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1 UX Concepts and Perspectives – From Usability to User-Experience Design

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CONTENTS

1.1	Introduction	3
1.2	From Human–Computer Interaction, Usability to UX.....	5
1.3	UX Concepts and Perspectives.....	7
1.3.1	UX as a Result of User Perception Interacting with a Digital Product or the Usability of a Digital Product	8
1.3.2	UX as a Result of User Perception Interacting with a Specific Product or Service.....	9
1.3.3	UX as a Design Process.....	10
1.3.4	UX as a Result of User Perception Interacting with Broad System.....	11
1.4	Concluding Remarks	12
	Acknowledgments.....	13
	References.....	13

1.1 INTRODUCTION

Nowadays, much has been said about user-experience (UX) as an attribute of a product or service intended to be offered. Many companies consider a good user-experience as one of the leading value propositions and work strategically to deliver it in the best way. However, the definition of what a user-experience is and how it affects people’s lives and companies’ businesses is still very plural. Some define the user-experience as a result perceived by the user of an interaction with a digital interface, considering as a fundamental part the usability of the interface (Falbe, Andersen and Frederiksen 2017, Brooks 2014, Tullis and Albert 2008, 2013). While others arrive at broader concepts, interpreting the user-experience as the totality of the perceptions a user has with an ecosystem, where the digital interface can be one

of the parts included (Norman 2013, Kuniavsky 2010, Ou 2017, Hartson and Pyla 2019, Rosenzweig 2015). However, UX's concept comes from a transition that the consumer society is going through, where digital technology has its essential role but is not the only factor.

The focus of consumer society is changing with time. We lived in the agrarian economy, the industrial economy and recently (and occasionally we still) the service economy. It is important to call attention to the fact that, in the last two decades, we are undergoing a transition to the experience economy, where consumption focuses on obtaining experiences (Pine and Gilmore 2020). Since the beginning of the century, studies suggest that experiential purchases (i.e., the acquisition of an event to experiences, such as a dinner, a day at the spa or a trip) make people happier than material purchases (i.e., the acquisition of tangible objects that someone wants to own, such as clothing and jewelry, a television or a computer) of equal value (Boven and Gilovich 2003; Carter and Gilovich 2010). Boven and Gilovich (2003, p. 1200) point out that experiential purchases make people happier because of at least three possibilities: "experiences are more open to positive reinterpretation," "experiences are more central to one's identity," and "experiences have greater 'social value'."

Nonetheless, this interest of individuals in experiences is fostered by the society in which they live because it has gone through constant periods of economic prosperity and material wealth. Therefore, the conquest of positive events in their lives feeds these people's well-being, and the greater demand for these events transforms these societies into Experience Society (Hassenzahl 2011). According to the author, if before it was necessary to go to places called exotic in favor of a search for experiences, today, the search is for simpler experiences, such as being with friends at a barbecue. The idea is to dissociate experience from an expense and slow down the day-to-day work, where much of the focus is to raise resources for their sustenance.

Experiences are inherently personal, unlike products that are factors or systems external to the buyer. Experiences exist only in the mind and memory of the person who has experienced them, whether on an emotional, intellectual, physical or spiritual level (Pine and Gilmore 2020). Thus, each experience originates from the event's interaction with the individual and his/her mental state. So, it is impossible for two people to live the same experience. Even with products, it is possible to have good experiences. According to Rossman and Duerden (2019), the decision to purchase a product in the experience economy is no longer linked to how many features a product can have. Still, it is associated with what the product can do for the individual's experiences. Both Hassenzahl (2011) and Hekkert and Schifferstein (2007) point out that the product or a device is a means that leads an individual to live an experience, allied to other factors inherent to the individual and the context in which he/she is located.

As a result, this change in people's behavior towards their consumption emphases has attracted companies' attention. In turn, they have placed a greater focus on "selling" the experience highlighting the quality or usefulness of their product or service. From the individual's point of view, the experience is an experience. Regardless of how the individual realizes it, his/her focus is on what he/she will feel, reflect, take from that moment, store in his/her memory and what he/she will share with those

close to him/her. However, it is essential for those who design the experience to distinguish how the individual experiences it. Therefore, the mediator of this experience with the individual (be it a service, a product or an event with which he/she will interact) defines how the designer will approach and shape the user-experience (Hassenzahl 2010). So, a successful design must place the user in the first place in relation to the mediator (product, service or event).

