

**Improving Social Interactions:
Developing Products to Promote Human Interactivity**

by

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Abstract

The form of social interaction has been undergoing significant changes since the information era began in the 1990s. People born in this era and who have been exposed to the Internet, social networks, and mobile systems from their earliest youth are considered Digital Natives. Studies show that they spend more and more time on online socializing and sometimes neglect their relations in real life. The Interactive Product Design (IPD) method is proposed in this paper to help designers develop interactive products which promote human-human interactions in social contexts. The IPD cards and a toolkit are created to conduct the IPD method effectively. The usage of the IPD method and the toolkit is shown by the example design implementation.

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1 Introduction

1.1 Problem Statement

Socializing seems to be a natural ability humans have; however, it has been undergoing significant changes in human-human socialization since the information era began in the early 1990s. People used to interact with others more in person; current forms of social interaction tend to fall into a more virtual practice through social media. Due to growing concern about the new generation's use of Internet as well as their socializing ability, many studies and surveys have been undertaken to discover the actual impact of Internet on social interaction. Internet has become an essential part of people's lives and it provides rich resources and convenience with no doubt. However, studies also discovered that digital natives spend more and more time on online socializing and sometimes neglect their relations in real life. The *displacement* theory of Internet use suggests that as the time people spent on one activity simply cannot be spent on another activity (Nie & Hillygus, 2002); people probably sacrifice their in-person interacting time to fulfill their online socializing demands. Additionally, people are surrounded by various types of personal devices, which drive their attention into a relatively blocked and individual world and reduces some chances of interacting with other people.

1.2 Need for Study

Social interaction plays a very important role on both humans' psychological health and physical health. Studies show that social relationships can help people deal with work and life pressures and help them build up healthy lifestyles (Kiecolt-Glaser et al. 2002; Thoits 1995; Uchino 2004). Moreover, bad quality or low quantity of social relationships may cause medical issues (Umberson & Montez, 2010). It is valuable to consider people' social interaction as an essential issue in the designing process.

Lots of product design processes focus on individual users, which aim to enhance users' productivity and provide high usability. However, humans live in a social context; human-human interaction is equally important as human-product interaction. Additionally, there is a common misunderstanding of Interaction Design: it is fundamentally concerned with the digital medium (Buchanan, 2001). There is also lack of product design approaches that focus on human-human interaction.

1.3 Purpose of Study

The objective for this thesis is to create a set of tools that encourage design thinking while engaging in human centered designing to promote human-human social interaction. The tool, a set of cards and auxiliary information, is created specifically for engaging designers and stakeholders to explore design problems. This study includes the following goals:

- To study the definition of social interaction and its influence.
- To identify the appropriate meaning of Interaction Design.
- To investigate digital natives' behavior patterns.
- To study the design thinking process and the structure of design methods.

- To study theories of promoting social interaction through products.
- To study existing cases and conclude their features of promoting human interactions.
- To develop the structure of design instruction cards.

1.4 Assumptions

This study is directed based on the following assumptions:

- All the research, approaches, methods and data found are correct.
- Designers using this design method have a basic understanding and knowledge of design thinking process and methodologies.
- Humans have the ability to interact with other humans and objects.
- Social interaction is a component of a person's life.

1.5 Scope and Limits

This study focuses on the methodology of creating a design process for products that promote human-human social interaction, especially for people in the Millennial and Z Generations. The aim of the design method is to be universal and widely applicable in all categories of product design. However, it also has some limits:

- Cultural context of designers' belief, cognition, value and their definition of positive social interaction may have impact on implementation of the design method and results of evaluation.
- Cultural context of users' belief, cognition, value and their hobbies of interaction may have impacts on the results of evaluation.

- This design method is theoretically applicable to different states of interpersonal relationships, but its effectiveness may vary in different interpersonal relationships.
- This design method is theoretically applicable to different types of products, but its effectiveness may vary in different types of products.
- The strategies in Step 4 come from Case Studies, which have not been peer-reviewed. Their effectiveness in promoting human-human interaction has not been tested.
- The application of this design method has not been tested because of force majeure (the Covid 19 pandemic in the year 2020).

1.6 Anticipated Outcome

The primary outcome of this thesis provides a designer-led tool for professionals or students who are practicing in a design studio with the goal of developing products to promote social interaction. This tool kit includes a set of design instruction cards, an information chart of Generation Z, a chart of the design tree, and observation record sheets and their use instruction.

1.7 Definition of Terms

- **Affordance:** refers to the perceived and actual properties of the thing, which determine how the thing could be used (Norman, 2013).
- **Interactability:** a product's ability to promote human-human interaction.
- **Interaction design:** focuses on how human beings relate to other human beings through the mediating influence of products (Buchanan, 2001).
- **Interactive Product Design (IPD):** a design method which is used to create products with the aim of promoting social interaction.

- **Interactive Product:** products that can improving human-human interaction.
- **Operable Suggestion:** features of product that relate to the suggestion of manual operation like mechanical switches or levers.

2 Social Interaction, Interactivity and Digital Natives

2.1 Social Interaction

2.1.1 Definition of Social Interaction

The general meaning of Interaction is “an occasion when two or more people or things communicate with or react to each other” (Cambridge Advanced Learner's Dictionary & Thesaurus, 2008).

Social interaction is the process of mutual influence exercised by individuals over one another during social encounters (Little, 2016). In a micro-level, according to the new field of study called *Microsociology* created by Erving Goffman, interaction includes those acts people perform toward each other and the responses they give in return (Alida, 2015). Usually social interaction refers to face-to-face encounters in which people physically meet with each other. However, in contemporary society, social encounters are also technologically mediated such as in texting, Skyping, or messaging (Little, 2016).

Social interaction could be defined as a communication between two or more people where there is delivery of information or materials and a response. Additionally, between the opportunities of work collaboration or play (as in really having fun together), being present in the same space or sharing a point of focus is also considered social activities (Ludvigsen, 2006).

This expands the meaning of social interaction to include two different levels of human interaction: 1) where people are actually participating in the activity with others; 2) where people observe the activity and share the focus of others.

2.1.2 Rules of Social Interaction

There are three layers of rules for social interaction: the occasion, the situation and the encounter. Their relationship is that the *occasion* contains the *situation*, which again contains one or more of the *encounters* (see figure 1.1) (Ludvigsen, 2006).

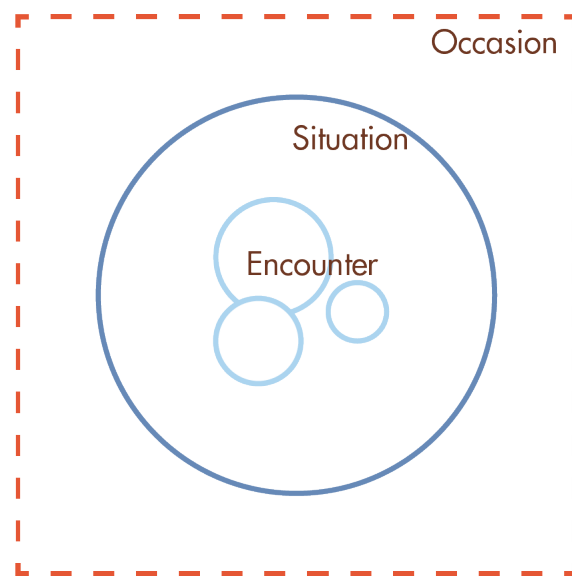


Figure 2.1: Layers of Rules Defining Social Interaction (adapted from Ludvigsen, 2006)

The *occasion* is the social construct which informs people about how to act in the social circumstances before they enter. The *situation* is the specific manifestation of the occasion, which would be influenced by other things such as number of participants and/or spatial arrangement. The *encounter* consists of only two or more people present together, focusing on a shared object (Ludvigsen, 2006).

Understanding different layers of social interaction reminds designers to consider the product's effects on different interaction levels.

2.1.3 The Conceptual Framework of Social Interaction

The conceptual framework of social interaction is represented in four layers: distributed attention, shared focus, dialogue, and collective action (Ludvigsen, 2006). The following provides the definitions of each term.

- Distributed Attention: people do not have an apparent center of attention, which means they will have different focuses around the space or each other.
- Shared Focus: all the people will have their attention around an object, and they feel they are part of the social grouping.
- Collective action: people work together for a shared goal and engage in the same activity.
- Dialogue: people exchange opinions or objects and share attention with each other.

Social interaction between humans can be improved by creating a shared focus in gatherings that helps people to connect to each other strongly and lays out the opportunity for further interaction. Therefore, the purpose of designing interactive products is to provide a shared focus for people's social interaction, which also acts as the context for reaching further levels like dialogue and collective action.

2.1.4 A Common Social Interaction in History

Communication is a very common form of social interaction. Human communication technology has evolved considerably since the oldest known cave painting dated to around 30,000 BC. After cave painting, symbols were generally developed and expressed as Pictograms

and Ideograms which became the foundation of writing (Lester, 2005). Later the invention of printing significantly expanded the ability to reach readers and made the information even more accessible. In 1876, the first electric telephone was exhibited by Bell and Watson (Coe, 1995). With the invention, people were able to talk to others over a long distance. The telephone lets verbal communication cross the distance of space. When the Internet appeared in 1989 (Couldry, 2012), it seemed to take over the world of human communication because it provided people a significant volume of information and allowed them to connect with numerous other people just with clicks.

However, an overall inspection of the history of human communication shows that the needs of delivering information and communicating, from ancient to present, have never changed. The typical forms of communication, as sounds, images, symbols as well as languages, have remained. The development of technology allowed these forms to be used across time and space in new ways. For example, radio and printing expanded the target audience while fax, telephone and Internet transport information across time and over great distances. People formerly communicated face-to-face, but, today, after moving into the information era, we have a much wider social network through the addition of online interactions.

Communication forms deliver information and emotion as a mediation, and this mediation can be anything that carries sounds, words, images or any other information. What if we think about turning products into a form of interaction and make them the carrier of information?

2.1.5 The Importance of Social Interaction

Human interaction plays an important role in people's psychological health. Social relationships can help people deal with work pressure and huge life changes. The awareness that a person is valued by others can help reduce the negative aspects of life and allow more focus on positive parts. It can also have a significant influence on people's physical health. In a 2010 report in *The Journal of Health and Social Behaviour*, Debra Umberson and Jennifer Karas Montez, sociology researchers at the University of Texas at Austin, pointed out that many medical issues like repeat heart attacks, autoimmune disorders, high blood pressure, and cancer can be influenced by low quality or quantity of social relationships.

Social interaction has the potential to benefit people's psychological health. Mechanisms for using social relationships to promote health include (but are not limited to): social support, personal control, symbolic meanings and norms, and mental health (Thoits, 1995; Umberson et al., 2010). For example, social support refers to the emotionally sustaining qualities of relationships (Cohen, 2004). Social support may have indirect positive influence on people's physical health through enhanced mental health, by reducing the impact of stress, or by fostering a sense of meaning and purpose in life (Cohen, 2004; Thoits, 1995). Furthermore, the emotional support provided by social ties enhances psychological well-being, which, in turn, may reduce the risk of unhealthy behaviors and poor physical health (Kiecolt-Glaser et al., 2002; Thoits, 1995; Uchino, 2004).

Additionally, healthy habits can be developed by particular social ties. For example, marriage and relationships with children can generate a greater sense of responsibility to maintain a healthy lifestyle (Nock, 1998; Waite, 1995).

Emma Seppala (2014) of the Stanford Center for Compassion and Altruism Research and Education tells us that connection to others helps people to have less anxiety and depression. They have “higher self-esteem, greater empathy for others, are more trusting and cooperative and, as a consequence, others are more open to trusting and cooperating with them.” She also tells us that “social connectedness generates a positive feedback loop of social, emotional and physical well-being” (para 6).

Although there are numerous materials showing the importance of social relationships, this increasingly tech-driven world is becoming more separated from purposeful conversations between humans who are also becoming isolated by virtual social media.

2.1.6 The Impact of Technology on Social Interaction

The form of social interaction has been undergoing significant changes since the information era began. In the 1990s, when the World Wide Web (WWW) opened to the world, blogs appeared, and search engines opened. Then from 2000 to 2004, MySpace, LinkedIn and Facebook were launched. By 2005, YouTube and Twitter were launched, and people saw the iPhone for the first time. A quarter of the earth’s population was using the Internet in 2009 and social media was on a dramatic rise because of smartphones. Currently, social media sites such as Facebook, Twitter and Instagram; messaging services such as WhatsApp, Skype and email; and professional sites like LinkedIn and Target Jobs have become the main types of social interaction mediums (Sujanani, 2014).

The Internet plays an important role in the lives of many people, no matter their generation. The Millennial and Z generations gain social confidence by expressing themselves and interacting with others online. They have all the sources for learning or entertainment, which

are easily accessible. People are able to keep in touch with friends regardless of time and distance. Business is expanding and easier to organize because of the simplicity of connection. However, sometimes online social interaction is distracting, which might lower people's work productivity. Segmented information may drive people towards a much different mode of thinking making it difficult to focus on only one thing. Furthermore, people might spend too much time using online social interaction and sacrifice too much face-to-face interaction, which may eventually cause isolation. Even more serious, a long time without appropriate social interaction could potentially cause dangerous physical or mental problems.

As numerous people have grown concerned about the new generation's use of the Internet, many studies and surveys were undertaken to discover the actual impact of technology on social interaction. The pattern of how the Internet affects interpersonal communication and sociability is complex, which is determined by the location and timing of Internet use (Nie & Hillygus, 2002). Internet use at home and use during weekends both have strongly negative impacts on time spent with friends and family as well as spent on other socializing (Nie & Hillygus, 2002). Some people argue that Internet users can also socialize with their family and friends online. How do we know the time they spend with friends and family is necessarily decreased? A *displacement* theory of Internet use indicates that time on one activity simple cannot be spent on another activity (Nie & Hillygus, 2002). In other words, the more time they spend on social media, the less time they have for interacting directly in person with family and friends.

Lots of technology is designed for single users: consequently, when designers consider the usability and applicability of products, technology often becomes an empowerment of the single user. However, humans are not only individual users; they are connected to other humans

and/or the environment. Humans' interaction bears as much importance as individual interaction with digital technologies (Hornecker & Burr, 2006). This suggests an opportunity for designers to consider focusing some of their attention away from individual users and more towards collective users.

2.2 Interaction Design

2.2.1 Definition of Interaction Design

The current association with interaction in design is that of human-computer interaction (HCI) in *interaction design* (Niedderer, 2006). The term *interaction design* was first used by Bill Moggridge and Bill Verplank in the 1980s (Moggridge, 2007). It is an adaption of the computer science term *user interface design* according to Verplank; it is an improved term for *soft-face* which means products containing software, according to Moggridge (Hsu & Yang, 2013). It is easy to see the term *interaction design* was born with a computer science background, and currently, most research and design theories for interaction design are around human-computer interaction. It emphasizes functionality and ergonomic standards, and it is used to deal in particular with the interactions between humans and computers. With regard to these, Buchanan (2001, p. 11) remarks that "There is a common misunderstanding that interaction design is fundamentally concerned with the digital medium." Buchanan goes on to define interaction design more broadly, emphasizing that interaction design should be "... focusing on how human beings relate to other human beings through the mediating influence of products" (2001, p. 11). He also suggests that the product can be physical or in other forms like experience and services.

