><td colspan="6">http://sumi.uxp.ie/</td></tr>
<tr><td>Objective</td><td colspan="6">It aims to measure the usability of software through user’s perception.</td></tr>
<tr><td>Brief description</td><td colspan="6">It is an online questionnaire with 50 questions and works with three hierarchical levels.</td></tr>
<tr><td colspan="7">Approach to the emotion knowledge</td></tr>
<tr><td colspan="7">Layer 2 works with the perception of affect</td></tr>
<tr><td colspan="7">Guidelines</td></tr>
<tr><td>Layer 1 Global usability</td><td colspan="6">It gives a single figure-of-merit approach.</td></tr>
<tr><td>Layer 2 Software quality</td><td colspan="6">It works with concepts like affect, efficiency, learnability, helpfulness and control</td></tr>
<tr><td>Layer 3 Consensual analysis</td><td colspan="6">It gives a comparison of the responses</td></tr>
<tr><td colspan="7">Usefulness in Innovation Process</td></tr>
<tr><td colspan="5">Innovation Process</td><td rowspan="4">Three-level qualitative scale</td><td></td><td></td></tr>
<tr><td colspan="3">Front End of Innovation (FEI)</td><td colspan="2">Back End of Innovation (BEI)</td><td>Strong</td><td>***</td></tr>
<tr><td>Knowledge acquisition</td><td>Goal definition</td><td>Idea generation</td><td>Concept definition</td><td>Product and process engineering</td><td>Medium</td><td>**</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>***</td><td>*</td><td>Weak</td><td>*</td></tr>
<tr><td>Category</td><td colspan="6">Questionnaire</td></tr>
</table>

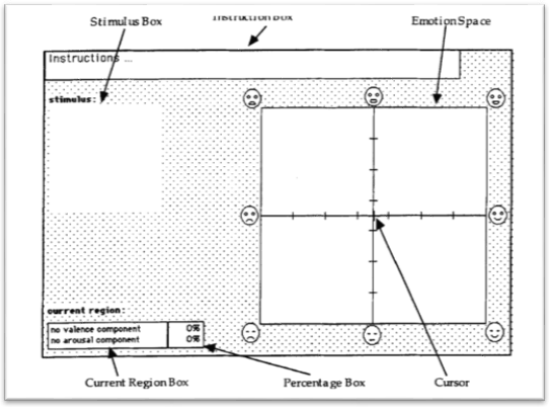
SUMI consists of 50 statements to which the user has to reply that they either **Agree, Don't Know,** or **Disagree**.

Here are some example statements:

Item No.	Item Wording
1.	This software responds too slowly to inputs.
3.	The instructions and prompts are helpful.
13.	The way that system information is presented is clear and understandable.
22.	I would not like to use this software every day.

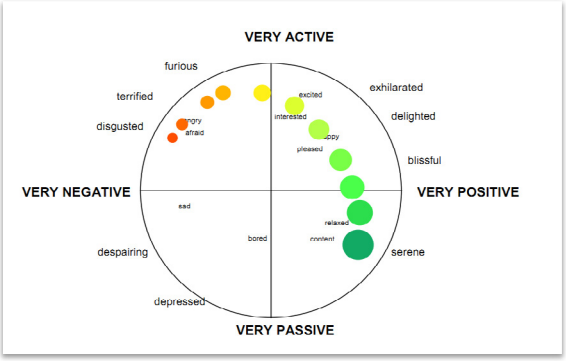
Name	Pleasure-Arousal-Dominance (PAD) Emotion Scales					
Reference	Mehrabian, A. (1995). Framework for a comprehensive description and measurement of emotional states. Genetic, Social & General Psychology Monographs, 339-361.					
Web reference	http://www.kaaj.com/psych/scales/emotion.html					
Objective	It assesses consumer emotional reactions towards services, products, or combinations of products and services.					
Brief description	It is a three-dimensional approach questionnaire to measure emotions.					
Approach to the emotion knowledge						
Framework of emotions						
Pleased, Aroused, Dominant	admired	boldly	carefree	excited	mighty	triumphant
Pleased, Aroused, Submissive	amazed	fascinate	grateful	impressed	loved	respectful
Pleased, Unaroused, Dominant:	at ease	comfortable	relaxed	satisfied	secure	unperturbed
Pleased, Unaroused, Submissive:	consoled	docile	protected	reverent	sleepy	tranquilized
Displeased, Aroused, Dominant:	angry	catty	defiant	hostile	insolent	nasty
Displeased, Aroused, Submissive:	aghast	bewildered	distressed	in pain	insecure	upset
Displeased, Unaroused, Dominant:	disdainful	indifferent	selfish-uninterested	uncaring	unconcerned	
Displeased, Unaroused, Submissive:	bored	despairing	fatigued	lonely	sad	subdued
Guidelines						
The information is not available						
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	Medium	**
					Weak	*
-	-	-	***	*		
Category	Questionnaire					

Name	2DES					
Reference	Schubert, E. (1999). Measuring emotion continuously: Validity and reliability of the two-dimensional emotion-space. Australian Journal of Psychology, pp. 154-165.					
Web reference	-					
Objective	To measure emotions, expressed by stimuli along two bipolar dimensions (happy-sad) and (aroused-sleepy)					
Brief description	It is a software to record movements by a cursor in a two-dimensional emotion-space interface.					
Approach to the emotion knowledge						
Framework of emotions						
Positive	happiness					
Negative	anger					
Neutral	neutral	surprise				
Guidelines						
Step 1	It is presented a stimulus to the participants, it could be static (picture or text) or music*.					
Step 2	Participants must indicate the reaction by pointing out the emotion with the cursor.					
*In the music test participants have to select a word from a list.						
Usefulness in Innovation Process						
Innovation Process						
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Three-level qualitative scale	Strong ***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium **
						Weak *
-	-	-	***	-		
Category	Software					

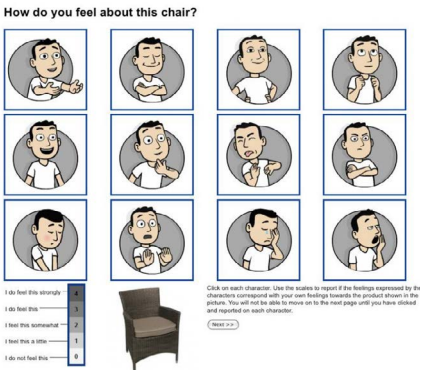


Name	Multi-Dimensional Scaling (MDS) Interactive						
Reference	Stappers, P. J., & Pasman, G. (2000). Exploring databases for taste or inspiration with interactive multi-dimensional scaling. Proceedings of the XIVth Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Association, 'Ergonomics for the New Millennium', (pp. 575-578).						
Web reference	http://studiolab.io.tudelft.nl/mdsi/						
Objective	It creates clusters of products with subjective judgements.						
Brief description	It is a data base with a visual interface to create clusters of products.						
Approach to the emotion knowledge							
Perception of taste							
Guidelines							
It works through a visual field of samples							
Adding samples	1. The user can ask for a new sample by clicking in the space between the samples						
	2. The database searches for a sample that matches the position that was clicked						
	3. The best object is added						
Removing samples	1. The user can weed out samples he/she thinks are irrelevant to his question by dragging them off the screen						
	2. By adding and removing samples, the user navigates through the database						
	3. The user must judge the samples						
Usefulness in Innovation Process							
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
***	-	-	-	-			
Category	Data-base						

Name	FeelTrace					
Reference	Cowie, R., Douglas-Cowie, E., Savvidou, S., McMahon, E., Sawey, M., & Marc, S. (2000). 'FEELTRACE': An instrument for recording perceived emotion in real time. ISCA tutorial and research workshop (ITRW) on speech and emotion. Newcastle.					
Web reference	http://emotion-research.net/toolbox/toolboxlabellingtool.2006-09-26.9095478150					
Objective	It examines the emotional dynamics of a speech.					
Brief description	It is a software with a colour coding interface to lead the users readily associate with an emotional state.					
Approach to the emotion knowledge						
Framework of emotions						
Positive	happy	pleased	content	excited	relaxed	
	exhilarated	delighted	blissful			
Negative	angry	sad	afraid	bored	depressed	
	despairing	furious	terrified	disgusted		
Neutral	interested	serene				
Guidelines						
Step1	It is presented a stimuli to the participants					
Step 2	After see the stimuli, participants should indicate the emotions by cursor in the interface, making landmarks over the space of the circle					
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	Medium	**
					Weak	*
-	-	-	***	-		
Category	Software					