Moreover, it should be noted that with the advent of the Internet, new technologies have emerged as well as new ways of interaction of the individual with the (digital) world. Innovations have appeared in the areas of service and consumption, especially with e-commerce. In the beginning, this digital communication network was restricted to the few consumers with enough purchasing power to acquire a personal computer (PC) or a notebook, added to the costs of Internet plans. This situation was reversed with smartphones' arrival that allowed greater access to the Internet for various economic classes. Therefore, as nowadays more people interact with digital interfaces, the industry sees as an opportunity the user-experience with these interfaces as a value proposition for its products. Thus, design as a process, especially the "human-centered design" is seen as the means to develop products and services focused on this experience (Norman 2013, ISO 2010).

In order to shape the user-experience, the industry is interested in the design professional who knows how to design for the user-experience (Quaresma 2018). In turn, he/she is called to develop the experience of technological interfaces and services, such as airline services, financial services (fintech – financial technologies) and startups' proposals (focus on the service experience through technological means) (Farrell and Nielsen 2014, Quaresma 2018). So, what is understood about the concept of user-experience (UX)? What differs between usability and user-experience? What is the relationship between the two terms? This chapter aims to analyze the concept of user-experience, its origins and the various perspectives around this concept.

1.2 FROM HUMAN–COMPUTER INTERACTION, USABILITY TO UX

In the evolution of interaction with technologies and at the beginning of what was concluded as the human–computer interaction (HCI) domain, we began to interact with the first computers, still very complicated and complex. Then we started using smaller and simpler computers, the personal computers (PCs), the laptops and, currently, we deal with a wide variety of interactive systems – notebooks, smartphones, tablets and smartwatches (Campbell-Kelly, Aspray, Ensmenger and Yost 2014). During this process, these human–machine communication interfaces have changed a lot (Hartson and Pyla 2012). It was a great novelty in the beginning and people were interested in what that technology could bring benefits to them; now, such technologies are already part of many people's daily lives. We no longer tolerate poorly designed interfaces, especially in matters of usefulness, usability and experience of use.

Human–Computer Interaction (HCI) began to be considered an area of knowledge around the 1970s. It has its origins in ergonomics/human factors, in Cognitive

Psychology, in Design and, obviously, in Computer Science. At first, issues related to interaction with hardware devices (Cathode-ray tube (CRT) terminals and keyboard), training, documentation (manuals) and text editors were dealt with, and then the focus became much more on interaction with the software in general (Hartson and Pyla 2012).

Before the consolidation of the term HCI, the area was called “human factors in computers,” in what refers to interaction with hardware and “human factors in software engineering,” in an approach more focused on interaction with the software. However, there is no way to separate one system from the other because where there is software, there is always hardware support. This includes its relationship with ergonomics/human factors, which is extremely strong, mainly in what concerns the research methods and analysis used in interface design, such as task analysis (Hackos and Redish 1998).

With the various studies that had been conducted in the domain of HCI since the early 1980s, together with the popularization of personal computers and the strong influence of Cognitive Psychology, the field of knowledge that we know today as “usability” (which was initially called “software psychology” by Shneiderman 1980) emerges. Understanding human behavior and performance in interaction, considering cognition, memory (short and long term), perception, attention and decision-making becomes fundamental for developing adequate solutions in communication between the human and the computer.

One of the most widely known definitions of “usability” is that of the International Organization for Standardization – ISO 9241-11 (1998), which defines it as “the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” Thus, after several attempts to define the term “usability,” the three most important metrics of usability – effectiveness, efficiency and satisfaction – are specified: the first two being measured objectively and the third more subjectively, but still a result of successful achievement of the first two metrics (Brangier and Barcenilla 2003).

While usability metrics were being established, researchers in the domain of HCI (Shneiderman 1987, Norman 1988, Bastien and Scapin 1993, Nielsen and Mack 1994) worked and researched human–computer interaction issues through the interface, based on the theories and assumptions of Cognitive Psychology. The results of the studies led to what is very well-known in the field as principles, criteria and heuristics of usability, from renowned researchers like the ones mentioned above, Nielsen and Mack (1994) being one of the most well-known for his ten usability heuristics. Until today, all these principles are widely used in interface design and interaction design and are the basis for various methods of analysis and evaluation as well as are used to base guidelines for technologies and interactions of specific contexts – such as human–robot interaction (Campana and Quaresma 2017) and human–vehicle interaction (Harvey and Stanton 2013).