2.2.2 The Triangular relationship of Interaction

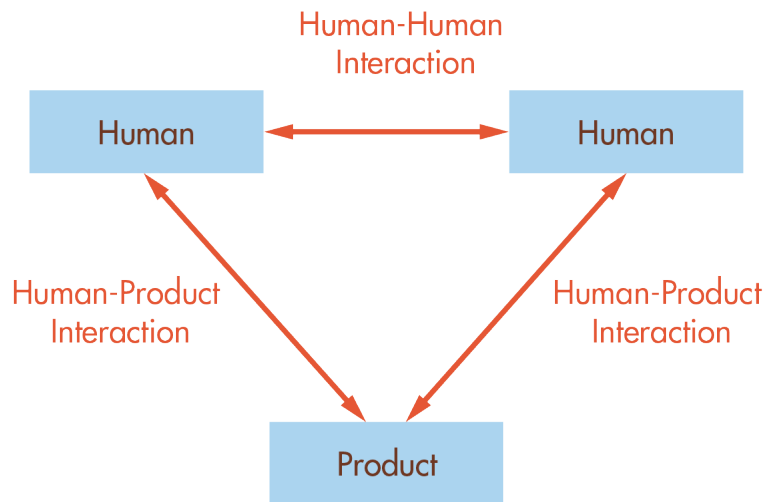


Figure 2.2: The Triangular Relationship of Interaction (adapted from Niedderer, 2004)

Based on Buchanan's redefined views of *interaction design*, Niedderer (2004) described her theory of interaction in design as a triangular relationship. Figure 2.2 shows a triangular Interactive Product Design method based on and simplified from Neidderer's theory in order to be more applicable to the design method proposed in this thesis.

There are two types of relationships, human-human interaction and human-product interaction, that make up this triangle, in which the product is working as a medium between these humans. The definition of interaction design in this paper is not the mainstream — HCI. Instead, interaction design is in the means of facilitating human-human interaction through product design. This design method, Interactive Product Design (IPD), is used to create products with the aim of promoting social interaction.

The core meaning of designing interaction is to develop products that will have a mediating effect on people in the interactive space, and these products are the prototypes and the boundary objects (Ludvigsen, 2006).

2.2.3 Tangible Interaction

Tangible interaction is an increasingly popular term in HCI, which relies on tangibility and full-body interaction. In the understanding of product design, tangible interaction emphasizes bodily interaction with objects, exploiting the sensory richness and action potential of physical objects, so meanings are created during interaction (Djajadiningrat et al., 2002). A framework of tangible interaction proposes four themes: tangible manipulation, spatial interaction, embodied facilitation, and expressive representation. Each theme provides a set of concepts that help with understanding the interaction with tangible interaction systems and becoming the support of social interaction (Hornecker & Burr, 2006). For example, haptic direct manipulation, lightweight interaction, and isomorphic effects are the concepts for tangible manipulation. These sets of concepts ask questions such as can users grab and feel the elements; can users easily proceed in simple, experimental steps; how easy is it to understand the relation between actions and their effects? Because the tangible manipulation happens in the real world, the interactions with products are easily observed (Hornecker & Burr, 2006). They lend to the support of face-to-face interaction.

2.3 Digital Natives

2.3.1 Defining the User – True Digital Natives

Digital natives can be separated into two generations — the first born 1980-1995, and the second generation born in the period 1995-the present. This second generation of digital natives overlaps with Generation Z (GenZ) and are usually considered as true digital natives because they have been exposed to the Internet, social networks, and mobile systems from their earliest youth (Francis & Hoefel, 2018).

2.3.2 Basic Information

In 2014, GenZ became the largest generation in the U.S. population, totaling more than one-quarter of the population. It is probable that GenZ will play a very important role in the coming decades and will have great impacts on the following generation.

The design method proposed in this paper is developed to be applied to GenZers (people belonging to Generation Z) who were born from 1995 to 2020 and are considered to be the true digital natives.

The following figures 2.3.1-2.3.2 summarize information, preferences, cognition and learning patterns of Generation Z (GenZ) and is one representation of the way GenZ prefers to receive information (Prensky, 2001). More details are included in the text of sections that follow.

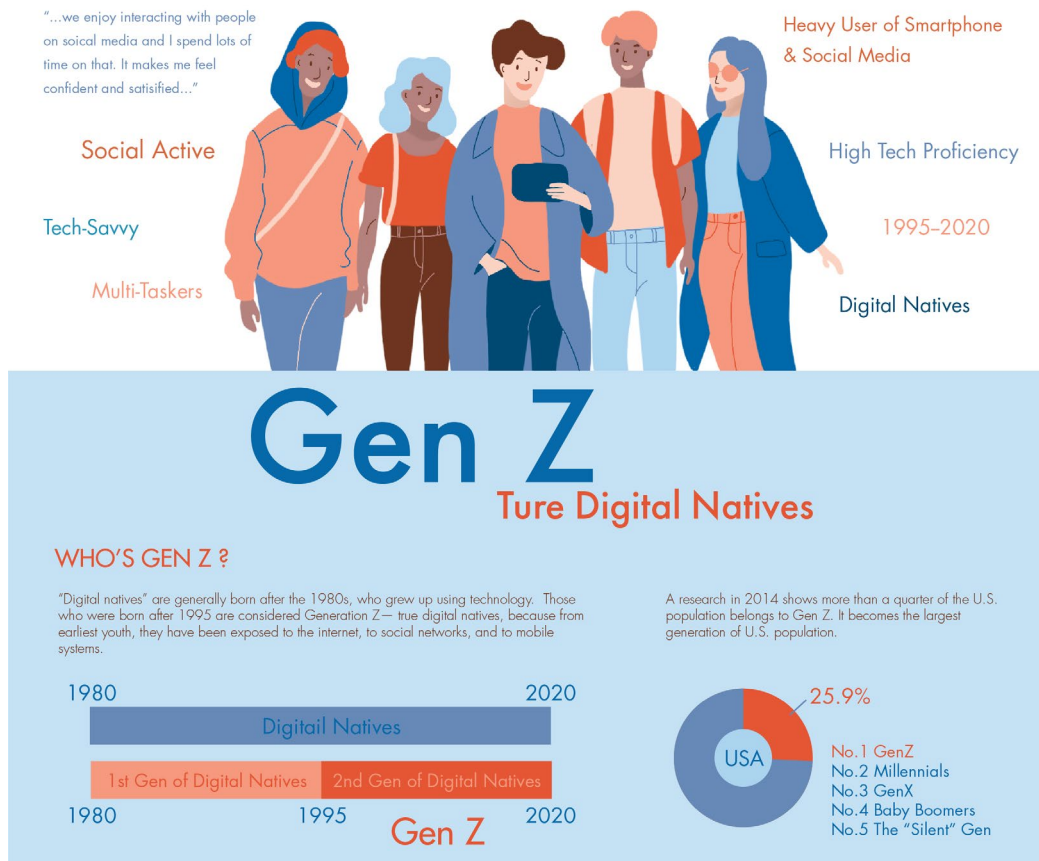


Figure 2.3.1: Characteristics of GenZ, the true digital natives (1 of 2)

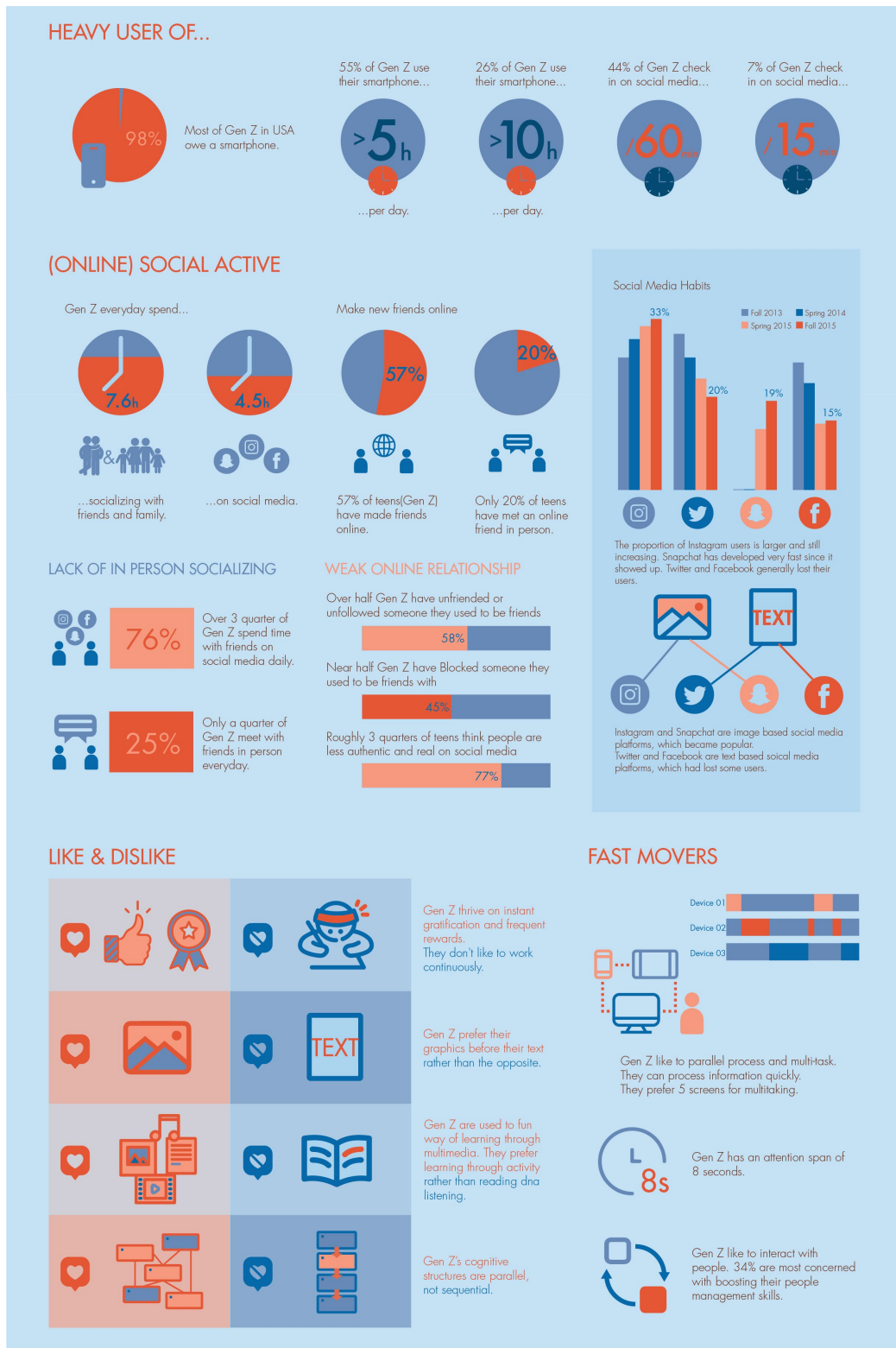


Figure 2.3.2: Characteristics of GenZ, the true digital natives (2 of 2)

2.3.3 Heavy Users of Smartphone and Social Media

As of 2017, 98% of GenZ in U.S. own a smartphone (GlobalWebIndex Q2, 2017), more than half GenZ use their smartphone over 5 hours per day, and about one-quarter use their smartphone more than 10 hours per day. Smartphones have become an essential part of their lives. GenZers check in on social media very frequently, with nearly half checking their social media every 60 minutes, and 7% of them every 15 minutes (The Center for Generational Kinetics, LLC, 2020).

Among popular social media sites, Instagram, Twitter, Snapchat and Facebook are the top four. According to statistics about numbers of users of these social media sites from 2013 to 2015, the proportion of Instagram users is one of the largest and still increasing quickly. Snapchat has been developing very fast since it was introduced in 2011. These are both image-based social media sites. On the other hand, the overall trend of Twitter and Facebook, which are text-based social media sites, is generally losing users in the same period (Trifecta Research, 2015). This also shows Gen Z's preference for images rather than text.

2.3.4 Socially Active

Many people have been concerned that GenZers will become addicted to the visual world built on the Internet and lose their ability to socialize in human-human interactions. However, statistics reveal that people belonging to Generation Z are quite active in socializing, although it happens more online.

GenZers spend an average 7.6 hours socializing with their friends and family every day. However, they also spend average 4.5 hours on social media every day (Adecco, 2015). According to the *displacement* model, these 4.5 hours are probably part of the overall socializing

time, and the more people socialize online, the less they do in person. Within these 7.6 hours of GenZ's socializing, it is reasonable to believe that some is in indirect communications with friends and family. There is more evidence: over three-quarters of teens (who are Gen Z) spend time with friends on social media daily. However, only one-quarter of them meet with friends in person every day (Lenhart et al, 2015). GenZers spend considerable time on socializing, but they seem to spend less time on in-person (human-human) contact.

The Internet also provides a new way for GenZ to make new friends, although some people may be concerned about the quality of those friendships. According to a 2015 survey, 57% of teens (who are Gen Z) have made friends online; however, only 20% of them have met an online friend in person (Lenhart et al., 2015). Because a majority of friendships made online remain online, they are weak compared to friendships in real life. In the same survey, over half of GenZ have unfriended or unfollowed someone they used to be friends with, and nearly half of GenZ have blocked someone they used to be friends with. Furthermore, roughly three-quarters of respondents think people are less authentic and real on social media (Lenhart et al., 2015). GenZers value their relationships built online, but they also doubt the quality of those relationships.

2.3.5 Learning and Cognitive Pattern

GenZers love instant gratification and frequent rewards and prefer games to "serious" work. They are used to fun ways of learning through multimedia such as full color graphics, stereo sound and videos (Kelly, McCain & Jukes, 2009; Tapscott, 2009). They prefer learning through activity rather than reading or listening (Sarkar, Ford & Manzo, 2017). They prefer graphic information instead of text messages (Prensky, 2001).

Their cognitive structures are parallel, instead of sequential (Moore, 1997; Prensky, 2001). They have a tendency to process information in nonlinear ways. (Prensky, 2001; Tapscott, 2009) GenZers are multi-taskers. They can use up to five devices at the same time.

GenZers are used to receiving and processing information very fast. On the other side, GenZers' attention span is very short, which can only last for eight seconds. Interactivity, an immediate response to their every action, can attract their attention and extend their attention spans (Prensky, 2001).

2.4 Product Design to Promote Social Interaction

2.4.1 Performative Objects (POs)



Figure 2.4: Social Cups designed by Niedderer in 1999 (adapted from Niedderer, 2004)

These Social Cups (Figure 2.4) were designed by Niedderer in 1999. None of these Social Cups can stand by itself; each needs to rely on the others to stay on the table. When Niedderer was designing these special and “annoying” cups, she started thinking about how

design can be a means for creating mindful interaction through the use of objects in social contexts. In 2004, she wrote a paper titled “Designing The Performative Object: A Study In Designing Mindful Interaction Through Artifacts”, which suggested that the disruption of functions can induce mindful interaction between people. In other words, a proper sacrifice of usability might trigger interactions among people. Niedderer described this type of product as *performative objects*, “artifacts that can stimulate the user’s behavior by means of their function, thus causing mindful reflection and interaction” (Niedderer, 2004, p. 3).