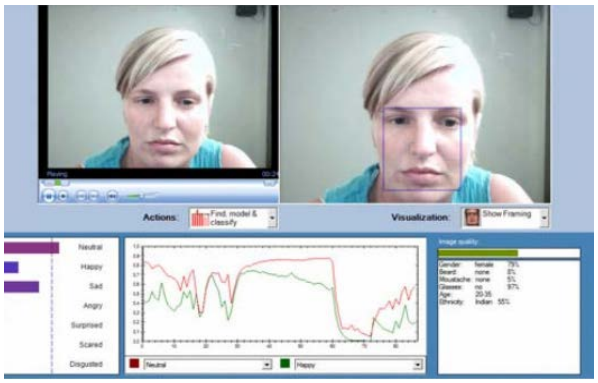
Name	PrEmo					
Reference	Laurans, G., & Desmet, P. (2012). Introducing PrEmo2 new directions for the non-verbal measurement of emotion in design. 8th International Conference on Design and Emotion: Out of Control - Proceedings. London.					
	Introducing PREMO2: New directions for the non-verbal measurement of emotion in design					
Web reference	http://www.premotool.com/					
Objective	It measures emotions evoked by separate aspects of products and by product usage.					
Brief description	It is a non-verbal self-report method that measures 14 emotions (positive and negative).					
Approach to the emotion knowledge						
Framework of emotions						
Positive	Satisfaction	Fascination	Joy	Admiration		
	Attraction	Pride	Hope			
Negative	Disgust	Contempt	Dissatisfaction	Boredom		
	Shame	Fear	Sadness			
Guidelines						
Step 1	It is presented a stimuli to the participants through web interface					
Step 2	The list of Participants must indicate their reactions by choosing one of the animated cartoons that represent 14 emotions					
Step 3	Participants must rate the stimuli using five point scale					
	1- I do feel this strongly					
	2- I do feel this					
	3- I feel this somewhat					
	4- I feel this a little					
	5- I do not feel this					
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)		Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	Medium	**
					Weak	*
-	-	-	***	**		
Category	Self-report method					



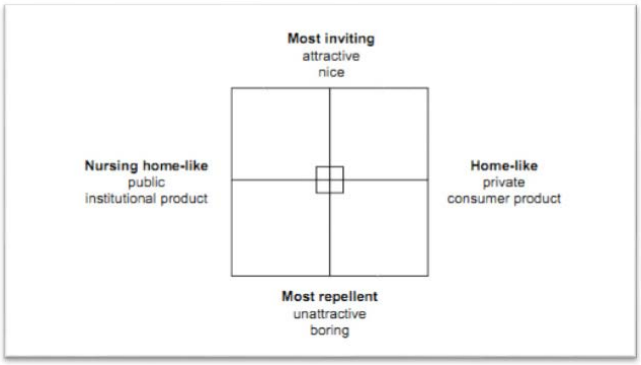
Name	EmoCards				
Reference	Desmet, P., & Overbeeke, C. (2001). Designing products with added emotional value; development and application of an approach for research through design. The Design Journal, pp. 32-47.				
Web reference	-				
Objective	To measures emotional responses.				
Brief description	It is a set of 16 emocards that depict cartoon faces with eight distinct emotional expressions (eight male faces and eight female expressions).				
Approach to the emotion knowledge					
8 emotion categories	excited neutral	excited pleasant	average pleasant	calm pleasant	
	calm neutral	calm unpleasant	average unpleasant		excited unpleasant
Guidelines					
Step 1	Exploring emotional responses				
	1) The stimulus is presented to the participants (it must be existing products). Participants must interact with the products.			2) The Emocards are spread out randomly in front of the participants	
	3) Participants must identify one card for every product, to express their emotional response				
Step 2	Getting to grips with the concerns				
	1) Designers analyse the results of step 1			2) Designer must discuss the concerns underlying the user's emotional responses in an interview, about the goals, the attitudes and the standards regarding to the product in study	
	3) Designer visualize the impressions on the aesthetic concerns in the form of collage.				
Step 3	Translating concerns into visuals.				
	1) Designers have to create a mock-up(s) expressing a proper match with the collage made on previous step			2) Mock-ups(s) is/are presented to the participants in order to evaluate and compare the emotional responses, using same logic that step 1.	
Usefulness in Innovation Process					
Innovation Process				Three-level qualitative scale	Strong *** Medium ** Weak *
Front End of Innovation (FEI)		Back End of Innovation (BEI)			
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	
***	-	**	*	-	
Category	Card-based method				

<table>
<tr><td>Name</td><td colspan="6">The [product & emotion] Navigator</td></tr>
<tr><td>Reference</td><td colspan="6">Desmet, P., & Hekkert, P. (2002). The basis of product emotions. In Pleasure with products, beyond usability (pp. 60-68).</td></tr>
<tr><td>Web reference</td><td colspan="6">http://studiolab.ide.tudelft.nl/studiolab/desmet/tools/</td></tr>
<tr><td>Objective</td><td colspan="6">It pursues to support designers at developing personal design vision that incorporates the users' emotional concerns.</td></tr>
<tr><td>Brief description</td><td colspan="6">It is an anecdotal online database of about 250 photos of products that elicit emotions.</td></tr>
<tr><td colspan="7">Approach to the emotion knowledge</td></tr>
<tr><td colspan="7">Type of products emotions</td></tr>
<tr><td>Positive</td><td colspan="6" rowspan="2">It work with three emotions focus: 1) Product as an object, 2) Product as an agent and 3) Product as event</td></tr>
<tr><td>Negative</td></tr>
<tr><td colspan="7">Guidelines</td></tr>
<tr><td>Option 1</td><td colspan="6">At clicking in the emotion adjective, the Navigator displays products that elicit the particular emotion</td></tr>
<tr><td>Option 2</td><td colspan="6">At clicking in a concern, the Navigator shows products that elicit an emotion because they are focused on the specific concern</td></tr>
<tr><td>Option 3</td><td colspan="6">At clicking in the product, the Navigator presents emotional responses</td></tr>
<tr><td colspan="7">Usefulness in Innovation Process</td></tr>
<tr><td colspan="4">Innovation Process</td><td rowspan="3">Three-level qualitative scale</td><td></td><td></td></tr>
<tr><td colspan="3">Front End of Innovation (FEI)</td><td colspan="2">Back End of Innovation (BEI)</td><td>Strong</td><td>***</td></tr>
<tr><td>knowledge acquisition</td><td>Goal definition</td><td>Idea generation</td><td>Concept definition</td><td>Product and process engineering</td><td>Medium
Weak</td><td>**
*</td></tr>
<tr><td>***</td><td>-</td><td>***</td><td>-</td><td>-</td><td></td><td></td><td></td></tr>
<tr><td>Category</td><td colspan="6">Data base</td></tr>
</table>

Name	FaceReader						
Reference	Zaman, B., & Shrimpton-Smith, T. (2006). The FaceReader: Measuring instant fun of use. ACM International Conference Proceeding Series, (pp. 457-460).						
Web reference	http://www.noldus.com/human-behavior-research/products/facereader						
Objective	It measures emotional responses at conducting usability evaluations.						
Brief description	It is a non-verbal instrument to register how “fun” can be to usage of an “app”.						
Approach to the emotion knowledge							
Framework of emotions							
Positive	happy						
Negative	angry	scared	disgusted				
surprised, neutral							
Guidelines							
Technological interaction							
Usefulness in Innovation Process							
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
-	-	-	***	-			
Category	Software						