However, in the late 1990s and early 2000s, new components beyond usability metrics began to be questioned, such as pleasure, emotion and affectivity in interaction (Norman 2005, Riley 2018, Pavliscak 2018). Since the usability satisfaction metric is limited to the satisfactory outcome of the system’s effectiveness and efficiency, what other components are part of the experience of interaction with the system?

Users already know how to recognize an interface/product with good usability and have gotten used to it, as it becomes the minimum expected. In this sense, Jordan (2002) makes a comparison with Maslow's hierarchy of human needs (Maslow 1970 apud Jordan 2002) in what he calls "New Human Factors," emphasizing that people want more than usability in interaction; they want to feel pleasure in that interaction.

From then on, usability becomes an essential requirement in an interface and an interaction. Now, it is necessary to motivate the user to "buy" the idea of the interaction and the use of the product or service; it is needed to fascinate and provide an excellent experience throughout the use and try to keep him/her using the product or service for as long as possible. All these factors led to the concept known as user-experience (UX). However, much of this experience is still the result of a good design that follows usability principles and remains a starting point for a good experience.

UX was first used by Donald Norman when working for Apple in the early 1990s and named his working group "the User Experience Architect's Office" (Norman 2013). At this time, Norman referred to the term as a concept of something broad that encompassed an entire experience that a person could have when interacting with any product and not necessarily digital, even though he was at Apple (a digital industry company). The concept defined by Norman is related to all situations in which the user is involved with the product, either interacting with it or thinking about it.

Nevertheless, because it has been used for the first time in the digital realm, the concept still has a strong focus on the development of digital products, as much as it is understood that the experience is something that transcends the interaction with a digital interface. Rossman and Duerden (2019, chap. 1) specify that an "Experience is a unique interactional phenomenon resulting from conscious awareness and reflective interpretation of experience elements that is sustained by a participant, culminating in personally perceived results and memories." The authors also point out that experiences are multiphased: starting with the anticipation phase, going through the participation phase (where there is direct interaction with the elements of experience or interfaces, whether physical, digital, interpersonal, tangible or intangible) and ending with the reflection phase, where the individual realizes the whole experience itself.

1.3 UX CONCEPTS AND PERSPECTIVES

Although there is a certain consensus that the experience is something individual, that it is felt by each person differently and that this feeling depends on several factors, the concept of user-experience (UX) has different perspectives. These perspectives depend on the type of interface (in its broadest sense) that is being designed or a reference to designing an interface. From a literature review, mostly based on recently published books (as of 2010), four main perspectives were found: (1) the experience is a result of the user perception in interacting with a digital product; (2) the experience is a result of the user perception in interacting with a specific product (not necessarily digital) or a service; (3) as a design process; (4) an interaction with a broader system with various elements of experience. These perspectives are presented below.

1.3.1 UX AS A RESULT OF USER PERCEPTION INTERACTING WITH A DIGITAL PRODUCT OR THE USABILITY OF A DIGITAL PRODUCT

This perspective on UX's concept concerns the user's perceptions of direct interaction with a digital product and often relates to how effective, efficient and satisfying the interaction is, i.e., the usability of the interactive product (ISO 1998). This view is also a highly emphasized perspective in the digital industry. In general, people who are hired to work with UX Design are responsible for dealing with the interface of the digital product precisely and need to have a broad background in usability heuristics and principles. It can be observed that many jobs offer demand for what is called UX/UI designer; that is, the person responsible for designing the user-experience will be the one who will work on the user interface of the digital product.

This point of view is quite reasonable since digital products play an important role in our daily lives and our everyday experience with the products presented to us that we have to deal with (Falbe, Andersen and Frederiksen 2017). The authors emphasize that UX is also usability, as this is a fundamental part of the user-experience. A product with poor usability can significantly affect the user-experience, causing frustration and negative aspects of the whole interaction process. These negative aspects are not restricted only to the direct interaction with the digital product; they end up affecting the entire system or service in which this product is inserted, as well as the image that the user has with the organization's brand related to the product or service.

