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Principles for User Experience

What We Can Learn from Bad Examples

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Abstract: The idea of User Experience (UX) is to achieve a positive emotional reaction of users on a product interaction and thereby to create a unique selling proposition. However, people's needs, perception and resulting emotions are subjective and very diverse. Furthermore, UX is dependent on the physical and social context. We developed the Customer Experience Interaction Model (CEIM) which consists of UX-relevant elements from different relevant disciplines to handle this complexity. In order to support real designers without theoretical background, we surveyed real customers' product reviews describing good respectively bad UX from different sources and extracted UX principles. We already presented principles taken from positive samples in another publication. In this paper we discuss principles based on reviews with negative examples. These UX principles shall clarify to developers how to avoid negative experiences. Thereby, we combine a theoretical approach and concrete principles and examples, which illustrate the application of theory and help preventing bad UX.

Keywords: User Experience, Emotional Design, User-Centered Design.

1. INTRODUCTION

1.1. User Experience

Beyond usability, which has been a point of interest in science and industry for several years, the quite young approach of User Experience (UX) extends the view on user product interaction by emotional aspects. The motivation of UX is to develop positive experiences and emotions. Therefore, products have to meet psychological needs and motives of the customer (Kim et al., 2011). By triggering the user's emotions and thereby create a brand loyalty, UX can help differing products in saturated markets.

Figure 1: Bottle closures designed for usability (left), UX (right) and as a compromise (center)

UX is understood in many different ways by several disciplines. The definitions and approaches range from a psychological to a business perspective (Roto et al., 2014). The challenge is to bring these views and strengths together and to enable multidisciplinary development teams to effectively work together on UX. Mostly, psychological experts and competencies are missing in product development teams. This deficit needs to be considered when creating an approach to support designers developing or designing for UX.

1.2. Problem

The scientific state of the art offers a lot of theoretical descriptions of UX as well as methods for measuring it like AttrakDiff (Hassenzahl et al., 2003) or PrEmo (Desmet, 2003). This analytical view is widely covered. However, there is a deficit of concrete tools and methods supporting the synthesis of experiences. Approaches like the «psychological needs-driven experience design approach» (Kim et al., 2011) or Kansei Engineering (Nagamachi & Lokman, 2011) aim at creating an emotional impact on users. Both approaches require dealing with user needs and influence the whole product development process, in particular the early stages.

However, UX needs to be realized in real development projects by real designers and engineers, mostly within a team without psychologists. We suggest that most of the approaches and models are unlikely, if not impossible to be included in highly interrelated, inflexible and long-lasting development processes for complex products. No doubt: UX demands a profound psychological consideration and could have the highest impact, if the whole development process was organized accordingly. Nevertheless, we could not discover a successful implementation of UX synthesis support in real industrial projects so far. (von Saucken et al., 2013a)

1.3. Solution

In this paper, we present a pragmatic tool for UX synthesis which is applicable throughout the whole development process without any deeper psychological knowledge: we developed a guideline consisting of one pager UX principles. We derived these principles by paraphrasing real customers' product reviews which we analyzed using the Customer Experience Interaction Model (von Saucken et al., 2012). With these principles developers shall be motivated to consider different UX-related problems, opportunities and goals. The principles are enriched with real examples and reviewer quotes to clarify the UX issue and to inspire new solutions.

We have investigated and analyzed 57 reviews from various sources and derived 20 UX principles. The scientific basis for our analysis is the Customer Experience Interaction Model (CEIM) described in section 2.2. It helps analyzing real customers' product reviews which is shown in section 2.3. The method for deriving UX principles from these reviews is discussed in section 2.4, the resulting principles in section 3.1 and a form sheet for illustrating them in section 3.2.

2. RESEARCH METHOD

2.1. Overview

To clarify the proceeding in this paper, we show three exemplary extracts from product reviews which we analyze by paraphrasing and demonstrate the derivation of a UX principle. The three examples describe bad experiences with a smartwatch, a Wi-Fi router and a convertible laptop:

- **Galaxy Gear**. *(…) The Galaxy Gear gently vibrates to let you know when something comes in through these channels, but upon checking the notification, the smartwatch displays a message that tells you to look at the contents through your mobile device. The experience is akin to a waiter telling you that your food is ready, but that you have to go get it from the kitchen if you want to eat. Thankfully, there are third-party apps that can provide this type of functionality, but it's a shame Samsung couldn't do it itself, especially since the Gear can be set up to receive notifications from these specific services right out of the box (…).* (IGN Entertainment Inc., 2013)
- **Linksys Wi-Fi Router.** *(…) Other than that the router has no new features at all. In fact it has exactly the same as what the EA6500 has to offer, including the shortcomings. For example its Guest Access feature is still available only on the 2.4GHz band, and you can't change the name of this guest network. (…)* (CBS Interactive Inc., 2013)
- **Toshiba Satellite Click.** *(…) Second battery issue aside, the device's performance simply can't keep up with competing Intel-powered devices, which really don't cost that much more. (…) Port selection isn't great from a laptop. On the right edge of the upper tablet section, there's a volume rocker, headphone jack, a Micro HDMI port and a micro SD card slot. On the left edge sits a power jack and the power button. (…)* (Digital Trends, 2014)

Figure 2: Exemplary product reviews, © by Samsung, Linksys, Toshiba

All of the statements above have in common, that the reviewer expects a certain feature whereas the product misses that specific recognizable technological advance or benefit. We will now paraphrase (cp. Mayring, 2003) the respective part in order to develop a better understanding:

- **Galaxy Gear Paraphrasing.** The reviewer is annoyed because Galaxy Gear does not completely display messages although the technological preconditions are met.
- **Linksys Wireless Router Paraphrasing.** The Linksys Wi-Fi router has no new features compared to another router.
- **Toshiba Satellite Click Paraphrasing.** Laptops usually have a better performance and more ports than the Toshiba Satellite Click.