Mindfulness, function and interaction are the three key concepts of the design method for POs. Niedderer described the relationship of these three concepts in this way: “... interaction is the context in which mindfulness may occur, caused by the performative object’s function. In the process, interaction also becomes the object of mindful awareness” (Niedderer, 2004, p. 6). In this case, the design method of performative objects can be a way to design a product with appropriate functional disruptions to induce mindful interactions.

“The concept of mindfulness refers to the attentiveness of the user towards the social consequence of actions performed with the object” (Niedderer, 2004, p. 4). She also tells us that the established form of perception and experience should be broken in order to induce mindfulness (Niedderer, 2004).

Ligo (1984) suggests functions both in material and immaterial levels are distinct to five aspects: structural articulation, physical function, psychological function, social function, and cultural-existential function. This suggests that the design method of POs — *disruption of function* can be applied broadly and promoting human-human interaction can be considered a function.

2.4.2 Human Interaction Design (HID)

A design method which can improve alienated interpersonal relationships is defined as Human Interaction Design (HID). HID focuses on interactions between people rather than the interaction between people and objects, which is similar to POs. User-centered approach is a basis of HID. It does not emphasize functionality or ergonomics, but instead, it focuses on social relationships (Hsu & Yang, 2013).

The HID design pieces are classified as active HID and passive HID according to the process and categories of interaction design (Figure 2.5). The active HID design pieces have five common features: special form, functional disruption, inducing mindfulness, multiple users, requesting interaction to compensate for functional disruption (Hsu & Yang, 2014). These elements made up a principle of designing interactive products.

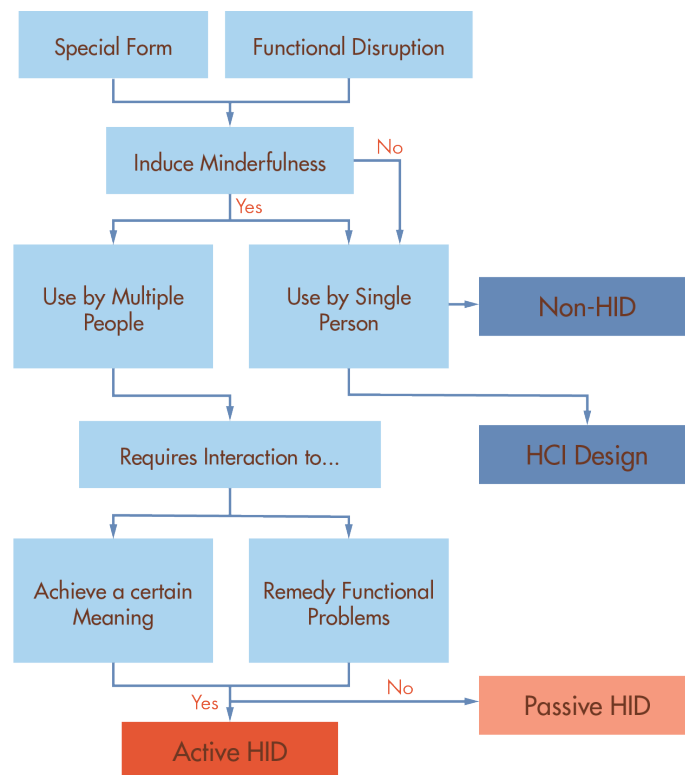


Figure 2.5: The process and categories of interact design (adapted from Hsu & Yang, 2013)

2.4.3 Design for Interest

When the IPD method is applied to develop products, the goal is to provide users with a positive emotion during their interaction with the product and other people.

A study by Yoon et al. (2012) shows that novelty-complexity and coping potential can evoke interest. Novelty-complexity has the combination of meanings of new, unusual, unexpected, complex, and hard to process. Coping-potential is the degree of ability to deal with an event (Silvia, 2005).

Usability is admittedly an influence factor of user emotion. High usability triggers positive emotion and low usability is the opposite. Coping-potential has a congruent relationship with usability, which is that high coping-potential is associated with high usability and low coping-potential is associated with low usability (Yoon et al., 2012). Novelty-complexity shows a negative correlation with usability, which means, theoretically, in order to evoke positive emotion, we should maintain high usability and sacrifice novelty-complexity. However, the study shows that high novelty can evoke positive emotions if it is combined with high coping potential. In other words, it is possible to induce positive emotion by applying high novelty as long as it comes with high coping potential (high usability). Simply described, products that are designed to be novel as well as easy to use should evoke positive emotions.

2.4.4 Design for Playful Interaction

Play is originally a very interactive process. Beckker et al. (2009) address three values for designing playful interaction to stimulate physical activity and social interaction. They are motivating feedback, open-ended play, and player interaction patterns. Motivating feedback can stimulate children to be physically active, and even the onlookers can be involved to share

attention with others and provide ideas for the actual player. Open-ended play provides the opportunity for children to create their own play rules with the object, which possibly generate more interaction among players. Other than these values, the ability of communicating among objects also contributes to creating interaction among players. The feature of sending and receiving information stimulates children to explore games in a social interaction component (Bekker et al., 2009).

3 Case Studies

In order to practically apply the design principles, values, and frameworks from Chapter 2 into the Interactive Product Design method, a review of specific cases will enable abstracting the specific valuable points from these theories, and then allow organization of design strategies for designing interactive products.

Based on the design thinking process and the proposed IPD design method (Figure 3.1), a table is created to categorize and document the information about products studied and includes product type, number of users and their relationships (discussed in Chapter 4.2.1) and use scenario.

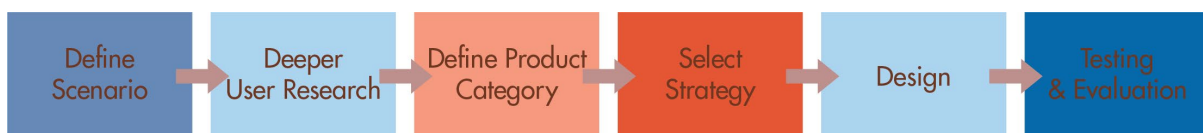



Figure 3.1: Interactive Product Design Process

3.1 Case 01: Social Cups

Product	User's Relationship	Place	Activity	Characteristic
	Acquaintance Build-up Continuation	Public place (e.g. restaurants) Private place (e.g. dining room)	Drink wine together	Proper Disruption of Function
	Product Type	Number of User	Interaction	
	Social + Simple function	2 or more	Pick up and put down the Social Cups together/ Ask for help/ Be asked for help	

The background story of Social Cups can be found in Chapter 2.4.1.



Figure 3.2: Social Cups designed by Niedderer in 1999 (adapted from Niedderer, 2006, p.1)


Social Cups (see Figure 3.2) are used when a group of people gather together, and they serve a simple function as drinking containers. According to the descriptions of product categories in Chapter 4, these should be classified as a “social product”. For the people who use these cups, their relationships could be acquaintances, in a build-up status or even continuation status (see the explanations for

relationships in Chapter 4.2.1). They could be casual friends gathering in a club, a meeting, or an association. They could also be close friends, families and so on. Also, this activity could happen either in a public place or a private place. Compared to normal cups, the interaction involved here is quite rich. If people want to drink a toast, they need to pick up the cups at the same time and also put them down together, which creates more synchronous behaviors among the users. In order for this to happen, people need to talk to each other. One may ask a favor of another to

hold their cup for them. At the same time, others are attracted to watch or even follow. Although these are just simple actions, they actually induce more interactions among users. Because of proper disruption of function, that functionless part of the product needs to be fulfilled by people, which actually involves people in the activity.

According to the conceptual framework of social interaction (in 2.1.3), the social cups work as a shared focus in this situation, and they lead people to have collective activities.

3.2 Case 02: La Gralla

Product	User's Relationship	Place	Activity	Characteristic
	Acquaintance Build-up Continuation	Public place (e.g. restaurants, meeting room) Private place (e.g. dining room)	Take turns to drink coffee	Proper Disruption of Function
	Product Type	Number of User	Interaction	Information/ Material delivery among people
	Social + Simple function	3-10	Pass the container/ Watch others passing or drinking	Relate to Social Culture/Events

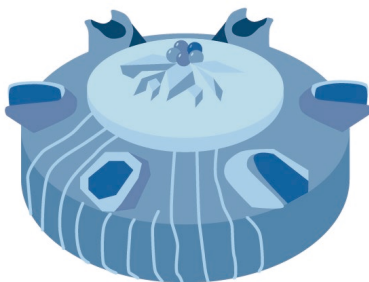



Figure 3.3: La Gralla (adapted from Niedderer, 2006, p. 14)

This ancient, traditional drinking vessel call “La Gralla” (see Figure 3.3) from Northern Italy is commonly used to serve coffee with grappa, sugar, and spices. It has a lid and can have three to ten spouts around its body. La Gralla is served with a number of spouts corresponding to the number of diners, who pass the vessel around and drink directly from its spouts. This action links the diners symbolically. Because this vessel has numerous

spouts, it subverts the functional concepts of ordinary vessels. Therefore, it also attracts attention and forces people to interact to use it (Hsu & Yang, 2014). According to the conceptual framework of social interaction (in 2.1.3), this drinking vessel is a shared focus during the pass around process, and it serves people’s collective activities of drinking from the same container.

La Gralla is usually used on special days such as when guests are in the house or celebrating a festival. This product usage is culture related. It shows the important meaning of ‘sharing’, which encourages people to share with others, and more importantly, to connect people and show concern for others.

3.3 Case 03: Juicy Salif

Product	User’s Relationship	Place	Activity	Characteristic
	Acquaintance Build-up	Private place (e.g. dining room, kitchen)	Squeeze juice	Unusual Appearance Self-expression
	Product Type	Number of User	Interaction	
	Social + Simple function	1	Conversations Show how it works	

This Alessi Juicy Salif citron squeezer (Figure 3.4) was designed by Philippe Starck. It goes well beyond the look of traditional juicers and so always catches people's attention quickly. Norman (2004) addresses that there is another important component of this juicer - "...the reflective joy of explanation. The juicer tells a story... As Starck is rumored to have said, ‘My

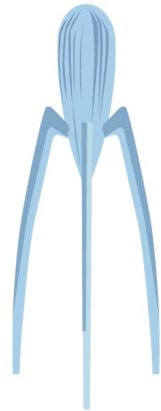



Figure 3.4: Juicy Salif (adapted from Norman, 2004, p. 112)

juicer is not meant to squeeze lemons; it is meant to start conversations” (Norman, 2004, p. 114). This juicer becomes a conversation starter which influences people’s social interaction in dialogue layer (according to conceptual framework of social interaction in 2.1.3).

It shows how a functional and single-use product can become a social product to stimulate conversation. When people first see it, they want it without thinking because it raises peoples’ desires from the instinct level. When people who own this product have guests come by, the unusual look of this juicer attracts their guests’ attention which encourages the host to talk about its story and how the story relates to himself/herself.

3.4 Case 04: Impossible Teapot

Product	User’s Relationship	Place	Activity	Characteristic
	Acquaintance Build-up	Private place (e.g. living room, dining room)	Communicate	Proper Disruption of Function
	Product Type	Number of User	Interaction	Unusual Appearance
	Social	1	Talk	Self-expression

This “impossible teapot” (see Figure 3.5) was created by the French designer Jacques Carelman. Obviously, it is against form follows function and it is very difficult to use, but it



Figure 3.5: Impossible Teapot (adapted from Norman, 2004, p. 3)

attracts people because of its unique look which make people want to own it, which is similar to the “Juicy Salif”. Norman (2004) has this teapot in his collection of emotional products but indicates that he does not use the “impossible teapot” in his daily life; however, when guests arrive, he shows the teapot as a reflection of his values. It is a perfect beginning of a conversation and it always raises interesting

discussions. This teapot’s purpose has changed from serving tea to starting conversation. The impossible teapot influences people’s social interaction in dialogue layer (according to conceptual framework of social interaction in 2.1.3).

3.5 Case 05: Tilting Teapot

Product	User’s Relationship	Place	Activity	Characteristic
	Acquaintance Build-up Continuation	Private place (e.g. living room, dining room)	Make tea Drink tea	New Usage Unusual Appearance
	Product Type	Number of User	Interaction	
	Social + Function	1 or more	Operate the teapot/ Talk	

This Tilting Teapot was designed by the German designer Ronnefeldt. Norman (2004) says it is a good conversation starter between him and his guests.

What makes this teapot unique is its ways of usage. You can see there are three statuses of the teapot form (Figure 3.6). They correspond to the three steps: drawing tea, filtering tea and serving tea. Ronnefeldt’s design strongly followed the form follows function rule. For instance,




Figure 3.6: Tilting Teapot (adapted from Norman, 2004, p. 3)

different ways of standing are to separate water and tea leaves or let them contact; the 'belt' which is around teapot's 'waist' is telling the user where to stop adding water, and the structure of the lid is to make sure it won't fall off when the teapot is in different standing positions. It is a very functional product. In other words, it is not designed for promoting people's interaction. However, what makes its owner want to show it to guests is its

function, its special usage. Guests might ask how it works and enjoy looking at how the host uses it. During this process, it includes operations (from the owner), observations (from the guest), questioning (guest), explaining (owner) and discussing (both). According to the conceptual framework of social interaction (in 2.1.3), the Tilting Teapot works as a shared focus between the guest and the host, and it probably will lead to dialogue layer. Of course, because its form is following its new usage, its appearance is also new, which attracts people's attention in the very beginning.

3.6 Case 06: Motion-Controlled Game

Product	User's Relationship	Place	Activity	Characteristic
	Acquaintance Build-up Continuation	Public place (e.g. Games City) Private place (like dining room)	Play motion-controlled game	Motivating Feedback
	Product Type	Number of User	Interaction	
	Playful	1 or more	Body movement	

A motion-controlled gaming system (see Figure 3.7) is one that allows players to interact with the system through body movements. Input is usually through a combination of spoken commands, natural real-world actions and gesture recognition (Techtarget, 2011).

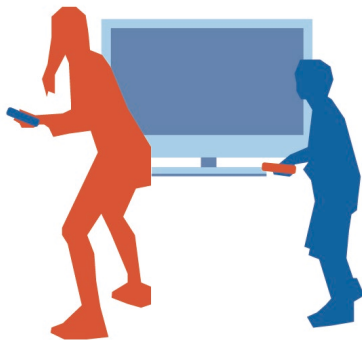



Figure 3.7: Motion-controlled game
(adapted from Kelly, 2009)

Simply described, the game character will act inside the game according to the player's movements, which makes the players feel like they are inside the game. The motivating feedback (the character's reactions) comes from the screen and no matter whether the result is success or failure, it encourages users to try again and become more active. The motion-controlled game affects people in collective activity layer (see 2.1.3).

Bekker et al (2009) address that “receiving feedback stimulates children to be physically active”. The game Battle Bots illustrates this statement. It allows children to remotely control the game with their body movements. They found that the children were enthusiastic in playing the game and the onlookers also become involved by providing ideas.