Falbe, Andersen and Frederiksen (2017) still point out that the user-experience can be broken down into some levels, such as meeting the user's needs without any fuss or hassle to complete tasks; the user should not have to remember information from previous steps, i.e., the user should not be mentally overloaded; the interaction should be in accordance with the user's expectations; the user should be able to recover any errors made; the system should have adaptability and flexibility to accommodate different expertise; the user should have control over the system; and the user must have a memorable experience. Actually, most of these levels that the authors place are a summary of the heuristics and golden rules of usability and ergonomics criteria presented in the 1990s by authors such as Nielsen and Mack (1994), Shneiderman (1987) and Bastien and Scapin (1993) to work on the usability of an interactive system.

Also, Brooks (2014) points out that in the past, digital web page interfaces were composed of only a page of text and pictures, and now websites and mobile apps are much more complex, which makes the user-experience, according to the author, much more vital to the product's success. In this sense, it seems that the user-experience is something that can be created when building systems like websites and mobile apps. However, it is believed that the author is referring to interface design that considers the principles of usability and that this will lead to a good user-experience.

Finally, still in this perspective, Tullis and Albert (2008, 2013), although they understand that UX's concept can be broader (see Section 1.3.4), argue that the user-experience can be measured. However, this measurement should be done using usability metrics, evaluated from the interaction with digital systems. In fact, we believe that the user-experience itself can be measured in part by usability metrics

since usability has a significant positive or negative impact on a person's experience when interacting with a product or service that contains a digital interface.

Nonetheless, other issues related to the ecosystem in which the product is inserted and affecting the user-experience, as some authors point out (in Section 1.3.4), may not be evaluated through usability metrics, such as feelings, emotions and other perceptions. Although usability metrics like satisfaction are subjective, its other metrics are much more objective, such as effectiveness and efficiency (ISO 1998), and these do not measure everything that involves an experience. Nevertheless, new studies involving infrared digital neuroscience thermography and neuroscience, with measurements through electroencephalography, point to the possibility of physiological measurements to assess emotions as pointed out by Rebelo et al. (2022), Vitorino et al. (2022) and other authors such as Barros (2016), Barros, Soares, Marçal et al. (2016), Soares, Vitorino and Marçal (2019), Ioannou, Gallese and Merla (2014) and Guo, Li, Hu et al. (2019).

1.3.2 UX AS A RESULT OF USER PERCEPTION INTERACTING WITH A SPECIFIC PRODUCT OR SERVICE

Very similar to the previous perspective, in this one, UX is related to the user's perception when interacting with a specific product and not necessarily with a digital product, as this may also be analogical. In this sense, regardless of the type of product, the experience lived by the user is a consequence of the (direct) use of a product, be it digital or not. Garrett (2011) states that a product or service has two sides: the inner workings and the outside, where the user has the contact, but what will have an effect on the experience is the result of what the user can do with the product or service (on the outside).

Hekkert and Schifferstein (2007) emphasize this perspective, as mentioned before in their book *Product Experience*. Products are an efficient way to create good experiences. At first, the main focus is not on what the product is, but what it does for the user and its consequences. Garrett (2011, chap. 1) also adds that the “features and functions always matter, but user experience has a far greater effect on customer loyalty.”

In addition, Házi (2017) states that even though UX is not just a “digital thing” or a “magic ingredient” that you can add to an existing product, UX is always around you because the user-experience surrounds you. If someone can understand how a product works on the first contact, then this is a good UX. This direct relationship with the product's function seems much more linked to usability than to the extent of the whole user-experience. Indeed, the author uses as an example of good UX the two handles of a door that indicate their openings. The same example is given by Norman (2013) to explain the concepts of affordances and signifiers, as principles of interaction and usability.

Moreover, Buley (2013) notes that UX is a fancy term to describe words that people often speak about their experience of using a product, such as “love” or “hate” or phrases like “easy to use” or “user-friendly.” In other words, feelings have always existed when we talk about an interaction, which, in the end, we treat as good/bad or

easy/difficult. The term “user friendly” has also been used frequently in the past to refer to the usability of a product.