Name	The User Compass Chart (UCC)						
Reference	Sperling, L., Kristav, P., Olander, E., Eriksson, J., & Hans, L. (2006). Exploring emotions for design of your future chair. Proceedings from the 5th Conference on Design and Emotion 2006.						
Web reference	-						
Objective	It evaluates sketches and models.						
Brief description	It is a verbal self-report method with 2 dimensions of adjectives: 1) most inviting and most repellent and 2) home-like and nursing home-like.						
Approach to the emotion knowledge							
It is not specified the approach, but there is an insinuation that the method is a emotional design method.							
Guidelines							
Step 1	The pictures are presented one at a time and in an individually in randomised order						
Step 2	The participant is asked to "think aloud" about the represented product and to position the marker at a relevant location on the UCC						
Step 3	When all images are positioned, the subject is allowed to adjust the positions in relation to each other						
Usefulness in Innovation Process							
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
-	-	-	***	-			
Category	Verbal-Self report method						



Name	RealPeople						
Reference	Porter, C. S., Porter, J. M., & Chhibber, S. (2007). RealPeople; Capturing the Emotions of Product Users. En Meeting Diversity in Ergonomics (pgs.. 187-208).						
Web reference	-						
Objective	Its main intention is to help designers to be aware of the specific characteristics of products that give pleasure to the people who own them.						
Brief description	It is a DVD that contains information from a survey of 682 people concerning their attitudes towards product functionality and usability, product pleasure and product preference.						
Approach to the emotion knowledge							
The information exposed is related to the pleasure of products							
Guidelines							
Users can select the categories of the information	individuals						
	product types						
	gender						
	age category						
	income bracket						
Usefulness in Innovation Process							
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
***	-	-	-	-			
Category	Data base						

<table>
<tr><td colspan="2">Name</td><td colspan="6">EmoTools</td></tr>
<tr><td colspan="2">Reference</td><td colspan="6">Bustillo, C. (2007). Emoscope: An Emotional Usability Tool. Formalization and Application in User- Centered Design (UCD).</td></tr>
<tr><td colspan="2">Web reference</td><td colspan="6">http://www.allaboutux.org/emoscope</td></tr>
<tr><td colspan="2">Objective</td><td colspan="6">It was created to identify the divergence between what users say they do with what they actually do.</td></tr>
<tr><td colspan="2">Brief description</td><td colspan="6">It is software aimed to collect emotional information during a test or tasks in Human-Computer Interaction.</td></tr>
<tr><td colspan="8">Approach to the emotion knowledge</td></tr>
<tr><td colspan="8">There is the indication that the method serves to collect emotional data</td></tr>
<tr><td colspan="8">Guidelines</td></tr>
<tr><td colspan="2">Emotron</td><td colspan="6">Collects emotional data during a process of test of tasks</td></tr>
<tr><td colspan="2">Emotraker</td><td colspan="6">Collects data from the eye tracking</td></tr>
<tr><td colspan="2">Pulsometro</td><td colspan="6">Collects polygraphed data and relate it with the rest of the tools to obtain a greater quantity of physiological emotional data</td></tr>
<tr><td colspan="8">Usefulness in Innovation Process</td></tr>
<tr><td colspan="5">Innovation Process</td><td rowspan="4">Three-level qualitative scale</td><td></td><td></td></tr>
<tr><td colspan="3">Front End of Innovation (FEI)</td><td colspan="2">Back End of Innovation (BEI)</td><td>Strong</td><td>***</td></tr>
<tr><td rowspan="2">knowledge acquisition</td><td rowspan="2">Goal definition</td><td rowspan="2">Idea generation</td><td rowspan="2">Concept definition</td><td rowspan="2">Product and process engineering</td><td>Medium</td><td>**</td></tr>
<tr><td>Weak</td><td>*</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>***</td><td>-</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Category</td><td colspan="6">Software</td></tr>
</table>

Name	Product Attachment Scale
Reference	Schifferstein, H. N., & Zwartkruis-Pelgrim, E. P. (2008). Consumer-product attachment: Measurement and design implications. International journal of design, 1-13.
	Ruth Mugge, H. N. (2005). A longitudinal study of product attachment and its determinants. E-European Advances in Consumer Research Volume 7, pp. 641-647.
Web reference	http://www.allaboutux.org/product-attachment-scale
Objective	It identifies and measures seven possible determinants of consumer-product attachment.
Brief description	It is a questionnaire with seven possible determinants of consumer attachment: 1) enjoyment, 2) memories to persons, places, and events, 3) support of self-identity, 4) life vision, 5) utility, 6) reliability, and 7) market value.

Approach to the emotion knowledge

It is not specified the approach to the emotion knowledge, but, the definition of consumer-product attachment is described as the emotional bond between a consumer and a durable product

Guidelines	
Step 1	Participants must choose a sample of product and describe the appearance of this product
Step 2	Participants have to express why they choose the product
Step 3	Participants inform the way in which the product was acquire and for how long they have been with the product
Step 4	Participants rate the relationship with the product through 28 statements

Usefulness in Innovation Process

Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
-	-	-	***	-			

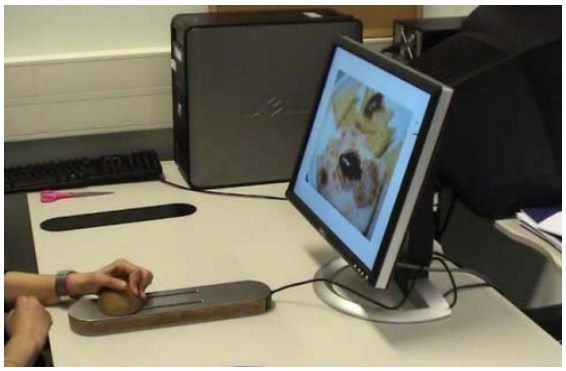
Category	Questionnaire

Appendix 1. Scales tested in the confirmatory factor analysis

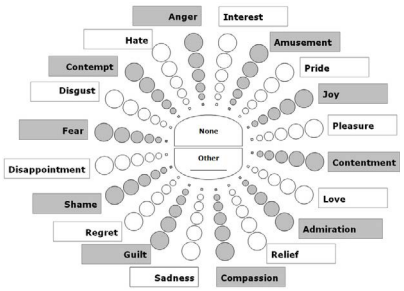
Item
Attachment
I feel emotionally connected to this product
This product is very dear to me
I have a bond with this product
This product has no special meaning for me (-)
This product does not move me (-)
I am very attached to this product
This product has a special place in my life
This product means a lot to me
I have no feelings for this product (-)

Name	LEMtool					
Reference	Huisman, G., & van Hout, M. (2010). The development of a graphical emotion measurement instrument using caricatured expressions: the LEMtool. Emotion in HCI–Designing for People. Proceedings of the 2008 International Workshop, (pp. 5-8).					
Web reference	http://www.lemtool.com/					
Objective	It measures emotions in web interfaces.					
Brief description	It is a web-based self-report method to depict emotions through facial expressions and body language.					
Approach to the emotion knowledge						
Framework of emotions						
Positive	Desire	Joy				
	Fascination	Satisfaction				
Negative	Sadness	Dissatisfaction				
	Disgust	Boredom				
Guidelines						
Online interface	Steps					
	1	2	3	4	5	
	In the upper right corner of the screen there is the “evaluation mode”	At clicking in the character permits to the user to draw the area to evaluate	When the area is drawed, a small screen is displayed with eight characters	The user can select the character that best reflects how he/she feels about the area. The user can write comments	The feedback is stored, and the user can continue giving feedback on other areas by repeating from step 1.	
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	Medium	**
					Weak	*
-	-	-	-	***		
Category	Self-report method					