3.7 Case 07: Dual Rocking Chair

Product	User's Relationship	Place	Activity	Characteristic
	Build-up Continuation	Private place (e.g. bedroom, living room)	Sitting	Eye contact Facial expressions
	Product Type	Number of User	Interaction	
	Social + Simple function	1 - 2	Eye contact/ Rocking the chair	

This dual rocking chair (see Figure 3.8)

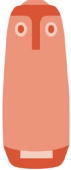


Figure 3.8: Dual Rocking Chair (adapted from Markus Krauss, n.d.)

called ‘Sway’ was designed by Markus Krauss and handmade in Germany. The oversized cushion offers plenty of room for two people. They can sit on this chair and talk to each other with eye contact and facial expressions while rocking. It provides a more casual, comfortable and fun environment for people to talk. It becomes the shared focus between these two users in this environment (according to conceptual framework of social interaction in 2.1.3).

According to a study of human adult pairs, real-time eye contact is the basis of effective social interaction because it conveys the message “I am attending to you,” thereby promoting effective communication and enhancing social interaction (eNeuro, 2019). It will be easier for people to start, as well as keep their conversation going, when they have eye contact and facial expressions for communicating.

3.8 Case 08: Meeting Owl

Product	User's Relationship	Place	Activity	Characteristic
	Stranger Acquaintance	Public place (e.g. meeting room)	Have a meeting	Eye contact Facial expressions
	Product Type	Number of User	Interaction	
	Social + functional	2 or more	Eye contact/ Facial expressions/ Speaking/ Listening/ Discussing	

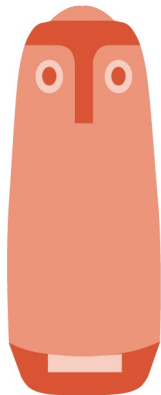



Figure 3.9: Meeting Owl (adapted from Owl Labs, 2019)

The Meeting Owl (see Figure 3.9) is a smart video conferencing camera which dynamically captures 360° video and audio (Owl Labs, 2019).

Compared to the previous way of having an online meeting with an immovable camera, the Meeting Owl tries to simulate the real situation people have during an in-person meeting where people will look at and pay most of their attention to the person who is speaking. It is like the person who is talking is talking to everyone else individually, which helps people from being easily distracted by something around them or their own thoughts. It also

shows how important it is to have eye contact and facial expression among people. Meeting participants actually increased and improved their interaction by providing supplementary information or even actual meanings for what people are saying when using this product. According to the conceptual framework of social interaction (2.1.3), the meeting owl serves people in the social interaction layer of dialogue.

3.9 Case 09: ColorFlares

Product	User's Relationship	Place	Activity	Characteristic
	Acquaintance Build-up Continuation	Public place (e.g. playroom) Private place (e.g. bedroom)	Playing	Information delivery among products Open-ended Play
	Product Type	Number of User	Interaction	
	Playful	2 or more	Deliver color through this ColorFlares	

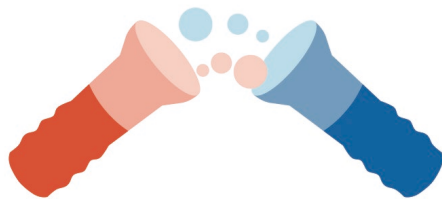



Figure 3.10: ColorFlares (adapted from Bekker et al, 2009)

This toy called ColorFlares (see Figure 3.10) allows children to send and receive colors by putting their ColorFlares close to each other, then the same color can be transmitted from one ColorFlare to the other. It stimulates children to explore games that use this functionality, leading to games with a social interaction component (Bekker et al, 2009).

Information delivery is an essential part in humans' interaction. In this case, ColorFlares plays the role as a messenger. When children were able to deliver their messages, they would be able to create their own rules for playing the game as well

as interacting with each other. The ColorFlares affect children in both dialogue and collective activity layers of social interaction (see conceptual framework of social interaction in 2.1.3). The social interaction during playing depends on the interaction opportunities that are offered by the interactive objects and their characteristics.

3.10 Case 10: Lego

Product	User's Relationship	Place	Activity	Characteristic
	Stranger Acquaintance Build-up Continuation	Public place Private place	Play Legos	Open-ended Play (open-ended Usage)
	Product Type	Number of User	Interaction	
	Playful	1 or more	Build something together with Legos	

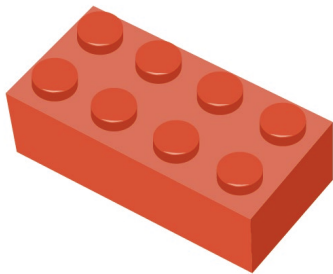


Figure 3.11: Lego bricks (adapted from Lego, 2015b)

Lego (see Figure 3.11) is a line of plastic construction toys that are manufactured in Billund, Denmark (Lego, 2015a). Legos consist of colorful interlocking plastic bricks accompanying various other parts that can be assembled and connected in many ways to construct objects, and then reused to make new things (Lego, 2015b).


LEGO and other simple blocks and construction toys facilitate kid-directed recreation — the opportunity to play without structure, to build and take apart as necessary. They tend to elicit less goal-directed play, do not come with a set of instructions, and are often considered to be a means to promote open-ended play (Kulman, n.d.).

According to the different layers of social interaction in 2.1.3, the ability of Legos allowing open-ended play influences players' social interaction in collective level.

Creating opportunities for players to define their own game goals and rules is a design value to promote social interaction and is also an important aspect of children's play behavior (Bekker et al; 2009).

According to the chart above, the interaction created by this strategy includes more interaction types (cooperation, competition and exchange). Because of its open-ended characteristic, it actually gives more flexibility to the number of users and their relationship, playing place and interactions. Similarly, if you apply this theory to product design, it gives flexibility to users in how they use the product and how they interact with others through the product.

3.11 Case 11: Monopoly

Product	User's Relationship	Place	Activity	Characteristic
	Stranger Acquaintance Build-up Continuation	Public place (e.g. playroom) Private place (e.g. living room)	Play board game — Monopoly	Symbolic Characters
	Product Type	Number of User	Interaction	
	Playful	2 or more	Take turns operating their character	

Monopoly (see Figure 3.12) is a traditional and very popular board game which is derived from *The Landlord's Game* created by Lizzie Magie in the United States in 1903 (Pilon, 2015). It simulates a micro economic market and every player in this game is a capitalist who

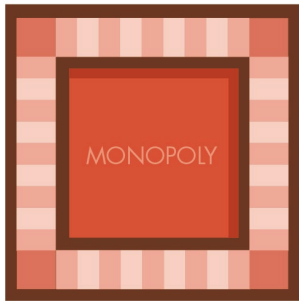


Figure 3.12: Monopoly

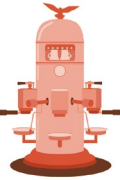
tries to corner the market. The money, properties and certain society rules are symbols from the real world, which help people dive into the situation and play the game. When people pretend to be their characters, they will do certain things which match their characters, so, they set up competition or cooperation relationships naturally, because the relationships are already decided by

the characters. Further, players will act properly and have interaction with others as needed. In this case, the player is a capitalist who takes the opportunity to buy and trade properties and collect rent from the opponents. Every players' goal is to drive the other players into bankruptcy, so, everybody would be in a competition relationship and try hard to occupy the most valuable location on the game board or use special cards to pull others down.

Monopoly affects people's social interaction by generating topics for dialogues and bringing people into a collective activity (according to conceptual framework of social interaction in 2.1.3).

Similarly, it is also very common to play as characters in video games. People enjoy trying something different that they cannot do in real life. When offered opportunities to have co-players, the players would easily interact with each other because they belong to the same character, which gives them a sense of belonging.

3.12 Case 12: Venus Bar

Product	User's Relationship	Place	Activity	Characteristic
	Stranger Acquaintance	Public place (e.g. a party, a club)	Have a cup of coffee	"Operable" Suggestion Affordance
	Product Type	Number of User	Interaction	
	Functional	1-4	Operate the coffee maker/ Observe other's operation/ May talk	

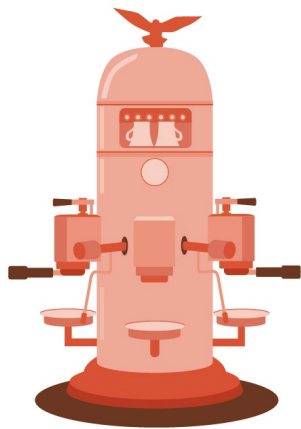


Figure 3.13: Venus Bar (adapted from Va Machinery, 2020)

Venus Bar (see Figure 3.13) is from Victoria Arduino. What is worth to mention in this case is not about how luxurious and beautiful this coffee machine looks, but that the switches and handles suggest users to discover them and play with them. As it is designed for multiple users, it allows strangers or acquaintance gatherings in some moments during the event. It serves as a shared focus in the using situation (according to the conceptual framework of social interaction in 2.1.3).

A previous study showed that if a person observes others operating a tool or a physical device, the action rule of observed action would be automatically activated and influence the observer. It also said that priming effects are modulated by the operating handles of the device (Massen, 2009). In other words, the operation of a physical device by one person can affect another person who might follow the operation rules and interact with the physical device.

Norman (2004) used the term *affordance* to describe the ability of a physical object to provide clues to its operation. On the other hand, a convenient coffee machine, which just needs simple operations (press several buttons), has clean appearance, and is very efficient has fewer affordances for manual operation.

Because of the use of digital products, people are more and more used to tapping and clicking on the laptop, touch and swipe on the screen. Operations with knobs, handles and other more mechanical like switches could easily raise users' mindfulness, which means they could notice what they are doing and pay more attention to it.

3.13 Knowledge Gained from Review of Case Studies

These case studies provided an opportunity to analyze what characteristics of those products actually induce people's interaction. These characteristics become the strategies that can be applied as one step of the design method that can be found in detail in Chapter 4.

- **Proper Disruption of Function**
- **Unusual Appearance**
- **New Usage**
- **Open-ended Usage**
- **Motivating Feedback**
- **Information Delivery between Products**
- **Culture-Related**
- **Operable Suggestion / Affordance**
- **Symbolic Character**
- **Eye contact / Facial Expression**

4 Developing an Interactive Product Design Approach

4.1 IPD (Interactive Product Design) Approach

The goal of this study is to create a design method which can promote human-human social interaction.

4.1.1 Learning from the Design Thinking Process

Based on the design thinking model proposed by the Hasso Plattner Institute of Design at Stanford (d.school) (Dam & Teo, 2020) and developed by David Kelley and Tim Brown of IDEO in the 1990's (Gibbons, 2016), Interactive Product Design (IPD) proposed in this chapter is a variational design method for creating interactive products, which can promote social interaction. The five-stage design thinking model proposed in Figure 4.1 includes these stages: 1) Empathize, 2) Define (the problem), 3) Ideate, 4) Prototype and 5) Test (Doorley et al, 2018). Based on these five stages, IDEO refined the design thinking model by adding the sixth stage — Implement - and classified these six stages into three larger subjects: 1) understand, 2) explore, and 3) materialize (Figure 4.2) (Gibbons, 2016).

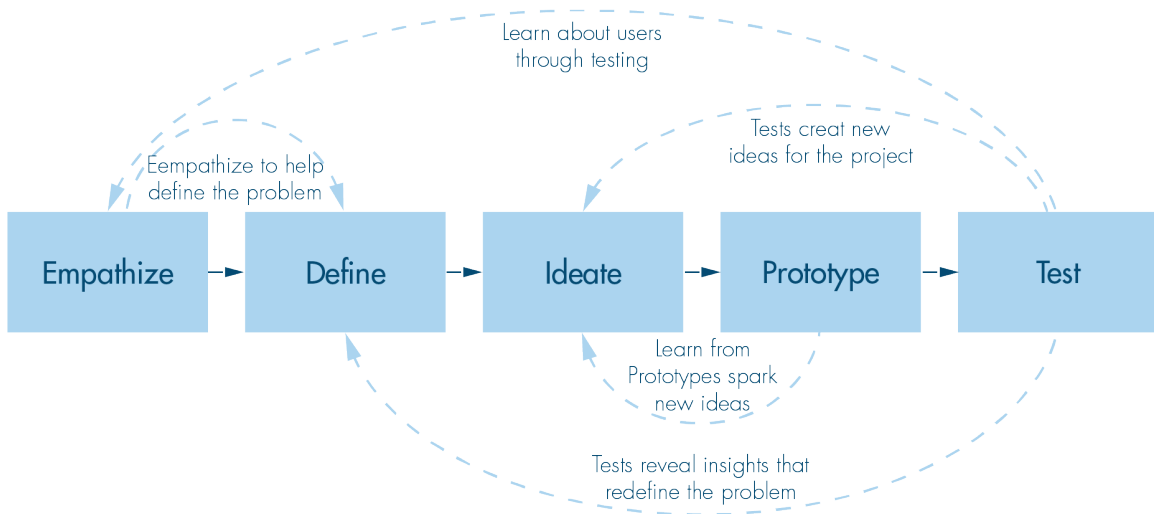


Figure 4.1: Five-stages of the design thinking process (adapted from Interaction Design Foundation, 2020)

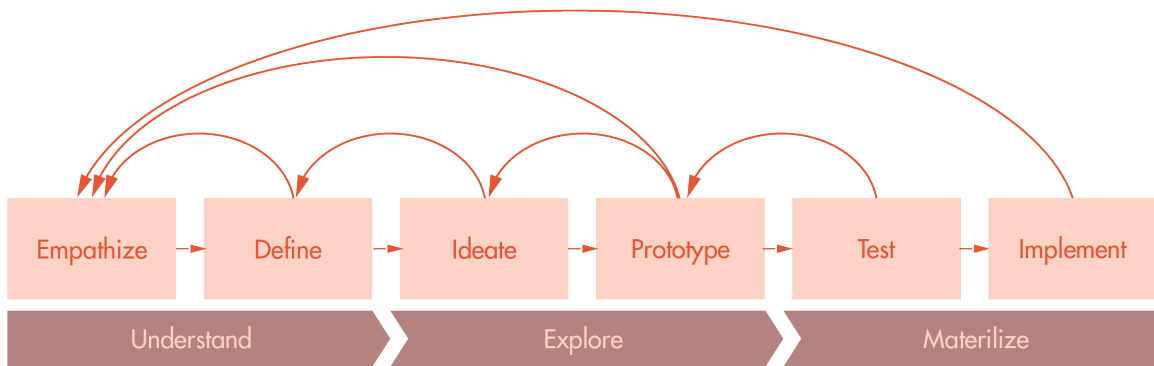


Figure 4.2: Design thinking framework (adapted from Gibbons, 2016)

- 1) Empathize: “Empathy is the foundation of human-centered design” (Doorley et al, 2018). In the beginning, you need to understand your users’ problems and needs by building empathy with them.
- 2) Define: Based on the understanding of users, come up with a problem statement, your point of view and define what really matters.
- 3) Ideate: Generate radical design alternatives to explore a large quantity and broad diversity of ideas.
- 4) Prototype: Transfer your ideas into physical forms.

- 5) Test: Gather feedback, refine solutions and continue to learn about your users.
- 6) Implement: Put the vision into effect.