Lastly, some authors also relate the user-experience with the direct use of a product or service, but when the interaction is with a service, it is preferable to use terms such as service design or customer experience (CX) (Házi 2017; Lindborg 2015). However, this distinction between “user-experience (UX)” and “customer experience (CX)” requires further discussion beyond the scope of this chapter and maybe the subject of another publication.

1.3.3 UX AS A DESIGN PROCESS

One of the most relevant perspectives of UX is to understand it as a design process. After all, the user-experience can only be positively impacted if there is a user-centered development process behind it. In this perspective, the word Design is added to the acronym UX (creating the term UX Design).

For Unger and Chandler (2012), the scope of UX Design is large and growing; it is a process that aims to develop elements that will influence the user’s perceptions and behaviors and affect his/her experience. These elements, according to the authors, range from tangible elements (e.g., physical products, packaging) to intangible elements (e.g., sound, aroma), including people who are part of the entire ecosystem of the experience (customers service representatives, salespeople, friends, family). These elements, when well developed and well integrated, lead to a good user-experience. The authors also add that for this user-experience to be successful, the design must align business objectives, users’ needs and any limitations that will affect its viability (e.g., technical limitations, project budget or time frame).

Marsh (2015) corroborates Unger and Chandler’s (2012) remarks and makes an analogy of the UX Design process with the process of doing science, where you start with research, to understand both the needs of users and the needs and requirements of the business. From then on, it proceeds to the development of ideas to meet such needs and to assess whether the solutions work in the real world. Research in UX Design is one of the fundamental steps to design a good user-experience, especially the user research.

Besides process, but in a similar sense, other authors define UX Design as a holistic discipline (Bluestone 2019) or a convergence of disciplines (Dash 2014) or a multidisciplinary practice (Baines and Howard 2016). Thus, the authors state that working for the user-experience is a process that encompasses several disciplines (e.g., Visual Design, Industrial Design, Information Architecture and Interaction Design) with diverse and not necessarily predetermined inputs. This process is user-centered and conducted through a methodology appropriate to a particular problem to strategically solve issues that meet the requirements of users and businesses. Baines and Howard (2016) emphasize “without research, there is no UX” as one of the main steps in the process. That is why we see, nowadays, a great emphasis in this area, which has been called UX Research (Buley 2013, Marsh 2018, Travis and Hodgson 2019).

However, within this strategy of working for the user-experience, involving the user in research, it should not be forgotten, according to Dash (2014), Unger and Chandler (2012) and HÁZI (2017), that in a UX process, the user's needs and business requirements should be combined. The processes and multidisciplinary that most authors point out are related to the human-centered design approach and its main activities. However, as specified by ISO 9241-210 (ISO 2010), this approach does not clearly show how this alignment between the users' needs and the business requirements is done. In contrast, processes such as Service Design (Stickdorn, Lawrence, Hormess and Schneider 2018) and even Design Thinking (Brown 2009) seem to do better. Nevertheless, UX designers or UX researchers are still far from mastering this subject.

1.3.4 UX AS A RESULT OF USER PERCEPTION INTERACTING WITH BROAD SYSTEM

The last perspective presented here is a broader view of UX's concept and perhaps the one that most closely matches Donald Norman's idea when he first used the term (Norman 2013). From this perspective, a user-experience is shaped from the result of interaction with a broad system or ecosystem that contains several (parts) interfaces in which the user has contact throughout a journey. Ou (2017) perhaps overstates that UX "is how a person feels when interacting with the *world*," but what the author wants to say is that the world is understood by systems (e.g., computers, products, humans and process), and it is these various systems that users interact to achieve their goals in their journeys. Pereira (2018) also states that UX encompasses all interactions that a user has with a product's brand. In this case, the brand or organization related to the brand is the broad system that the user interacts with and, in this system, some subsystems are the channels in which the user will have contact with the brand (e.g., sites, applications, customer service and online help). Chapanis (1996, p. 22) defines a system as "an interacting combination, at any level of complexity, of people, materials, tools, machines, software, facilities, and procedures designed to work together for some common purpose."

Nonetheless, this perspective may have two different points of view: the product side and the service side – the side that will be chosen will depend on what it is intended to design. From the product point of view, one can think of the experience of interacting with it in various touchpoints, what Rosenzweig (2015) calls user-experience touchpoints. The author gives, as an example, a typical everyday product, a car. When we have a car, we interact with various elements or subsystems of experience, such as the car dealer, the vehicle's occupant packaging, the driving dynamics, the moment of fill it up, the maintenance and sharing, and other people.