Name	The emotion slider						
Reference	Laurans, G., Desmet, P., & Hekkert, P. (2009). The emotion slider: A self-report device for the continuous measurement of emotion. Affective Computing and Intelligent Interaction and Workshops, 2009. ACII 2009. 3rd International Conference on (pp. 1-6). IEEE.						
Web reference	-						
Objective	It collects affective reactions through movements.						
Brief description	It is an elongated box with a metal plating on top and a rounded handle.						
Approach to the emotion knowledge							
Valence or hedonic tone of an experience							
Guidelines							
To measure	It is presented the stimuli to the participants	To report negative feelings, participants have to push the handle upwards	To report positive feelings participant have to pull the handle downwards				
Movement record	The device can be linked through a USB cable to a computer to record the movements, the corresponding software registers and writes all movements in a log file						
Usefulness in Innovation Process							
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
-	-	-	***	-			
Category	Self-report method						



Name	Geneva Emotion Wheel					
Reference	Sacharin, V., Schlegel, K., & Scherer, K. R. (2012). Geneva emotion wheel rating study. Center for Person, Kommunikation, Aalborg University, NCCR Affective Sciences.Aalborg University, Aalborg.					
Web reference	http://www.affective-sciences.org/en/gew/					
Objective	It measures emotional reactions towards objects, events and situations.					
Brief description	It is a verbal self-report method of a picture of 20 different emotions arranged in a circular way.					
Approach to the emotion knowledge						
Framework of emotions						
Positive	Admiration	Pride	Pleasure			
	Amusement	Relief	Interest			
	Joy	Compassion				
	Love	Contentment				
Negative	Sadness	Disappointment	Hate			
	Guilt	Fear	Anger			
	Regret	Disgust				
	Shame	Contempt				
Guidelines						
Steps	Step 1		Step 2		Step 3	
	Identify the event, object or situation to measure		Choose the emotion that correspond at best to the kind of feeling is being experienced		Determine the intensity which it is experienced	
Alternatives	Alternative 1		Alternative 2		Alternative 3	
	Participants choose only one emotion		Participants choose several simultaneous emotions		Participants must to rate all of emotions	
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)		Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition / Idea generation	Concept definition	Product and process engineering		Medium	**
					Weak	*
-	-	-	***	-		
Category	Self-report					



Name	Emotion Rainbow
Reference	Desmet, P. (2012). Faces of Product Pleasure: 25 Positive Emotions in Human-Product Interactions. International Journal of Design, pp. 1-29.
Web reference	http://studiolab.ide.tudelft.nl/manila/emotion_rainbow/
Objective	It explores the 25 positive emotions in relation to human-product interactions.
Brief description	It is an online data base of 25 positive emotions and 5 possible situations to elicit the emotions.

Approach to the emotion knowledge

Framework of emotions

Positive	Admiration	Dreaminess	Inspiration	Relaxation	Worship	
	Amusement	Enchantment	Joy	Relief		
	Anticipation	Energized	Kindness	Respect		
	Confidence	Euphoria	Love	Satisfaction		
	Courage	Fascination	Lust	Surprise		
	Desire	Hope	Pride	Sympathy		

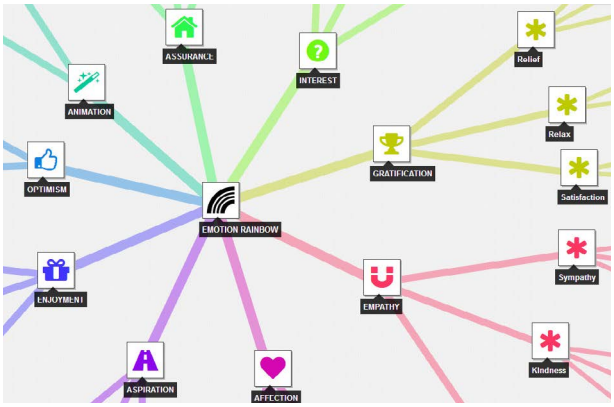
Guidelines

1 ring	It presents nine categories of emotions: assurance, interest, gratification, empathy, affection, aspiration, enjoyment, optimist and animation
2 ring	It displays 25 positive emotion types
3 ring	The information of every emotion contents its definition and presents how the product could elicit the emotions: it could be by the product itself, by using the product, by seeing someone using the product by owning the product or by the designer of the product.

Usefulness in Innovation Process

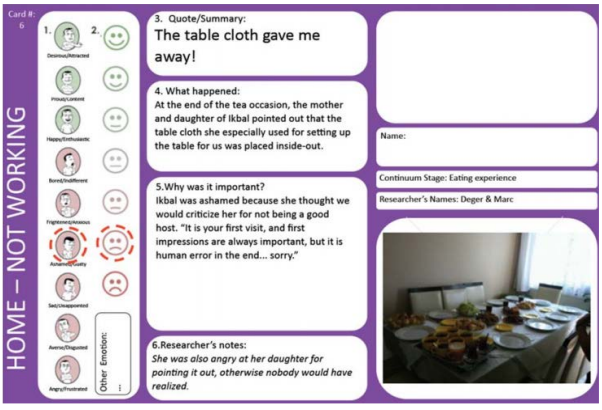
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
***	-	**	-	-			

Category Data base



Name	Emotion Capture Cards (ECC)			
Reference	Okaramanli, D., Fokkinga, S., Desment, P., Balkan, E., & Eapen, G. (2013). Recreating Alaturca: consumer goals conflicts as a creative driver for innovation. Brilliant Transformations; proceedings of Qualitative Research, Valencia, 17-19.			
Web reference	-			
Objective	It aims to create a fine understanding of consumers by focusing on their emotions.			
Brief description	It is a card-based method of two stages: 1) to understand the emotion and 2) to understand how the emotion was elicited.			
Approach to the emotion knowledge				
Framework of emotions				
Positive	Desirous / attracted	proud / content	happy / enthusiastic	
Negative	bored / indifferent	frightened / anxious	ashamed / guilty	
	sad / disappointed	averse /disgusted	angry / frustrated	
Guidelines				
Step 1	Participants (consumers) are asked to report their emotions as they arise. Alternatively, the researchers can show an emotion capture card when they suspect an emotional event.			
Step 2	Participants are interviewed using a laddering-type technique, to deepen the understanding of underlying consumer goals			
	For each emotion captured, three types of questions are asked.			
	Question type “what” is asked to understand what happened			
	Question type “how” is asked to understand how the participant felt during the event			
	Question type “why” is asked to capture why the event was important to the participant			

Usefulness in Innovation Process							
Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
***	-	-	-	-			
Category	Card-based method						

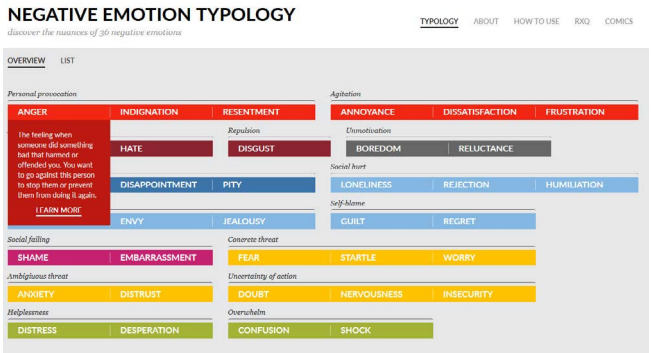


Name	Positive Emotional Granularity (PEG) Cards					
Reference	Desmet, P. (2012). Faces of Product Pleasure: 25 Positive Emotions in Human-Product Interactions. International Journal of Design, pp. 1-29.					
Web reference	http://studiolab.ide.tudelft.nl/diopd/library/tools/embodied-typology-of-positive-emotions/					
Objective	It aims to support emotion-focused design process.					
Brief description	It is card-based method of 25 positive emotion types.					
Approach to the emotion knowledge						
Framework of emotions						
Positive	Admiration	Dreaminess	Inspiration	Relaxation	Worship	
	Amusement	Enchantment	Joy	Relief		
	Anticipation	Energized	Kindness	Respect		
	Confidence	Euphoria	Love	Satisfaction		
	Courage	Fascination	Lust	Surprise		
	Desire	Hope	Pride	Sympathy		
Guidelines						
Techniques	Persons	Steps				
Understanding nuances in positive emotions	4	Select cards randomly and reflect	Select a product to discuss: how you feel about it …?			
Determining emotional intention of a product	4	Identify activities to address by the product	Write down the activities and the positive emotions that the group would like to have on users			
Facilitating creativity in design conceptualization	4	Randomly select a card. Write down the conditions needed	Generate ideas	Select again one card		Repeat the same procedure until all of the 25 positive emotions have been explored.
	1	Randomly select a card	Write down the conditions needed to be addressed to evoke the positive emotion.		Generate ideas	
Usefulness in Innovation Process						
Innovation Process				Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering	Media	**
					Weak	*
					Not applicable	-
***	-	***	-	-		
Category	Card-based method					