It is important to mention that these stages are not always sequential; they can be performed in different orders and designers may go back and forth during the whole design process (Dam & Teo, 2020). For example, designers may collect information and prototype during the entire project to make sure to bring their ideas to life. Results from testing may bring new discoveries about users which may lead designers back to the ideate or prototype phases.

4.2 Interactive Product Design Method (IPD) Overview

The IPD method has been created for designers who want to develop a product with interactive characteristics for GenZers, the true digital natives. It also provides a new way to explore the range of customers for products that promote human-human interaction. This design process can be used both by practicing professionals and/or students.

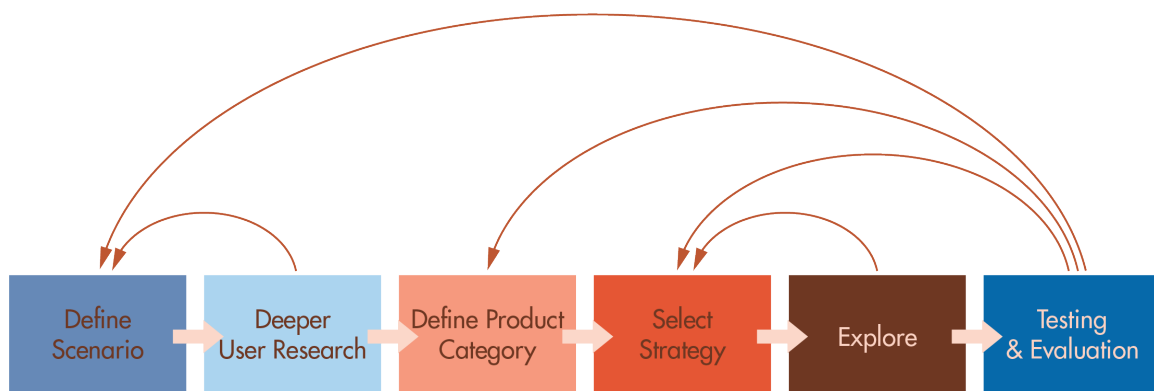


Figure 4.3: Interactive Product Design Process

As this IPD process focuses on promoting human interaction, the first priority is to understand users' human-human relationship, and when and where they will use this product (or

when and where they desire to interact with people). This first step is to Define the Scenario, as shown in Figure 4.3 above.

Design thinking is a user-centered design approach, so, its first step is to understand the target users. In this case, target users are already defined — GenZ (see Chapter 2). However, GenZ is a very large group which includes children, teenagers, and adults who can be in many occupations, different income levels, can live in different places, and experience multiple cultures. GenZ only provides the overall characteristics of our target users which means deeper user research will still be needed to understand the specific target audience (the second step).

According to a study by Hsu and Yang (2014) on how design can improve alienated interpersonal relationships, not all types of product have the ability to improve human interactions; they have to fulfill certain standards including special form, functional disruption, inducing mindfulness, including multiple users, and requesting interaction to compensate for functional disruption, to become active Human Interaction Design (HID) objects. However, in order to explore as many potential methods of promoting human-human interactions, the third step is defining the product's category (e.g. playful, social, functional). This ensures the selection of design strategies is most appropriate.

Strategies for designing interactive products were illustrated through the case studies discussed in Chapter 3. In the fourth step, the strategies provide inspirations and opportunities for designers. Some of those strategies are more suitable for a specific scenario or a certain product type, which will be illustrated later in this chapter.



4.2.1 Step1: Define Scenario

The process for defining scenario is inspired by the AEIOU research method, which is an organizational framework that helps researchers record and classify observations about the subject's activities. It includes Activities, Environments, Interactions, Objects, and Users. The AEIOU framework was developed in 1991 by the industrial design firm Doblin Group in Chicago (Martin & Hanington, 2012).

Activities are goal-directed sets of actions, and are the pathways that people go through when they try to accomplish something. *Environments* are the entire arena in which activities take place. *Interactions* are the action and reaction between people, or between people and objects. They are the building blocks of activities. *Objects* are the building blocks of environment. They are key elements which conduct interactions or activities among people or connect people and the environment. *Users* are the people whose behaviors, preferences, and needs are being observed (Martin & Hanington, 2012). As interactions and objects can be included into activities and environments respectively, the standard for how to define a scenario in this IPD method includes three areas: 1) **Users**, 2) **Environments**, and 3) **Activities**.

- **Defining Users' Relationships**

It is important to define users' relationships because these affect whether or not there is human-human interaction and in what form it manifests. Relationship can be classified in many different ways; for example, according to people's closeness, social networks, or blood ties. In this case, users' relationships are categorized according to relationship stages of interpersonal

relationship. An interpersonal relationship is a strong, deep, or close association or acquaintance between two or more people that may range in duration from brief to enduring (Levinger, 1983). An influential model of relationship development was proposed by psychologist George Levinger (1983). His model includes five stages of relationship: 1) Acquaintance, 2) Buildup, 3) Continuation, 4) Deterioration, and 5) Ending. These five stages of interpersonal relationships are the process people go through from weak to strong relationships and are universal for describing different human relationships. However, some of them do not fit this design method, so these categories are proposed for the IPD method: 1) **Stranger**, 2) **Acquaintance**, 3) **Buildup**, 4) **Continuation**, 5) **Deterioration**.

1) **Stranger**: “any person whom one does not know” (*American Heritage Dictionary* (2011a)).

2) **Acquaintance**: “knowledge of a person acquired by a relationship less intimate than friendship” (*American Heritage Dictionary*, 2011b). Strangers could become acquainted depending on previous contact (e.g. first impression); and if two people feel good about each other, continued interactions may lead to the next stage, but acquaintance can also continue indefinitely (Levinger, 1983).

3) **Buildup**: in this stage, people begin to trust and care about each other, and they are searching for common background, values and goals which determine whether their relationship will continue or not (Levinger, 1983).

4) **Continuation**: this stage represents a commitment to a strong and long-term friendship, romantic relationship, or marriage. It is generally a long and stable period.

5) **Deterioration**: not all relationships will deteriorate, but it does happen, and could happen at any stage of acquaintance, buildup, or continuation; at this stage, boredom, resentment, or dissatisfaction may occur. People generally need to find some way to resolve the problems and rebuild their trusts (Levinger, 1983).

- **Environment**

This area can be classified into **private environment** and **public environment**. Research shows that both private and public environments have great impact on participants' attitude change. Participants who present in the public condition reported less frequency of engaging in embarrassing behaviors than those in the private condition (MacDonald & Nail, 2005). People might interact differently in a private or public place. Their interactions within the same activity might change because of different privacy levels of environment.

- **Activity Types**

There could be thousands of activity types, but in order to make the IPD method clean and easy to apply, they are defined as 1) **Entertainment**, 2) **Social Activity**, and 3) **Task**. These activity types are a match to specific product categories — the third step in the design method, which is explained in greater detail later in this chapter. Entertainment, social activity and task correspond to playful products, social products and functional products respectively.



4.2.2 Step 2: Deeper User Research

Although basic information, learning and cognition pattern, and preference of GenZ have been defined in Chapter 2, designers still need to know their target users on a more detailed level. The summary of GenZ only guarantees the IPD method's applicability for Gen Z, and deeper user research is needed here for understanding the specific needs of the Users that were identified for the scenario.

Deeper research might include users' gender, family structure, income, location, occupation and so on. Once the type of scenario (user, environment and activity) is defined in the previous step, designers can do more research about users' real needs such as their feelings, experience, and expectations under those defined scenario types. Research methods can be varied, like questionnaires, observation, focus groups, interviews, and in-context immersion (Foo et al, 2018). Designers can choose any research method to better understand their specific users according to needs or reality conditions.

After collecting needed information about the scenario, IPD method recommends creating an *Interaction Journey* illustration as a technique to make a summary of this step. An *Interaction Journey* is similar to a user journey/storyboard, but it focuses more on the target users' interaction between/among each other. In the *Interaction Journey*, the typical process of users' activity is addressed through a timeline of the experience and separated into several sections which contain elements of users' interaction.

The *Interaction Journey* should include the following: **typical interaction process, emotion variation flow, touch points and relevant products.**

Users' changing emotions need to be noted throughout the journey to create the emotion variation flow, which is helpful for discovering touch points for introducing a product that promotes human-human interaction. Using this type of emotional curve is a way of validating the modeling experience. Applying this to plot the anticipated activity and actual process can help the designer to find touch points (Shin & Thomas, 2015). The down moods often suggest potential touch points where interaction can be introduced. The relevant products shown in every interaction section will lead designers to the next step -- Define Product Category.

This is an example (Figure 4.4) that shows how an *Interaction Journey* was created in the design application in section 5.1.2. See full size version in Appendix (A).

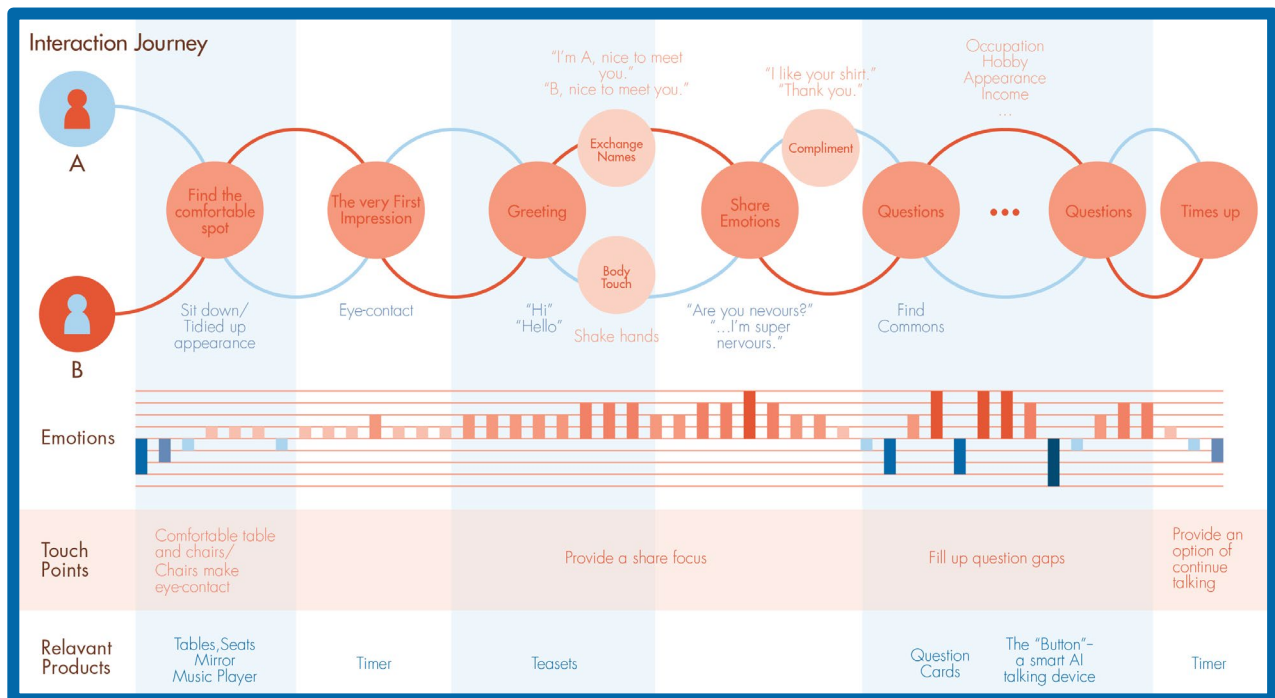


Figure 4.4: Interaction Journey



4.2.3 Step 3: Define Product Category

According to *interactive* characteristics, products can be categorized into these three types: **playful products**, **social products with simple function**, and **functional products**.

In the case study, **playful products** stand out for their feature of *interactive*. Interactivity is inherent in these products because play originally happens between people, or between people and objects. The users' purpose is to have fun with other people or with objects. As a result, playful products can be the most powerful products for promoting human interaction, and methods for designing playful products are also powerful strategies for designing interactive products.

Playful Products are designed for entertainment. People can play with others by the use of these products in any form.

Hsu & Yang (2014) and Niedderer (2014) show examples of tea sets and tableware to illustrate how products can promote mindful interactions — they serve drinks but at the same time, because of their special forms, disrupted function or multiple users allowance, they encourage people to interact with each other. These are examples of **social products** which serve certain simple functions.

Social Products with Simple Function are used in social situations like meeting friends, inviting guests for dinner, and parties. Social products can serve certain simple functions. They

are not just for entertainment, which distinguishes them from the playful product. They are part of the social environment and they help people interact with others easier.

Functional products are usually regarded as the least interactive products because when higher efficiency is required, individuals usually finish tasks with the help of tools or machines; therefore, people have less and less communication because work that used to be done by two or more people now can be done by individual. They do not need to interact, and they do not even have a chance to interact with each other. Inspired by Neidderer (2006), it is proposed to apply proper disruption of function to design functional products which could promote human-human interactions.

Functional Products are designed to help people complete certain tasks with more emphasis on function, efficiency and usability. For example, most kitchen utensils are functional products which fulfill people's need to cook and make it quicker as well as easier. In terms of the nature of product demand side, they are products that have more stable and predictable demand, as well as long life cycles (Lee, 2002).



4.2.4 Step 4: Select Strategy

Ten strategies are recommended in the IPD method for designing interactive products according to the case studies of products evaluated in Chapter 3.

The usage of each strategy is summarized here. More detail will be provided on the design instruction cards in Chapter 4.4.

- **Proper Disruption of Function**

This strategy is recommended for use in functional and social product design.

Designers need to consider removing or weakening a certain function of the product which then can be compensated for by people so that during the usage process of this product causes human-human interactions.

This strategy applies the theory of designing *Performative Objects* (in 2.4.1) which suggests that compensable disruption of function can induce mindful interaction.

- **Unusual Appearance**

This strategy is recommended for use on functional, social and playful product design.

Designers need to think out of the box. They might try to combine a totally unrelated form with a function or absorb ideas from any other field. For example, ideas could come from movies, fictional writings, paintings, nature and even outer space. Form may not need to follow function in this situation. Designers can think about what the product would be like if its form opposes its functionality.

This strategy applies the theory of design for interest (in 2.4.3) which suggests that high novelty can evoke positive emotion with high coping potential (high usability).

- **New Usage**

This strategy is recommended for use on functional, social and playful product design.

Designers need to rethink the whole process of use of the previous product, and try to combine, separate or rearrange its use steps, which may inspire new ways of usage. Moreover,

designers may try to make its using process more pleasant or exciting for the observer and try to involve the observer in the interaction with the user.

This strategy applies the theory of design for interest (in 2.4.3) which suggests that high novelty can evoke positive emotion with high coping potential (high usability).

- **Open-ended Usage**

This strategy is recommended for use on playful and social product design.

Designers could think about providing certain functions with the product but should not limit users' behaviors. For instance, designers could provide room for users to customize the product, or they could think of designing modular products so users can assemble them at their own will.

This strategy applies the theory of designing for playful interaction (in 2.4.4), which suggests that open-ended play provides the opportunity for children to create their own play rules with the object. This potentially generates more interaction among players.

- **Motivating Feedback**

This strategy is recommended for use on playful, social and functional product design.