From the service point of view, the user-experience (also called customer experience or CX; Ou 2017) will be thought through the conception of the user interaction with the service's various touchpoints. In the design of a service, the alignment and integration of these touchpoints (which can also be products) and the fluidity with which the user passes through them is most important in shaping a good user-experience. When thinking about the interaction with airline service, the

user-experience will probably go through the brand awareness, the website for the purchase of the travel ticket, the check-in at the airport, the comfort of the airplane seat, the contact with the flight attendants, the snacks offered during the trip, until the conclusion at the exit of the destination airport, that is, all its touchpoints. This is if all goes well, because some unforeseen events such as loss of luggage or delays will also make the user talk to company employees and his/her experience may be impacted at this time.

Perhaps this perspective is also the most similar to the concept of Service Design, which is also a specific design process. According to Mager and Sung (2011, p. 1),

Service design aims at designing services that are useful, usable and desirable from the user perspective, and efficient, effective and different from the provider perspective. (...) service design takes a holistic approach in order to get an understanding of the system and the different actors within the system. (...) Service design looks at the experience by focusing on the full customer journey, including the experiences before and after the service encounters.

Kuniavsky (2010, p. 14) makes a definition of user-experience which, in its full scope, summarizes very well what this perspective emphasizes and also makes a bridge with the first two perspectives presented previously:

The user experience is the totality of end users' perceptions as they interact with a product or service. These perceptions include effectiveness (how good is the result?), efficiency (how fast or cheap is it?), emotional satisfaction (how good does it feel?), and the quality of the relationship with the entity that created the product or service (what expectations does it create for subsequent interactions?)

Finally, Hartson and Pyla (2019), in their book *UX Book* also add that the effects felt by users in the experience when interacting with products and systems occur in a temporal way, indirectly and directly. When thinking about the interaction with both a product and the service, the user has moments that are part of the experience – a moment before, during and after use; all the effects of interaction (direct or indirect) in the experience go through these moments. Direct interaction with the product or service occurs when the user is in direct contact with the artifact or touchpoint (which can be intangible, such as a voice interaction). In contrast, indirect interaction can be a feeling, a memory or a thought about the product or service. This description of Hartson and Pyla (2019) aligns exactly with what Rossman and Duerden (2019) specify as experience, mentioned previously. The first authors also point out that the user-experience is a combination of four components: usability, usefulness, emotional impact and meaningfulness. This combination clarifies that usability is part of what composes a user-experience, but both concepts are not the same.

1.4 CONCLUDING REMARKS

This chapter's idea was to bring an overview of what has been said and thought about the user-experience (UX) and especially its relationship with usability, which are

often misunderstood as the same thing. These are the most common perspectives found in literature, as the term still brings many misunderstandings, especially in industry and professional practice. Even in the industry, the term is overused among professionals; it has been at its peak, but today, terms such as service designer or customer experience designer seem to be having more value because they are believed to be more comprehensive and less focused on a digital interface. In fact, what may be happening is that professionals who really want to work on the user-experience in a broad sense may be transitioning from the first perspective to the fourth perspective presented in this chapter, which has a greater focus on ecosystem, system and interaction subsystems, on the user's journey.

Although the four perspectives seem different, it can be understood that they complement each other because UX (a) deals with interaction with a digital product, (b) deals with interaction with any product or service, (c) is a process and finally (d) involves several systems and subsystems that the user will interact with throughout his/her journey. However, understanding that experience is individual is fundamental. Designers can only shape and promote the best possible experience by designing products and services, integrating and aligning all parts of the ecosystem where the interfaces are inserted.

The issue of designing “the experience” or “for the experience” of the user is still quite confusing and nebulous, and there is much debate on this subject. After all, the experience is unique and experienced differently by each person. Perhaps, designing the experience as a whole and in detail for an individual is impossible, but transforming a person's experience through interface design and good planning of their journey in the various touchpoints with a brand is really possible. A system that is seen and understood holistically, with its subsystems (touchpoints) well designed, ensuring good usability, and planned and orchestrated in the best way, can positively impact and provide a good user-experience.

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