Name	Negative Emotion Typology					
Reference	Fokkinga, S. (2015). Design –|+ Negative emotions for positive experiences. Ipskamp drukkers.					
Web reference	http://emotiontypology.com/					
Objective	It provides a rich and varied information about the nuances of negative emotions.					
Brief description	It is an online data base of 36 negative emotions					
Approach to the emotion knowledge						
Framework of emotions						
Negative	Sadness	Disgust	Confusion	Annoyance	Humiliation	Distrust
	Guilt	Contempt	Anxiety	Frustration	Longing	Insecurity
	Regret	Hate	Indignation	Reluctance	Envy	Doubt
	Shame	Anger	Dissatisfaction	Pity	Jealously	Distress
	Disappointment	Worry	Boredom	Loneliness	Embarrassment	Desperation
	Fear	Nervousness	Resentment	Rejection	Startle	Shock
Guidelines						
To compare	To get an overview of the 36 negative emotions on the main page. Hover over an emotion to get a quick definition and compare them					
To get introduced	Read the comic of Murphy's bad day and see how he experiences each one of negative emotions					
To learn	To get an in-depth understanding of each emotion, click on its definition on the main page, or by switching to list-view					
Usefulness in Innovation Process						

Innovation Process							
Front End of Innovation (FEI)			Back End of Innovation (BEI)		Three-level qualitative scale	Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
***	-	-	-	-			

Category	Online data base

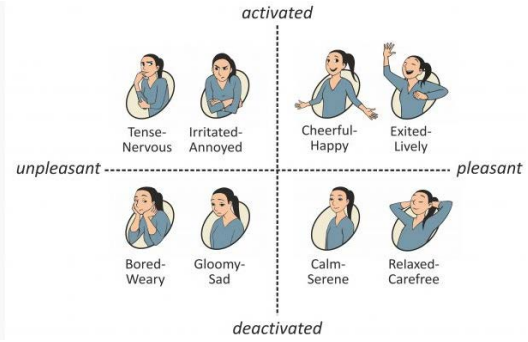


Name	Pick-A-Mood
Reference	Desmet, P., Vastenburg, M. H., & Romero, N. (2016). Mood measurement with Pick-A-Mood: review of current methods and design of a pictorial self-report scale. Journal of Design Research, 241-279.
Web reference	http://studiolab.ide.tudelft.nl/diopd/library/tools/pick-a-mood/
Objective	It is a method to report and express moods.
Brief description	It is a self-report method, based on three characters expressing eight mood states.
Approach to the emotion knowledge	
Categories of moods	
Category 1	excited and cheerful (for energized-pleasant)
Category 2	irritated and tense (for energized-unpleasant)
Category 3	relaxed and calm (for calm-pleasant)
Category 4	bored and sad (for calm-unpleasant)
Guidelines	
Step 1	Obtain the characters from http://studiolab.ide.tudelft.nl/diopd/library/tools/pick-a-mood/
Step 2	Decide which of the characters (male, female, or robot) you will use in your study
Step 3	Formulate your question(s) and/or rating scale(s)
Step 4	Prepare the measurement

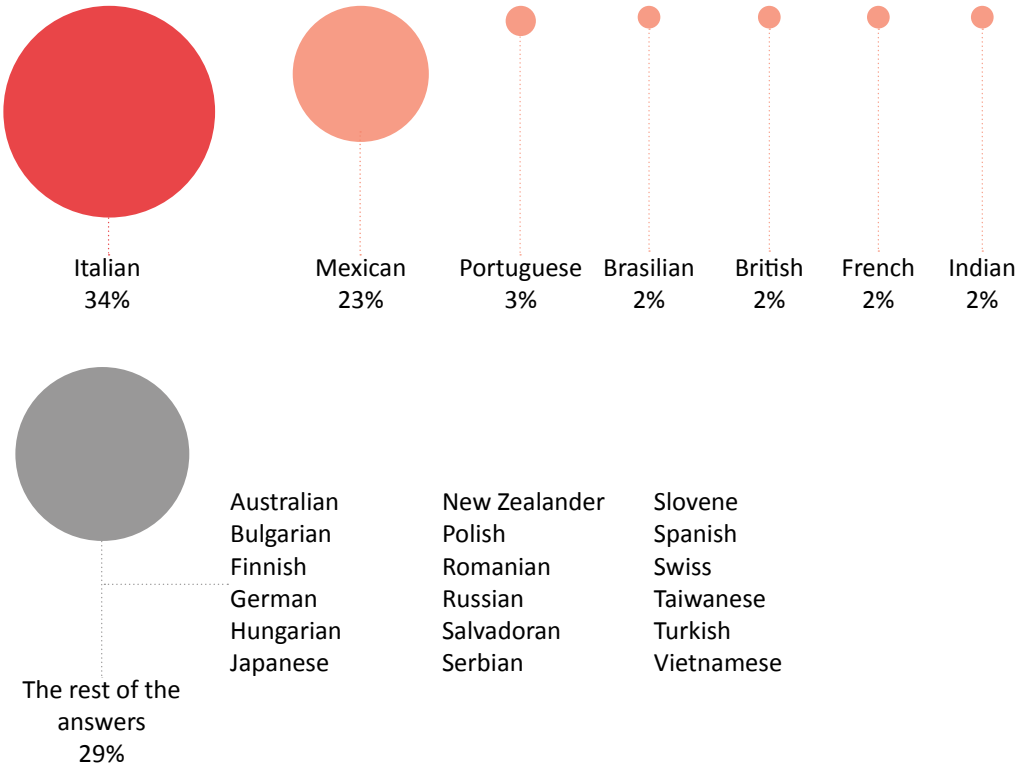
Usefulness in Innovation Process

Innovation Process					Three-level qualitative scale		
Front End of Innovation (FEI)			Back End of Innovation (BEI)			Strong	***
knowledge acquisition	Goal definition	Idea generation	Concept definition	Product and process engineering		Medium	**
						Weak	*
-	-	-	***	-			

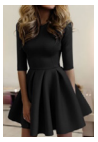
Category	Self-report method



B. Exploratory survey: responders



C. Exploratory survey: descriptions of products

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
1	Admiration			The solution is brilliant. Elegant design that allows you to read the time easily			Taiwanese
2				Use the software that I need and do my job with pleasant tools	Sure, I feel admired at having the product from Apple	Yes, cause I know the software I need it's only available on that brand.	Mexican
3	Amusement			The sound when you make click			Bulgarian
4	Anticipation		Material quality and finish and packaging and other materials	The general feeling manipulating the object	Yes, it's related to the idea of the product, it represents innovation in its niche	I think that the brand is raising up	Salvadoran
5							New Zealander
6	Confidence		When I pick up the product I am confident the product will work as intended. No need to fiddle or tinker to make the product work. A tried and tested device.				British
7				When I wear and feel the fabric		I know this brand has quality products, and they can last longer	Mexican
8	Courage		When I touched the silicon material	For the bright red light. It makes me feel secure when I am riding my bike at night			Mexican
9	Dreaminess						Serbian
10				I can see realized my fantasy, I can print anything I can imagine			Italian
11					When I see my trolley, I start dreaming, dreaming about the next trip, how it will be, and where I could go		Italian
12			When I touch it				Italian