Designers need to consider providing feedback during use, such as instant gratification and frequent rewards, which fits the characteristics of GenZ. Furthermore, designers should think about the interaction form between user and product, and between user and user; also, how feedback could influence and involve other users.

This strategy applies the theory of designing for playful interaction (in 2.4.4), which suggests that motivating feedback can stimulate children to be physically active, and even the onlookers can be involved to share attention and provide ideas.

- **Information Delivery between Products**

This strategy is recommended for use on playful, social and functional product design.

This is a strategy that allows the product to become a bridge to deliver information to and among people. It also offers a chance for people to interact with others in non-typical forms and/or indirectly. For example, the ColorFlares in Case Study 09 can transfer colors to other units by holding them close to each other. Designers can explore what information (in any form) in the use process needs to be delivered or could be potentially delivered through products to promote play (as in the ColorFlares example), social interaction, or clarify how the product functions. Designers may also think about transforming the information into a different form such as more graphic-like information which GenZ prefers.

This strategy applies the theory of designing for playful interaction (in 2.4.4), which suggests that the ability of objects to communicate with each other stimulates children to explore games in a social interaction component.

- **Culture-related**

This strategy is recommended for use on social and functional product design.

Designers might consider whether any social culture or event is related to this product or the activity when using this product. Culture refers to the attitudes and behavior characteristics of a particular social group (Lexico, n.d.). Designers could also consider how this product can

become a participant that reflects social culture in this activity, or how to combine the product's function with culture that makes the using process interesting and motivating people to interact around.

This strategy applies the theory of *Human Interaction Design* (HID) (in 2.4.2), which suggests that designing for multiple users and disruption of function are principles of designing active HID pieces.

- **Operable Suggestion / Affordance**

This strategy is recommended for use on functional and social product design.

Designers need to think about the product semantics that relate to the suggestion of manual operation like mechanical switches or levers which would attract people to have thoughtful interactions with the product and with people during use. In order to achieve the latter, designers may consider multiple users or relay use where one user passes it to another, then on to another.

This strategy applies the theory of *Human Interaction Design* (HID) in 2.4.2, which suggests that designing for multiple users and inducing mindfulness are principles of designing active HID pieces.

- **Symbolic Character**

This strategy is recommended for use on playful, social and functional product design.

Designers need to think about the potential of representing each user by adding symbolic characters to the product or series of products. For example, a group of functional products may have different forms to represent the users' characters and their relationships (e.g. different

shapes of cups for father, mother and child). It could also apply to one product which is used by the whole family, but each family member has a unique use mode. These modes will connect with each other according to family members' relationships. Simply described, when mother uses the mother mode, it might involve her child's voice or her husband's pet phrases. Those symbolic characters could be a special context given by the product's using rules (e.g. haptics, control buttons), which are built for people to interact with.

Theories of both HID principle (designing for multiple players) and designing for playful interaction (player interaction pattern) are combined to create this strategy.

- **Eye contact / Facial Expression**

This strategy is recommended for use on playful, social and functional product design.

Designers may consider providing a chance for users to have eye contact or read each other's facial expressions. Designers would need to know the using process/user journey and discover if there was any chance for eye contact or face to face interaction, and then think about the potential of changing the usage to fit this need.

This strategy applies the study about the real-time eye contact (in 3.7) to illustrate the effectiveness of eye contact and facial expression.



4.2.5 Step 5: Explore

This step includes ideate and prototype, which are typical steps in the design thinking process. In the ideate phase, designers can generate a range of crazy and creative ideas under the guidance of the strategies; they can pick one strategy or combine two or more to start their innovation design. In the prototype phase, designers would need to build real, tactile representations for a range of ideas (Gibbons, 2016). Designers could use any type of ideate and prototype method in this step (e.g. mind mapping, sketching, mockup or scaled model).



4.2.6 Step 6: Test & Evaluation

The solutions from the previous step need to be tested to determine whether the product can improve human-human interaction, and at what level it has contributed. Similar to using *usability* as a term to evaluate HCI design, I suggest using *Interactability* as the term to evaluate the effectiveness of IPD. *Interactability* is being defined here as a product's ability to promote human-human interaction.

The overall testing method is to observe the participant's interaction with the product and with other people.

According to Dumas and Redish (1993), usability testing needs to achieve five goals to guarantee its authenticity and effectiveness. These five goals are: improve the product's

usability, involve real users in the testing, give the users real tasks to accomplish, enable testers to observe and record the actions of the participants, and enable testers to analyze the data obtained. Similarly, in order to test the *Interactability* of the product, the test needs to meet these five standards:

- **Improve human-to-human interaction**
- **Involve more than one real user in the testing**
- **Set up an appropriate scenario for users to interact within**
- **Enable testers to observe and record interactions between users, or between user and product**
- **Enable testers to analyze the data obtained**

First, the method to determine what to test and what is essential in this case, is to use a mind map to list all the relevant elements. Based on the triangular relationship (Figure 4.5), which is used to describe humans' and the product's relationships and is the core of this paper, a mind map can be drawn like this (Figure 4.6):

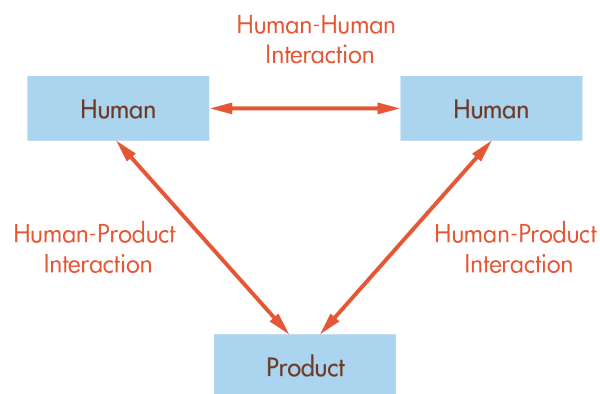


Figure 4.5: The Triangular Relationship of Interaction (adapted from Niedderer, 2006)

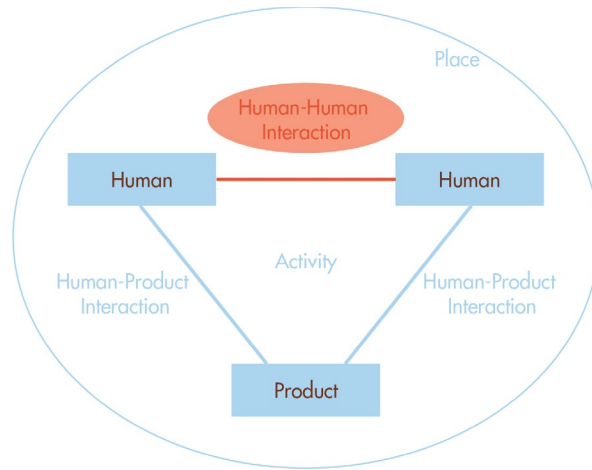


Figure 4.6: Mind Map of Relevant Elements

It is easy to see that the interaction between humans is the main test objective because it shows the effectiveness of the product on the humans' interaction, which is the goal of designing this type of product. However, the quality of human interaction is not specific and there are no direct indicators which can be easily observed or detected. Therefore, the second step is to choose proper standards for testing human interaction quality. There are different types of indicators: leading, analogous, awareness, engagement and dynamic changes, suggested in the "Human Centered Design Toolkit" (IDEO, 2011). In this case, analogous and engagement indicators seem like the appropriate options for describing the quality of human interaction. The indicators need to be standardized and measurable for ease of recording and analyzing.

Third, designers may use different strategies in their step 4 of the design method. In order to test the effectiveness of that applied strategy, in addition to common standards, special criteria for every strategy are needed. The measurable *Interactability* criteria are made up by:

- **Common Criteria**
- **Specific Criteria for Strategy**

These common criteria are used for evaluating participants' interaction frequency, closeness and duration, which include:

- **Eye Contact**
- **Body Touch**
- **Smile or Laugh**
- **Conversation**
- **Active Interaction Period**

The specific criteria for evaluating the applied strategy's effectiveness in improving human-to-human interaction are as follows:

- **Proper Disruption of Function:** Do the participants use their subjective activity to make up the disrupted function?
- **Unusual Appearance:** Do the participants have conversations or other interactions which are raised by the unusual appearance of the product?
- **New Usage:** Do the participants have interactions related to the new usage?
- **Open-ended Usage:** Do the participants create their own usages and have interactions during the creating process?
- **Motivating Feedback:** Do the participants gain motivation from the feedback and interact consistently? Do the watching participants give their opinions on interacting with the product?
- **Information Delivery between Products:** Do the participants deliver information through the product and interact with each other?

- **Social & Culture Relevant:** Do the participants talk about the social culture behind the product?
- **Operable Suggestion / Affordance:** Do the participants touch the product and operate it on their own?
- **Symbolic Character:** Do the participants plug in their characters actively and interact with others?
- **Eye contact / Facial Expression:** This criterion is included in common criteria.

A **Test Record Sheet** (Figure 4.7) along with instructions for its usage (Figure 4.8 & 4.9) have been created to help designers conduct their observation of the effectiveness of products created through IPD. Full size versions of these sheets are included in the Appendix (B).

The form is divided into several sections:

- SCENARIO:**
 - Place: _____
 - Activity: _____
 - Users' Relationship (SABCD): A diagram showing four circles connected by dashed lines in a square with diagonals.
- INTERACTION:**
 - STRATEGY NO.: _____
 - Meet specific criteria? yes no
- Behavioral Criteria (each with 12 checkboxes):**
 - EYE CONTACT:** 1-6
 - BODY TOUCH:** 1-6
 - SMILE/LAUGH:** a, b, c, d
 - CONVERSATION:** Raised by product (6 checkboxes), Others (6 checkboxes)
- INTERACTION ACTIVE PERIOD:** A timeline from 1min to 30min with checkboxes for each 5-minute interval.
- Product Information:**
 - Product: _____
 - Observation No. _____
 - Date: / /
 - Observer: _____

Figure 4.7: Test Record Sheet

INSTRUCTION

Audio and video recording is required during observation

For 2 participants

Number each relationship with 1-6

Define participants' relationships with SABCD:

- S - Stranger
- B - Buildup
- C - Continuation
- D - Deterioration

For 3 participants

3 Participants
3 Relationships

For 4 participants

3 Participants
3 Relationships

Number each participants with a,b,c,d

No interaction
Have interaction without the product
Have interaction with the product

Write down the number of that applied strategy (can be more than one) and check if the product fulfill the specific criteria.

See the STRATEGY NUMBER & CRITERIA SHEET

STRATEGY NUMBER & CRITERIA

- 1 Proper Disruption of Function
Do the participants use their subjective activity to make up the disrupted function?
- 2 Unusual Appearance
Do the participants have conversations or other interactions which are raised by the unusual appearance of the product?
- 3 New Usage
Do the participants have interactions related to the new usage?
- 4 Open-ended Usage
Do the participants create their own usages and have interactions during the creating process?
- 5 Motivating Feedback
Do the participants gain motivation from the feedbacks and interact consistently? Do those watching participants give their opinions on interact with the product?
- 6 Information Deliver between Products
Do the participants deliver informations through the product and interact with each other in this way?
- 7 Relate to Social Culture
Do the participants talk about the social culture behind the product?
- 8 "Operable" Suggestion
Do the participants touch the product and operate it on their own?
- 9 Symbolic Character
Do the participants plug in their characters actively and interact with others?
- 10 Eye contact / Face Expression
This criterion has included in common criteria.

SCENARIO

Place: *living room*

Activity: *Meet with friends*

Users' Relationship (SABCD):

Users' Relationship (SABCD):

INTERACTION

STRATEGY NO.: *02*

Meet specific criteria? yes no

Product: *ABC*

Observation No.: *001* Date: *04 / 15 / 20* Observer: *Colin*

Record how many times participants have these interactions.

EYE CONTACT	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BODY TOUCH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SMILE/LAUGH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CONVERSATION	Raised by product		Others		<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INTERACTION ACTIVE PERIOD

0min 5 10 15 20 25 30min

Product's name or number

Basic information about this observation

Mark every active interaction period (usually need to review the video record).

Figure 4.8: Use Instruction (1 of 2) for Test Record Sheet

STRATEGY NUMBER & CRITERIA

1 Proper Disruption of Function

Do the participants use their subjective activity to make up the disrupted function?

6 Information Deliver between Products

Do the participants deliver informations through the product and interact with each other in this way?

2 Unusual Appearance

Do the participants have conversations or other interactions which are raised by the unusual appearance of the product?

7 Relate to Social Culture

Do the participants talk about the social culture behind the product?

3 New Usage

Do the participants have interactions related to the new usage?

8 "Operable" Suggestion

Do the participants touch the product and operate it on their own?

4 Open-ended Usage

Do the participants create their own usages and have interactions during the creating process?

9 Symbolic Character

Do the participants plug in their characters actively and interact with others?

5 Motivating Feedback

Do the participants gain motivation from the feedbacks and interact consistently? Do those watching participants give their opinions on interact with the product?

10 Eye contact / Face Expression

This criterion has included in common criteria.

Figure 4.9: Use Instruction (2 of 2) for Test Record Sheet

4.3 The Design Method Tree

An IPD design tree (Figure 4.10) is illustrated to help designers have a better understanding of the structure of IPD process. Also see full size version in Appendix (C).

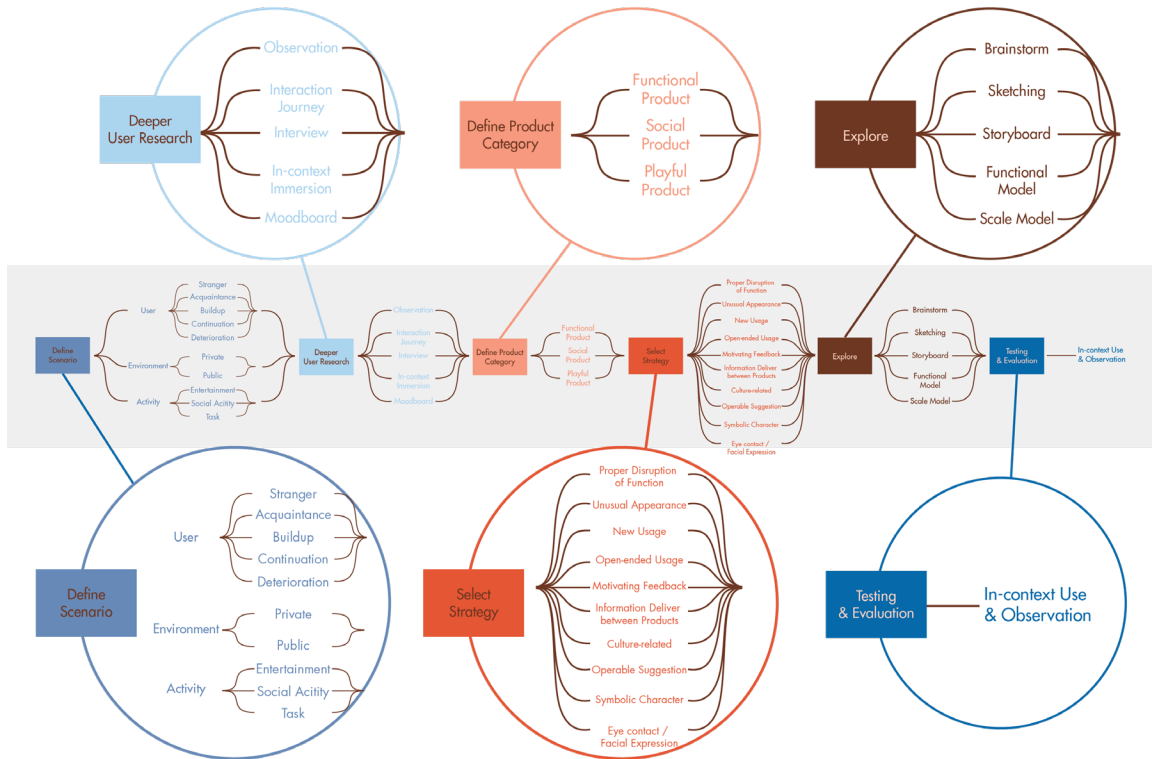


Figure 4.10: IPD Design Tree

4.4 Design Instruction Cards

The IPD Instruction Cards are created as a playful application of the IPD method, which can be used in both professional and educational environments.