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
13				The interaction sound. I can use a dish to enhance the sound.			Mexican
14			Seeing it and thinking about how it works				Italian
15			Shape is amazing, not immediately related to the use	Use is smooth, despite the unusual shape			Italian
16				The interaction with the product that allow me to change it according to my mood and necessity.	The idea that finally every one could have a domotic house with a cheap investment and that a lot of other innovations will arrive soon.		Italian
17			Materials	Speed, comfort, functionality	Futuristic design	There are expectations because the brand is well known	Italian
18	**Enchantment**		The shape is round with no corners. The object seems different when seen from different perspective and makes me watch it with admiration. I love seeing the contrast between the white of the lamp and the colour lilac of the ceiling.		It's an object created by Bruno Munari, a designer that I appreciated a lot so I'm also pleased to have chosen this lamp for my bedroom.		Italian
19					It stimulates state of mind		French
20			Touching is soft and firm at the same time	The interaction with the rest of my decoration	The value of the object		Mexican
21			The shape is simple but sophisticated in it's functions	By unexpected gesture that is needed to operate it			Mexican
22			By identifying well thought surfaces an affordances.	By knowing how to fix it and where to set paper, push or pull compartments			Mexican

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
23	Energised		Seeing it on the street				Hungarian
24				Depending on the type of music that I'm listening to, I can adopt a faster running pace.			Portuguese
25			By touching its materials	Comfortable feeling		The logotype	Mexican
26	Euphoria				It symbolizes freedom to me		Romanian
27				The whole performance	Futuristic design, excellent engineering		British
28	Fascination		Seeing it makes me want to try it, reminds me the feeling of motion, of freedom of movement and direction, of speed.	Even though it is for transportation, it is very different to a car, fix. I am the one moving it, I have way more road options, I can explore a different route for commuting from my office to home, or even for going shopping, or just for fun. I can feel the weather (even though the weather here in Denmark is not that fun...)	Motion, exercise, freedom		Mexican
29					The design of the bottle is unconventional		Swiss
30			I love to build things, create and made to myself. Feel the materials: plastic, wood or any other its fundamental for be part of this experience.	-	On my case, the form of this toys is representing a travel, a experience, a moment. So, for me its a remember.		Mexican
31			Touching the wood	Discover, try to find the "solution" how it works	Is the aim of the product itself to stimulate my curiosity while you try to solve it		Italian
32			Seeing the pattern of the poles in the field	I think it is when I see the poles supporting the plant			Portuguese
33	Hope		Seeing the product I know how I will handle it	Easy to understand	I know is from karim rashid, I know I will enjoy to use it		Turkish
34				The interface, makes me feel that I will have the control of my actions			Slovene

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
35	**Hope**		Seeing how it works				Mexican
36			The first impression is on the shape and aesthetic aspect of the product that lead to curiosity to touch and try the feature and functionality, later the perfect detail and mechanism would give feel of satisfaction and joy to operate and use the product.				Indian
37				I can take the camera wherever I want	It's a legacy for film makers and adventure		Indian
38			The manual interaction with an analogic device	The separation in time from taking a photo and see the result. That gives more importance to preparation.			Italian
39			It is provoked by the shapes, colours and textures ... more than function	Performance, easiness		Drive a vehicle of that brand has an effect on self-esteem	German
40							Japanese
41	**Inspiration**			It is simple and works for what I want		Creative community, inspiration	Russian
42				Linked to the fact that I can write notes, set alarms and notifications, check details on the internet, no need to memorise addresses and ways to reach one place, ... it is like having a helpful answer whenever I need it			Italian
43			The smell of new				Mexican
44				Challenges me to create something new			Mexican
45			The illustration in the screen and the sound when the computer starts			The history of the brand	Portuguese
46				The emotion is provoked when I use the product, there is nothing more stimulating than a blank page			Italian

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
47	Joy						French
48			Through soft shapes	Comfortable feeling when I am using it	The symbols on the faces of the product		Italian
49			Colours and shapes nurture my fantasy	How easy is to use it makes me feel competent and I enjoy that feeling			Italian
50							Italian
51	Kindness		The aesthetics make me feel good, in special the light colour		I think the product represents my values to others.	I love the sustainability connected to the product.	Finnish
52	Love		This is product design at its best. Take away everything that is aesthetically unnecessary and you are left with timeless,	I love that a beautifully designed watch. It is functional jewellery.	This watch, its design and history have particular meaning. When I was a Product Design student 25 years ago, this watch was launched. It was symbolizing a classic design at that time		Australian
53							Italian
54				I can show my ability to play the piano		Playing a piano from that brand makes me feel important	Italian
55	Pride		I really hated the guitar, I considered it a complicated and painful instrument (for the hands and the position), and however the proportions, the delicacy and the feeling of control of this object (ukulele) I love. As for the form I consider it an object taken to its maximum simplicity, easy, beautiful, practical, personal and depending on the quality it can be a delight to touch it. Activates several senses at the same time and awakens a feeling of being very aware of the synchronization of mind and body to do several activities at the same time and to get to control them, to get to master it gives you a feeling and self-realization.	By using the product you can increasingly feel the progress (by constant practice), accumulate achievements (by learning more and more songs), surprise people and making a connection or empathy with other people (break the ice). A very personal feeling that I constantly imagine thanks to this object, it's becoming the centre of attention, I could generate an incredible atmosphere, love, enjoyment, feel that you can control the environment of a place. In the case of being alone you can listen to yourself I get hyper relaxed and a sensations of peace.	In fact, this is the barrier in a certain way, it is closely related to "Summer" and "Hawaii", things that I don´t really like. For me this instrument / object symbolizes something more personal (I can share a hobby with my brother, my best friend and share emotions with my boyfriend), and cover my needs both taste, practisity and simplicity.		Mexican

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
56	Relaxation			Turning on the system	The quality of the sound of the product		Brazilian
57			When I see the needle touch the vinyl	When the sound come out of the stereo	Quality of sound		Mexican
58	Relief		The product catches my attention when it looks good and simple, without overloading superfluous shapes or colours. If it also has a nice touch.	For me it is very important that the product is very functional and helps me in my daily life.	Nowadays, it is very important that the product has been made with an ecological conscience, with recyclable materials.	The knowledge applied	Spanish
59	Respect		The most important value it is a shape.		The product has meaning because of the designer		Polish
60	Surprise			It is small, but significantly powerful. Also it looks like a generic laptop, but inside it is a masterpiece of engineering. So I constantly feel surprised by this little beast			Uzbekistan
61			Definitely when I see it running			Definitely Bugatti is a brand that evokes surprise in its products	Italian
62			When I first touched it I was pleasantly surprised by the metal of its closure, which I did not expect to be so solid and cool to the touch.	-	I was also surprised to realise how well the music played. The quality of the sound was impressive as it allows to use high-definition music files (FLAC, etc.) which many other music players are not capable of.		Italian

No.	Positive Emotion	Uploaded image of the product	Descriptions on:				Designer's nationality
			Aesthetic interaction	Behavioural interaction	Symbolic interaction - product	Symbolic interaction - brand	
63	Sympathy						Italian
64			Simple shape when I touch it	Easy to use it	Represents friendship		Italian
65							Italian
66			Touch and visual	Easy to clean easy to clean after I have used it			Italian
67							Italian
68				It is easy to use with many smart apps			Vietnamese
69				Because I live in a different city than my family, and by using all the apps available and the product itself, it makes me feel close to them, even when I don´t have the chance to see them everyday and keeps me in touch permanently.			Mexican
70							Brazilian

D. Emotional analysis of representative design innovation products

Positive Emotion	Emotional-job-to-be-done by the product	
Admiration	**The product stimulates the emergence of warm approval, respect and pleasurable contemplation**	
	Product	
Type of product	Espresso coffeemaker	
Product name	Ossidiana	
Source	XXIV edition Compasso d'Oro Award (2016 year)	
Designed by:	Mario Trimarchi	
Brand/Company	Alessi	
Interpretation		**Emotional Design Factors**
An espresso coffeemaker could be an ordinary object. The combination of elegant lines and metal colour make Ossidiana a strong object. The coffeemaker has a clear communication about where the shape comes, and the ergonomic issues of a coffeemaker are very well solved. Ossidiana transforms the ordinary activity of making a coffee in an activity to presume.		Elegant design Recognized brand

Positive Emotion	Emotional-job-to-be-done by the product	
Amusement	**The product gives a feeling of intense playfulness and fun**	
	Product	
Type of product	Motorcycle	
Product name	XSR900	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	GK Dynamics Incorporated	
Brand/Company	Yamaha	
Interpretation		**Emotional Design Factors**
The Yamaha XSR900 is the result of a combination of classic appeal and innovative design. It is made to drive with a natural sitting position which in combination with the frame made in aluminium gives to the driver a sensation of lightness and quickness at driving it. The XSR900 was designed thinking on drivers that either enjoy ride the motorcycle in the city and in the country side.		Natural sitting position Aluminium frame Designed to be drive it in countryside and city environments

Positive Emotion	Emotional-job-to-be-done by the product
Confidence	**The product gives a feeling of security and absence of anxiety (in relation to risks and uncertainties)**

Product

Type of product	Fire Extinguisher
Product name	SAVIORE
Source	Red Dot Award Product Design - Best of the Best 2017
Designed by:	Pei-Lun Sung
Brand/Company	SPL Design

Interpretation	**Emotional Design Factors**
In case of fire at home the latest issue that people need to deal, is to wonder how the extinguisher works. The basic shape of Saviore is its stronger characteristic, it makes its use intuitive; the brilliant colours contribute to find it easily in case of emergency; and the size permits to place it in convenient space to be found. The different colours and the basic form create a product able to match different indoor designs; hence, to have a primordial object in case of fire becomes part of the decoration.	Intuitive to use Brilliant colours The size permits to place it in convenient space to be found in case of emergency

Positive Emotion	Emotional-job-to-be-done by the product
Courage	**The product must make me feel that I am able to do difficult or dangerous things, to face uncertainty and to be able to trust and believe in my abilities**

Product

Type of product	Sports Car
Product name	Ferrari F12
Source	XXIV edition Compasso d'Oro Award (2014 year)
Designed by:	Flavio Manzoni
Brand/Company	Ferrari S.p.A.

Interpretation	Emotional Design Factors
Ferrari F12 is a grand tourer car (gran Turismo (GT)) produced by Italian sports car manufacturer Ferrari. To describe how the F12BERLINETTA (unofficial name) provokes Courage we need to start saying that F12 has been designed to be an aerodynamic highly efficient vehicle; then, the exterior design plays a significant role. The silhouette of F12 express a beautiful continuity of aggressive lines, making look the F12 strong at crossing the wind. The front of the car is characterized by the imposing grille and the strong shapes of the headlights extended vertically; while the rear part is a dazzling balanced proportion of the exhausts, the two full-LED circular tail-lights and the fog light (F1 Style rear fog light); for the lovers of F1 sport the detail of the fog light can increase the feeling at driving the F12. The interior design provides a sublime balance of sophistication; the poise is created by the hand-executed detailing of the frau leather seats and the advanced technologies; generating sensations of comfort and power to the driver.	Silhouette with aggressive lines Strong shapes of the headlights Rear fog light F1 Style Frau leather seats Advanced technologies Recognized sports car company

Positive Emotion	Emotional-job-to-be-done by the product	
Dreaminess	**The product frees the mind and helps to fantasize**	
Product		
Type of product	Interior design	
Product name	Xinhua Bookstore	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Beijing Fenghemuchen Space Design Center	
Brand/Company	Xinhua Bookstore, Baoding, China	
Interpretation		**Emotional Design Factors**
The interior design of Xinhua Bookstore is the combination of simultaneously organization and simplicity. There is a master application of the wood as main material. The interior design emphasizes the properties of the wood, by harmonising the natural and artificial lights in the different spaces. The warm-light lamps generated the artificial light; the different lamps fit with the different scenarios, or if I can say, the lamps are creating a topic in the spaces. There is a lot of natural light coming from the big windows, this characteristic stimulates the sensation of being in an open space, but without the bustle that could interrupt the reading or any cognitive exercise. The furniture dovetails naturally in the different scenarios creating conditions for the users be accompanied or to be isolated. But, in any of the circumstances what it is a fact is that the furniture offers a sensation of freedom inviting the people to rest their minds and fantasise while they are reading.		Simplicity and well organized Harmony between natural and artificial lights Sensation of being in an open space, but without bustle Furniture offers a feeling of freedom inviting the people to rest their minds.

Positive Emotion	Emotional-job-to-be-done by the product
Empathy	**The product stimulates feelings of understanding and closeness towards other people**

Product

Type of product	Office Desk
Product name	Stand Up
Source	Red Dot Award Product Design - Best of the Best 2017
Designed by:	Tomasz Augustyniak
Brand/Company	Mikomax Smart Office

Interpretation	Emotional Design Factors
Nowadays contemporary work places are more dynamic, Stand Up office desk address the new ways of collaborating. The principal characteristic of Stand Up desk is its adaptability. Firsts, it allows the user to adjust the height of the table to have different work positions along the day. Second, the mechanism permits to match the height of the desk with others desk, creating a perfect point to share information, hear opinions and organize quick meetings.	The mechanism permits to create a perfect point to share information, hear opinions and organize quick meetings

Positive Emotion	Emotional-job-to-be-done by the product
Enchantment	**The product astonishes me and leaves me speechless**

Product

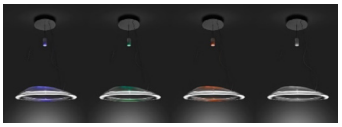
Type of product	Interior Design
Product name	Slim and White Axolute Code
Source	XXIV edition Compasso d'Oro Award (2014 year)
Designed by:	Ico Migliore and Mara Servetto
Brand/Company	Bticino

Interpretation	Emotional Design Factors
The installation was created to present the new products of BTicino Axolute white solution and Axolute Etèris. The visitors were captivated by the ravishing space, created by the merger of non-static real scenario and virtual landscapes. The non-static scenario is formed by walls covered with one thousand and two hundred books with quotes and thoughts on their white pages; the air blowing subtly creates a magical and delighted environment with the movement of the thousands of white pages in the walls. The virtual landscape is created by a big central screen in the main wall and with some screens elevated in the floor. The virtual expressions show the new products of Btcino in a balanced way with the real environment, matching perfectly the movements of the products with the movements of the pages in the walls.	The walls covered with one thousand and two hundred books with quotes and thoughts on their white pages The air blowing subtly creates a magical and delighted environment with the movement of the thousands of white pages in the walls

Positive Emotion	Emotional-job-to-be-done by the product	
Euphoria	**The product provokes a state of excitement**	
Product		
Type of product	Interior Design	
Product name	Omni Nightclub Taipei	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Etai-Space Design Office (Hsiang Hao Chang)	
Brand/Company	The LOOP Inc.	
Interpretation		**Emotional Design Factors**
The Omni Nightclub Taipei concept is designed to intensify the happiness. The scenario is created by lights flowing powerfully and harmoniously with the bits of the music, exalting the emotions that the songs can provoke to people. The architectural configuration of Omni nightclub provokes interaction between the visitors, through the organic arrangement of the spaces. The night clubbers can feel immerser in the excited environment of the spatial settings of Omni Nightclub Taipei.		The scenario is created by lights flowing powerfully and harmoniously with the bits of the music.