Figure 4.11: Back of IPD Cards

Design of the IPD cards follows the IPD color theme that differentiates each phase of the process (Figure 4.11) (For printable version please see Appendix D). A printed version was also made to use in design implementation (discussed in Chapter 5). Figures 4.12-4.21 is representation of cards for each of the six phases of the IPD process.

4.4.1 Step 1: Define Scenario

STEP 01 DEFINE SCENARIO

In this step, you need to define the scenario according to these 3 sessions:

- 1) User
- 2) Environment
- 3) Activity

User	Environment	Activity
{SABCD}	Private environment/	Entertainment
Stranger	Public environment/	Social Activity
Acquaintance	Public environment	Task
Buildup		
Continuation		
Deterioration		

Figure 4.12: IPD Cards – Step 01



Figure 4.13: IPD Cards – Step 01 - User



Figure 4.14: IPD Cards – Step 01 - Environment



Figure 4.15: IPD Cards – Step 01 – Activity Types

4.4.2 Step 2: Deeper User Research



Figure 4.16: IPD Cards – Step 02 – Deeper User Research

4.4.3 Step 3: Define Product Category



Figure 4.17: IPD Cards – Step 03



Figure 4.18: IPD Cards – Step 03 – Product Category

4.4.4 Step 4: Select Strategy

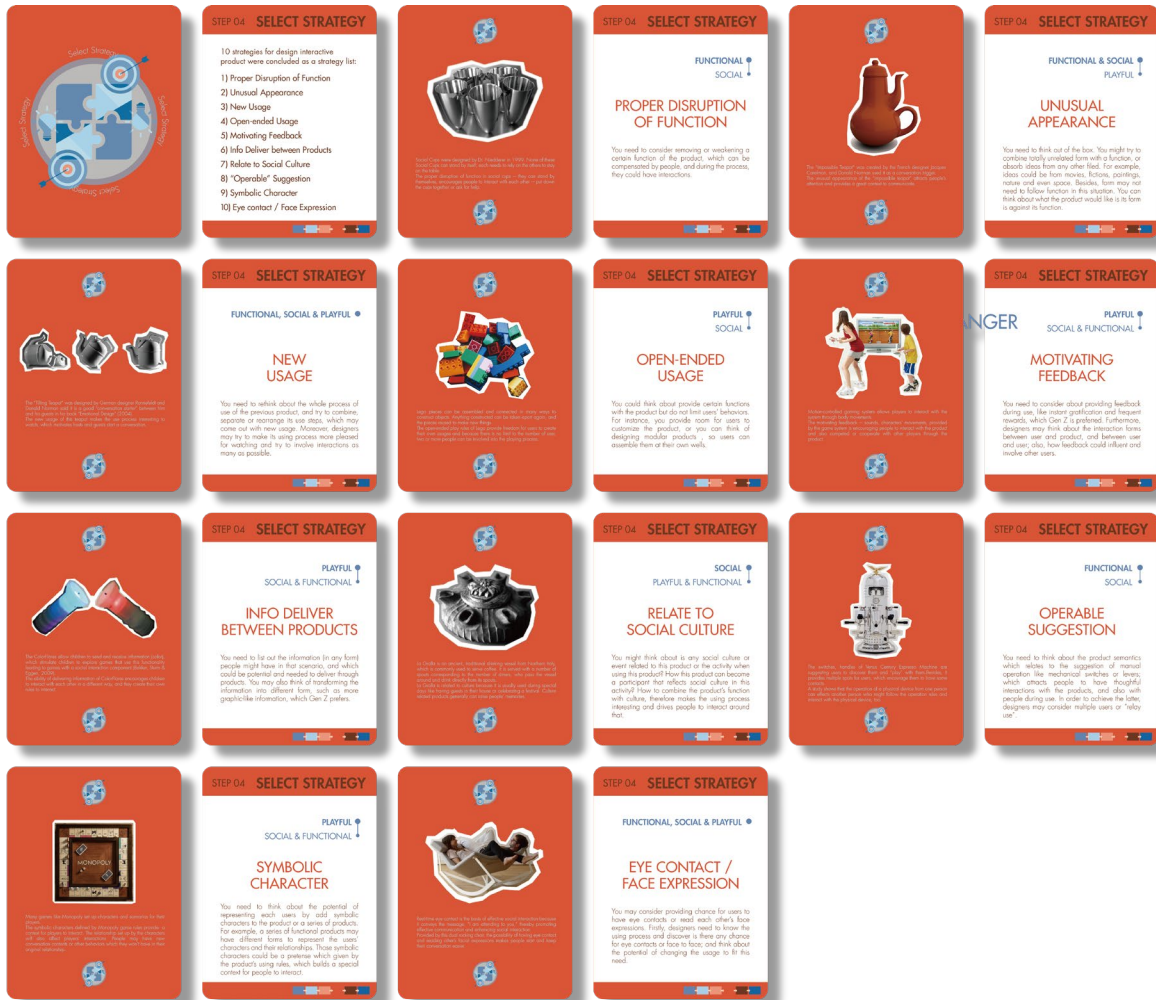


Figure 4.19: IPD Cards – Step 04 – Strategies

4.4.5 Step 5: Explore



Figure 4.20: IPD Cards – Step 05 – Explore

4.4.6 Step 6: Test & Evaluation

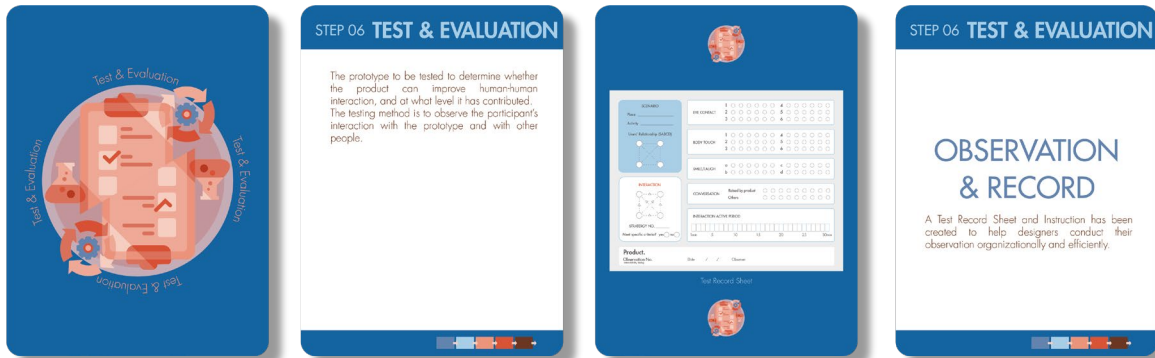


Figure 4.21: IPD Cards – Step 06 – Test & Evaluation

5 Designing with IPD

This chapter examines an implementation of the IPD method (including illustrations of the designing process) and discusses discovery of wider opportunities for usage of IPD.

5.1 Design Application

The design application is carried out under a context of being used in a design studio. The theme of the design studio is focusing on human interaction and designing interactive products.

The overall process can be shown with a design journey (Figure 5.1), which shows more details in every step compared to the typical design process.

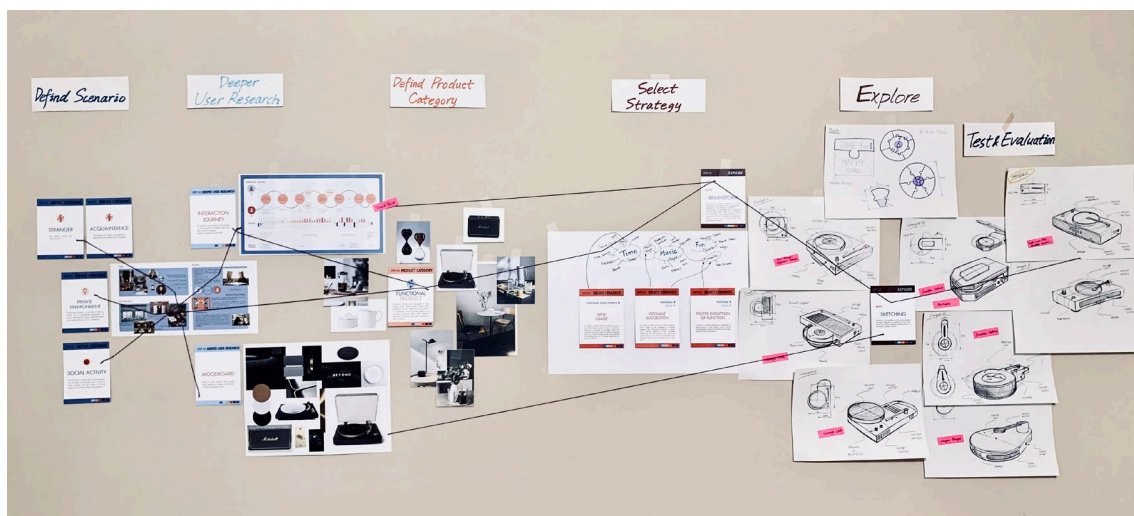


Figure 5.1: The Design Journey

5.1.1 Step 1: Define the Scenario

Scenario includes **User**, **Activity** and **Environment**. In this specific project, it starts with the users' relationship. Strangers and acquaintances are regarded as the relationships with more barriers that would benefit from product opportunities that encourage interaction. Then, activities like volunteering, shopping, school orientations, and blind dates are listed because the participants of these activities are most generally strangers or acquaintances. Blind dating is chosen as the activity because, in this case, interactions work as a function which can drive this activity toward a good outcome. The environment is defined as private environment in public place.

In Step 1, only the type of User, Activity and Environment has been defined (Figure 5.2), but the details of this scenario are still unclear and needs to be fully defined in next step: Deeper user research.

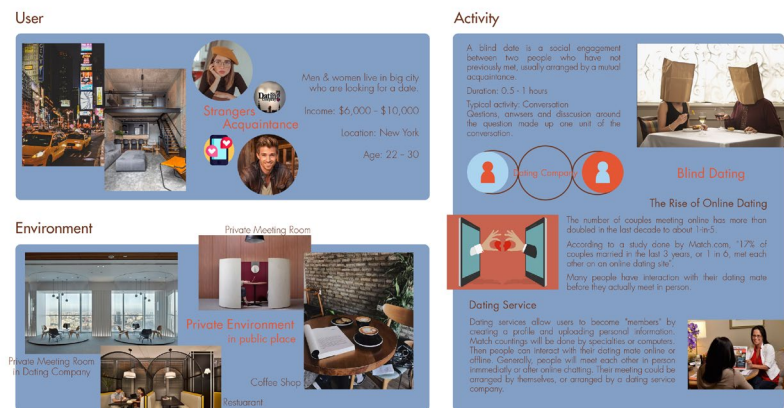


Figure 5.2: Type of User, Environment & Activity

Figure 5.3: Fully Defined Scenario

5.1.2 Step 2: Deeper User Research about Dating People

In this step, online searching, reviews of dating video records and interviews are the main resources of target users. The collected information is reorganized as a fully defined **Scenario** (Figure 5.3).

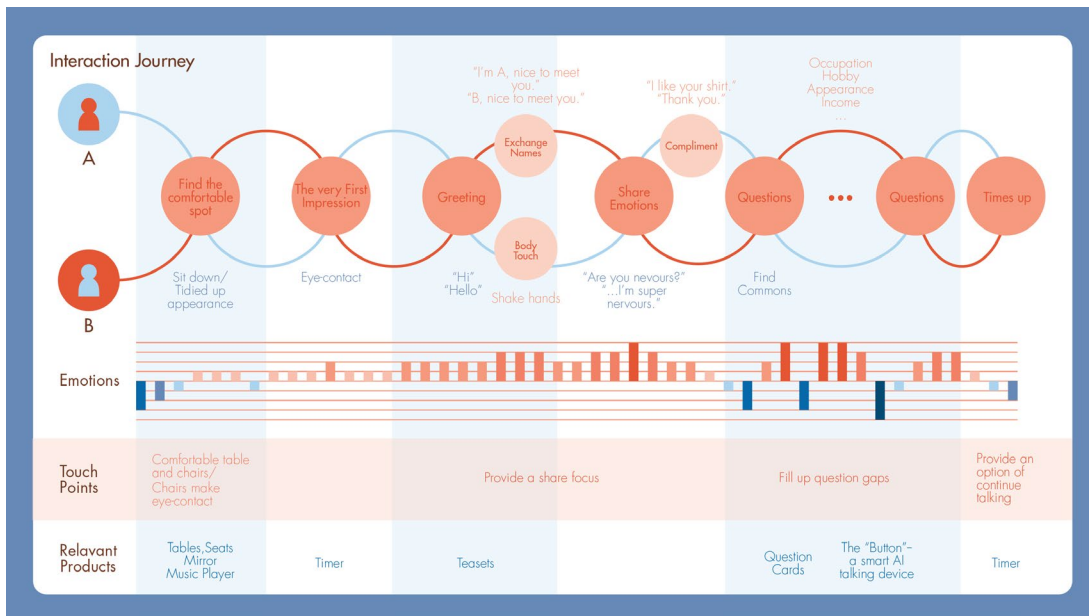


Figure 5.4: Interaction Journey

Based on this defined scenario, an **Interaction Journey** is created (Figure 5.4). It focuses on target users' interaction between each other. In the interaction journey, the typical process of blind dating is addressed, and it is separated into several sections, such as exchanging names, shaking hands and posing questions. An emotion variation flow is created along with the interaction process. The down moods show up in the very beginning and in the gaps between sections of questions. The touch points of the most awkward moments in blind dating are identified when people feel nervous before the dating starts and the silence between questions. Instead of eliminating the awkward gaps, the idea is to provide a shared focus and improve their interactions in the beginning, so that the participants feel much better even when they have gaps

between questions. The interaction journey also includes relevant products that might be involved in this scenario, which helps inspire solutions.