Positive Emotion	Emotional-job-to-be-done by the product	
Hope	**The product arouses a state of expectation linked to the fact that something good is about to happen or to the desire for a certain thing to happen**	
Product		
Type of product	Refrigerator	
Product name	LG Smart InstaView	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Kyutae Park, Kyukwan Choi, Hangbok Lee, Minsub Kim	
Brand/Company	LG Electronics Inc.	
Interpretation		**Emotional Design Factors**
The refrigerator has a holistic system of food storage interaction. First it permits to see what it is inside of the refrigerator without open it, juts by a simple knock in the door; this gesture turns on a light that allows the user to see the food inside through a tinted panel glass. Then, by an app the user can check what remains in the fridge and optimizes the groceries shopping. We know that the kitchen has always been a meeting point in the house, now with the LG Smart InstaView, the kitchen has an entertaining interaction. The technology of the refrigerator permits to the user send messages, watch films, read recipes, write memos and obviously administrate the food on the fridge. The refrigerator pictures an optimistic experience in the kitchen.		The refrigerator permits to see what it is inside of it, without open its doors It helps to optimize the groceries shopping Its technology allows to have an entertaining experience in the kitchen

Positive Emotion	Emotional-job-to-be-done by the product	
Inspiration	**The product ignites a creative impulse**	
	Product	
Type of product	Lighting System	
Product name	Alphabet of Light	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	BIG – Bjarke Ingels Group	
Brand/Company	Artemide	
	Interpretation	**Emotional Design Factors**
The principal features to startle of the Alphabet of Light are: 1) the invisible electromagnetic connector system that produces a continuous form of light, 2) the components can be attached easily to each other, and 3) the disposition and number of components used could change the intensity and projection of the light. Taking into account these three features the possibilities to create any form or letter are many; the user can play freely with the light form. The product can be placed in different environments, a room in a house, an indication in a museum, a decoration in an office, the forms will depend in the user's imagination.		The components can be attached easily to each other The disposition and number of components could change the intensity and projection of the light The forms will depend on the user's imagination

Positive Emotion	Emotional-job-to-be-done by the product	
Joy	**The product arouses a state of happiness and cheerfulness**	
	Product	
Type of product	Pendant Luminaire	
Product name	Ameluna	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Mercedes-Benz Style, Daimler AG	
Brand/Company	Artemide	
	Interpretation	**Emotional Design Factors**
Ameluna is a pendant lamp with an asymmetric volume and transparent material. Amenula permits to the user creates an innumerable number of scenarios with the dynamic light; the intensity and colours of the light can be controlled with an app. The transparent material of Amenula makes the lamp to adapt subtly where it is placed, and the different colours of light highlight the environment. Amenula is a combination of the light's competence of Artemide and the Style of forms and materials of Mercedes-Benz; two leaders in their respective fields pursuing to materialize a beautiful and intelligent floating object to play with.		Amenula permits to the user creates an innumerable number of scenarios The intensity and colours of the light can be controlled with an app

Positive Emotion	Emotional-job-to-be-done by the product
Love	**The product stimulates a feeling of profound affection towards someone or something**

Product		
Type of product	Lamp	
Product name	Ascent	
Source	XXIV edition Compasso d'Oro Award (2016 year)	
Designed by:	Daniel Rybakken	
Brand/Company	Luceplan	

Interpretation	**Emotional Design Factors**
It is easy to imagine an intimate moment with the warm light of Ascent. The intensity of the light can change with a subtle movement; this feature gives the control to the user to provoke a proper environment to show affection to some beloved person. The elegant body of Ascent does not represent an invasive object, which makes the lamp fits kindly in an indoor environment.	The intensity of the light can change with a subtle movement
	Warm light

Positive Emotion	Emotional-job-to-be-done by the product
Pride	**The product stimulates deep pleasure or satisfaction that rise from achievements**

Product		
Type of product	Office Chair	
Product name	Trinetic	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Boss Design	
Brand/Company	Boss Design	

Interpretation	**Emotional Design Factors**
Trinetic embodies the sophistication of a well-balanced and timeless design. Trinetic is the expression of an outstanding classic object, created by the clean configuration and by the chromed aluminium in the frame. The office chair has a hidden advanced technology, to bring the best sitting position. The chair adapts to the body of the user without a manual adjustment. Sitting in an elegant office chair can make feel the user confident and pleased with her/himself at work.	Timeless design
	Clean configuration
	Chromed aluminium in the frame
	Advanced technology; the chair adapts to the body of the user without a manual adjustment

Positive Emotion	Emotional-job-to-be-done by the product	
Relaxation	**The product stimulates a state of peace and serenity**	
	Product	
Type of product	Shower System	
Product name	Methven Aio Aurajet	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Methven Ltd	
Brand/Company	Methven Ltd, Auckland, New Zealand	
Interpretation		**Emotional Design Factors**
To take a shower can be seeing as an ordinary daily activity, the Methven shower system converts the ordinary activity into a moment of scape to calm the mind. Methven Aio Aurajet is a shower system that express a minimalist design. The material of the shower head is significantly reduced, shaping a ring; that, when the water enters to play, the water ring gives the feeling of being in a natural water source. The reduced material in the non-fixed shower head, offers lightness and subtlety when the user drops the water in her/his body. Methven Aio Aurajet shower system offers a comforting showering experience through its purist appearance.		Purist design The shower head gives the feeling of being in a natural source of water The reduced material in the non-fixed shower head, offers lightness and subtlety when the user drops the water in her/his body

Positive Emotion	Emotional-job-to-be-done by the product	
Sensuality	**The product stimulates seductiveness or physical attraction**	
	Product	
Type of product	Modular Washbasin System	
Product name	I Catini – Catino Doppio	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Andrea Parisio and Giuseppe Pezzano	
Brand/Company	Ceramica Cielo	
Interpretation		**Emotional Design Factors**
I Catini is a product to exalts the beauty of the human body. I Cantini is constructed on a on a slim frame made on stainless steel combined exquisitely with ceramic or marble materials; making it tremendously sexy. The pure design makes people being the protagonist of the space and feel sexy when enjoying the daily routine of body care.		Slim frame made on stainless steel combined exquisitely with ceramic or marble materials The design is extremely pure that makes people being the protagonist of the space and feel sexy

Positive Emotion	Emotional-job-to-be-done by the product
Surprise	**The product amazes with something unexpected causing a state of pleasure**

Product		
Type of product	Chair	
Product name	Magis Spun Chair	
Source	XXIV edition Compasso d'Oro Award (2015 year)	
Designed by:	Thomas Heatherwick	
Brand/Company	Magisdesign	

Interpretation	**Emotional Design Factors**
Spun chair is a product that provokes surprise, definitely! why? The sculptural vessel shape of Spun is totally unconventional for a chair; when it is leaned on its side the user can have so much fun going side to side or spin it around; and regardless of the sudden movements that the user can do the chair maintains the balance. Spun chair is a master combination of shape, balance, material (polypropylene) and manufacture method (rotational model technique) that all together makes Spun chair a design icon. Spun highlights the space where it is placed, it is not a humdrum object.	The sculptural vessel shape is totally unconventional for a chair
	The chair maintains the balance regardless of the sudden movements that the user can do

Positive Emotion	Emotional-job-to-be-done by the product
Vitality	**The product makes me feel vital and full of physical and mental energy**

Product		
Type of product	Wireless Headphones	
Product name	AirPods	
Source	Red Dot Award Product Design - Best of the Best 2017	
Designed by:	Apple	
Brand/Company	Apple, Cupertino, USA	

Interpretation	**Emotional Design Factors**
AirPods is a set of wireless headphones ergonomically well solved. The headphones provoke a sensation of freedom. The Airpods adapt to the user ears in a way that they become part of the human body, allowing to the user perform its activities without elements that interrupt its space. The headphones sitting firmly in the ear permitting to the user exercise and concentrate on its body movements; but in a cognitive activity the clean space of cables can lead to a better mind concentration. AirPods are manufactured by Apple, and as other Apple devices the Airpods can connect and work with other Apple products. AirPods express by themselves the identity of Apple, not only because of their function of connection with any Apple product, but, by their light colours, clean shapes and intuitive usage.	Allows to the user performing its activities without elements that interrupt its space
	The headphones sitting firmly in the ear
	The clean space of cables can lead to a better mind concentration
	AirPods express by themselves the identity of Apple

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Emotion-Driven Innovation

Teresa Alaniz