The deeper research about target users (e.g. their age, income level, and location) helps with making decisions about product style, market positioning and so on. A **Moodboard** is created to visualize the design style (see Figure 5.5). The target users live in big cities like New York with a rapid pace of life. They have high-technology background and they are able to obtain a wide range of latest information because they grew up with digital devices. Based on these criteria, the design style is concise and modern, with a simple color scheme that fits both males and females.



Figure 5.5: Moodboard

5.1.3 Step 3: Product Category

Relevant products associated with every interaction section is involved in the Interaction Journey (in step 2). Mapping printed images of relevant products (Figure 5.6) can help designers

have a visual impression and determine what type or what specific product they want. Product Category includes **Functional Product**, **Social Product** and **Playful Product**. Most of these relevant products are functional products, so this project goes with this direction.



Figure 5.6: Relevant Product Images

5.1.4 Step 4: Strategy

There are three key elements abstracted from Interaction Journey and Relevant Product: time, music and fun. *Time* is from the Interaction Journey because the whole dating process is sensitive to time and the silent gaps are about time. From the Relevant Product, *music* (music player) is chosen to be the shared focus between the two dating mates. *Fun* is the character which is added to the shared focus.

Based on these three key elements, a brainstorm is launched under the guidance of strategies (Figure 5.7). The ten strategies inspire the brainstorm with directions. Designers might try different strategies or combine some strategies. For example, *New Usage* stimulates designers

to find different ways of timing. *Operable Suggestion* motivates designers to pay some attention to the affordance form of the music player. *Proper Disruption of Function* encourages designers to think about adding certain difficulties to the use process of the music player.

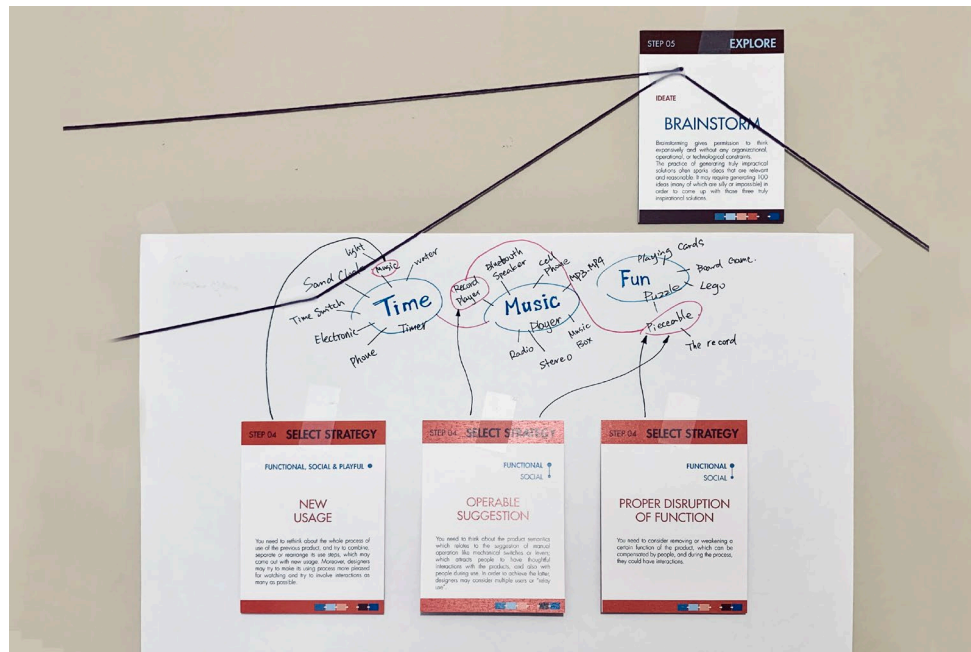


Figure 5.7: Brainstorm with Strategies

5.1.5 Explore

After finishing the previous four steps, a relatively solid idea is chosen — a Bluetooth speaker with a record player look, which uses puzzle records. Music is a gentle way of counting time and solving the puzzle record is the first thing dating mates need to do together to setup the music player. Sketching (Figure 5.8) is used to generate a better form for this idea. The moodboard created in Step 2 is helpful here for communicating the features of style. After posting all the sketches on the wall, post-it notes are used to identify/mark evaluation of each concept and help designers funnel their development towards one concept.

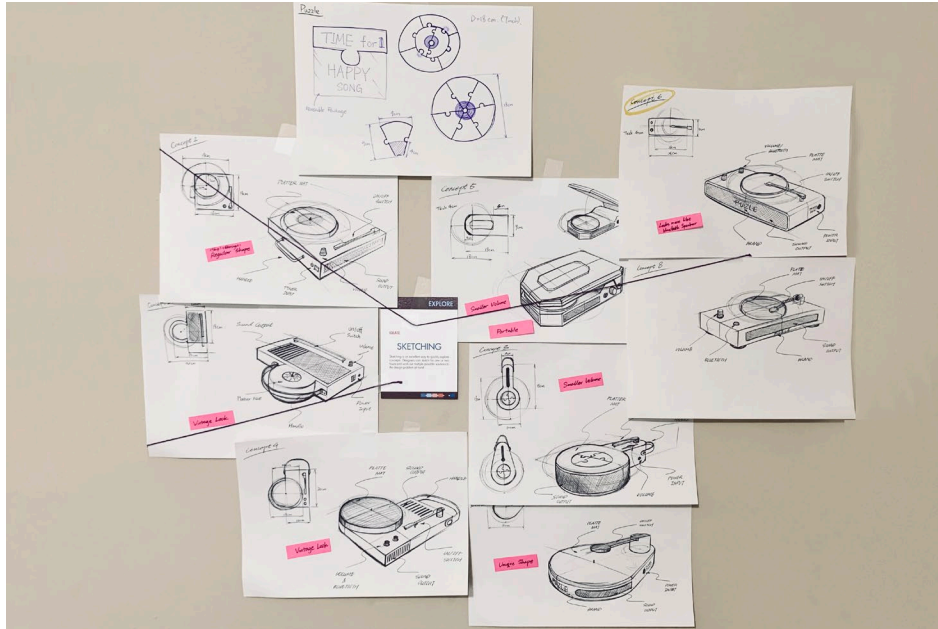


Figure 5.8: Sketches

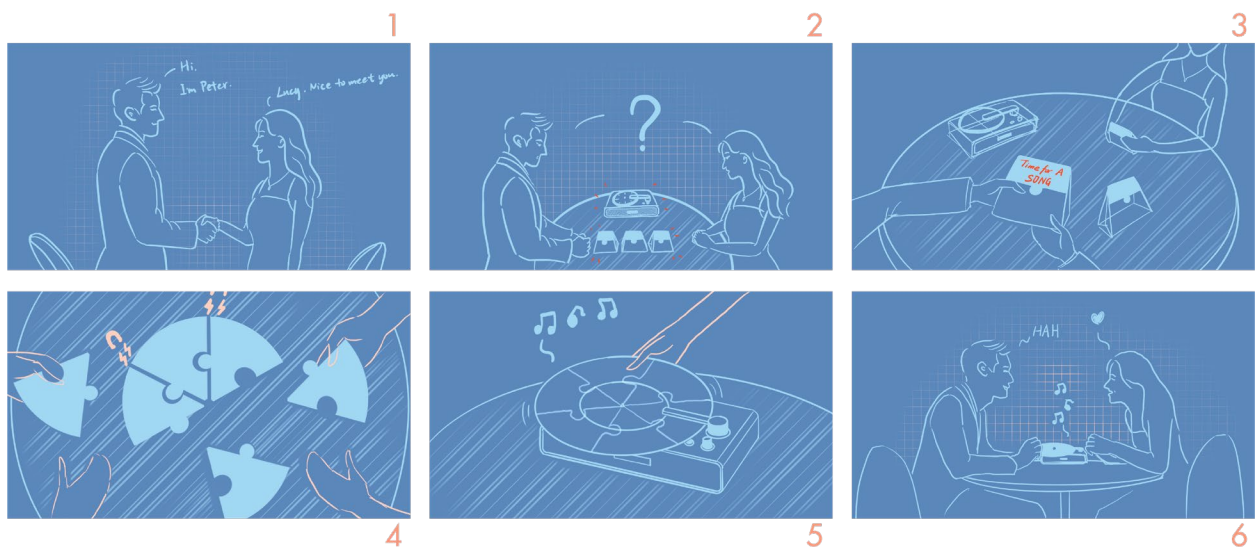


Figure 5.9: Storyboard of use process

A storyboard (Figure 5.9) is created to illustrate the use process of the music player and puzzle records and to show how this design can positively affect dating mates' interaction. The story of every picture is as follows:

- (1) When 2 dating mates go to a blind date, they greet each other by shaking hands and introducing themselves. They have the very first impression of each other.
- (2) Then they find a music player and several packages on the table. They are curious about what are they used for.
- (3) They take a look at the package and it says 'Time for a song'. There are some record segments inside, which they can see through the transparent package. They have music in different moods.
- (4) Then, dating mates make a decision together to open one package and then solve the puzzle records together. They figure out where to place each piece and they exchange ideas and puzzle parts.
- (5) Finally, the puzzle records are in the right position and they are connected by magnets on the edges.
- (6) Dating mates play the music and, following their cooperative experience, have a more comfortable talk.

CAD model and renderings (Figure 5.10) are used to visualize the solution, but a prototype is more important to test its *interactability*. A rough prototype (Figure 5.11) is made by cardboard.



Figure 5.10: Rendering



Figure 5.11: Prototype

5.2 Extended Usages

This example illustrates one implementation of the IPD process. Other applications of this process are also envisioned that will provide opportunities for developing products that promote human-human interaction, both in educational and professional settings.

In the context of an educational design studio, professors might want students to go different directions with the aim of more independent practices. Based on the actual process of the design example, every potential stage which has the ability to explore more directions is surrounded by brown lines (see Figure 5.12 and Appendix E) and explained in the following.

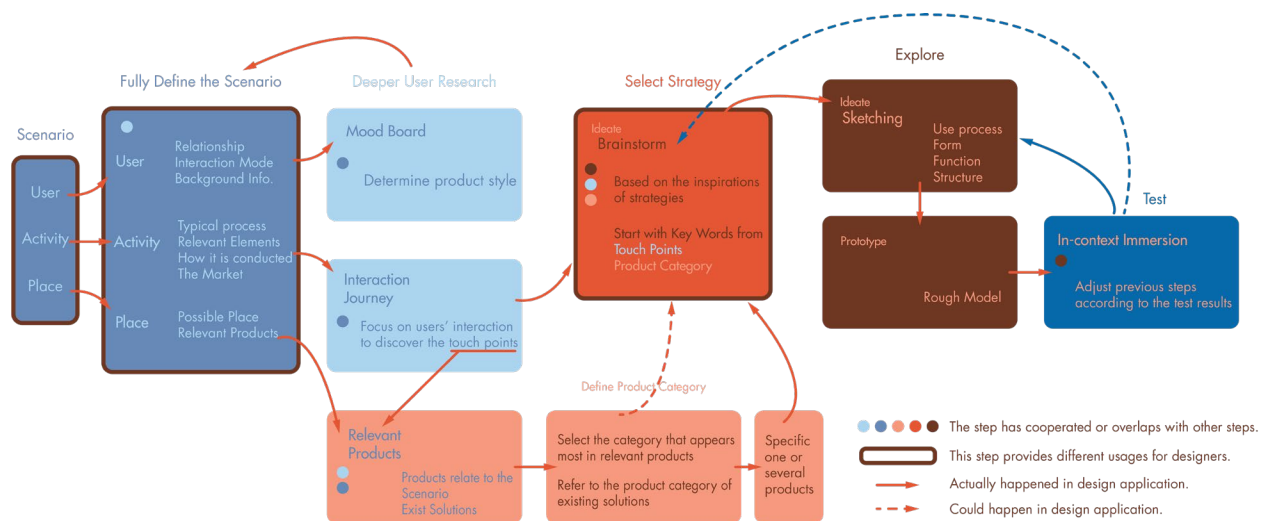


Figure 5.12: The Actual Design Process

In the first step, students can choose to start from different user relationship or different activities. For example, I chose strangers and acquaintances as the user relationship to start with; others may choose buildup and continuation. Alternately, they can choose an activity such as camping, traveling or having a party as the beginning of discovering interaction problems. These types of users, environments and activities can be defined by the educator or the students themselves. When students move to the step of fully defining their scenario and making their

interaction journey and moodboard, even if they have the same type of user relationship, environment or activity, they are able to define a different scenario. Students with same defined user relationship can work together as a group, and they can share the information about how people interact with each other under that certain stage of relationship; similarly, students who define the same activity can work as a group to share resources about the activity but work on a different user relationship. This provide students with the potential for different design directions by choosing different user relationships or activities and still have the opportunity to work together.

There is another option: students share the same fully defined scenario but choose their own direction in Step 3 and Step 4, which means they can choose different category of product and brainstorm with different strategies. They may design totally different types of product or they provide different solutions for the same specific type of product. For instance, under the scenario of blind dating, some students may choose social product like tea set as their direction and use *Culture-Related*, *Eye Contact/Face Expression*, and *Unusual Appearance* as their strategies, which are recommended preferentially to social products. In the stage of choosing product category or a specific product, it can be an improved design of an existing product by adding *interactive* characters, or it can be an innovative design which creates a brand-new product with interactive properties.

Similar strategies could be implemented in a professional studio where a group of designers might be working collaboratively on the same project to generate a larger pool of ideas to present to the client in the early stages of the designing phase.

6 Conclusion

The Interactive Product Design Method (IPD) is proposed in this paper, which helps designers develop products to promote human-human interactions in social contexts. This method can be used by professionals in a production environment or students in an education environment. IPD includes six steps: 1) define scenario, 2) deeper user research, 3) define product category, 4) select strategy, 5) explore, and 6) test & evaluation. The steps 1, 3 and 4 are unique compared to the typical design thinking process. IPD method is enhanced when it is conducted with IPD cards and toolkit. As shown in the example design implementation to create an interactive product for blind dating, the design process is not necessarily linear; steps may overlap or cooperate with each other. Designers should feel comfortable to adjust their procedures according to practical conditions. Design results may be affected by the designers' and the users' cultural backgrounds, cognitions, values and so on.

Further refinement of this design method is expected through additional and future implementations of this process. The IPD method can be tested through different product design cases to examine its effectiveness on promoting human-human interaction. With more applications, the usage of the strategies can be illustrated with more details, and they can be tested and extended to fit a wider range of product types.

Socializing is a very common activity in humans' life; however, it has been undergoing significant changes in human-human socialization since the information era began. People used to interact with others more in person; current forms of social interaction tend to fall into a more virtual practice through social media. Digital Natives, who have been exposed to the Internet, social networks, and mobile systems from their earliest youth, are used to living with the convenience provided by these technologies. However, studies have discovered that digital natives spend more and more time on online socializing and sometimes neglect their relations in real life. Because humans live in a social context, human-human interaction is equally important as human-product interaction. This IPD method helps designers understand digital natives, move their focus to collective users and develop interactive products to enhance their in-person social interactions.

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8 Appendices

Appendix A – Interaction Journey Illustration

Appendix B – Print version of Test Record Sheet & Instruction

Appendix C – IPD Design Tree

Appendix D - Print version of IPD Cards

Appendix E – IPD: The Actual Design Process