The three reviewed products apparently have a lack of technological advance, either because expected and technologically feasible features are not implemented or because the state of the art usually offers better technical standards. Thus, we can derive the principle «ensure technological advance» from these three reviews. The associated form sheet is illustrated in section 3.2.

2.2. Customer Experience Interaction Model (CEIM)

We take the Customer Experience Interaction Model (CEIM) as the scientific basis for our review analysis. CEIM is a cross-disciplinary model to illustrate causal connections in user product interactions relevant for UX. It incorporates relevant perspectives from the disciplines of industrial design, engineering, ergonomics and psychology. It supports the communication of developers by creating a shared understanding and a common terminology. CEIM consists of five elements (see figure 3): the surrounding environment, in which the user performs a usage with the development object causing an effect. Apart from the environment each element consists of detailed segments. Arrows illustrate the interrelations between these elements. (von Saucken et al., 2012)

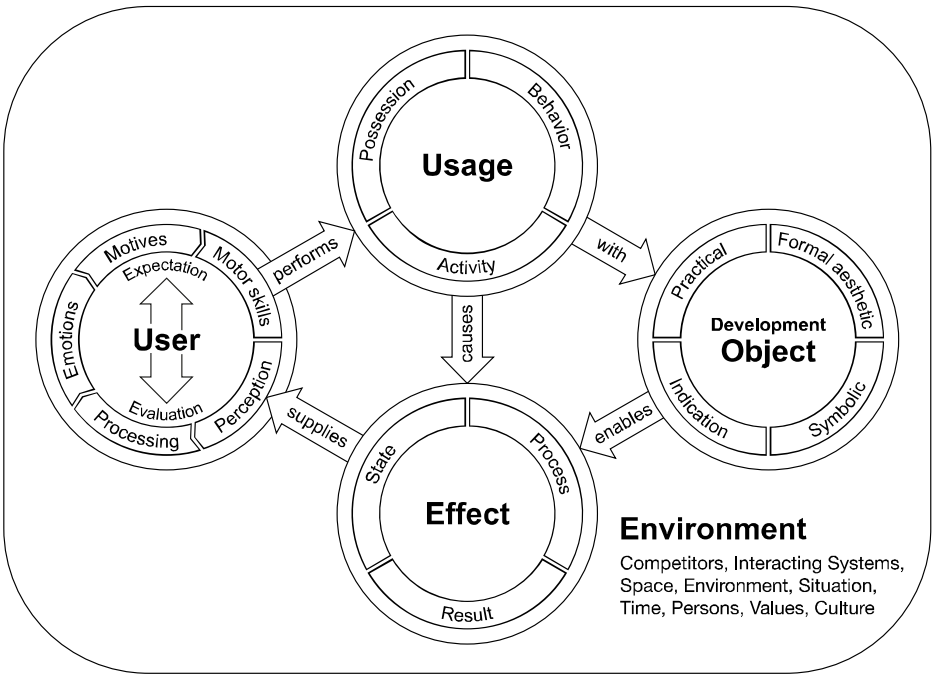

Figure 3: Customer Experience Interaction Model (von Saucken et al., 2012)

CEIM is based on the block diagram of human machine system by Schmidtke (1993) which represents a classic ergonomics perspective with the goal to optimize the working performance. As the UX view requires a stronger consideration of the human perception and processing, CEIM details the user element by adding triggered emotions and user motives. Furthermore, CEIM enlarges the functional understanding of the development object (product, service or combination) by indication, aesthetic and symbolic aspects according to Steffen (2000).

Another UX-relevant consideration is involved in the element behavior (Rasmussen, 1983): UX highly depends on the user's level of training. The experience of driving a car for the first time is very intensive and completely different from the driving experience of an expert driver. Both users need to be considered in the UX design perspective. Finally, we added the consideration of ownership in the possession element, as this highly influences the subjective experience of a user.

The different aspects of CEIM help analyzing an observable experience holistically: By matching quotes from reviews to the corresponding elements we could get a deeper understanding what reviewers like or dislike about their product. Our three exemplary statements show different UX aspects: the reviewers of the router and the laptop describe a bad experience as they compare the practical function of their product with competitors. The smartwatch reviewer complains the deficit indication in combination with an interacting system (mobile device) compared with competitors.

2.3. Analysis of Product Reviews

In preparation of deriving principles, we analyzed a variety of reviews using CEIM – both products and services – and user comments from diversified sources. This section addresses the specification of review sources and the breakdown of product and service categories that have been analyzed. While consumer-testing magazines usually focus on features (Norman, 2001) and often lack the consideration of emotional aspects, user-generated content provides a suitable source for the underlying task.

A similar approach has been presented using positive experiences to deduce UX principles (von Saucken et al., 2013b). In this paper we focus on negative experiences, in which the authors of reviews and comments were frustrated or bored. The Cone Online Influence Trend Tracker (Cone Communications, 2011) found out that 4-out-of-5 consumers reverse their purchase decisions based on negative online reviews, therefore representing a significant source for deriving design principles.

Although online shops such as Amazon or Ciao already offer an enormous database of customer reviews we wanted to diversify the analysis and additionally examined reviews from forums (e.g. Yahoo, ebay user forum…), blogs (e.g. CNET, Digitaltrends…), online magazines (e.g. Spiegel.de, Chip.de…), information portals (e.g. IMDB, Jameda…) and social media (e.g. Twitter, Instagram…). Figure 4 (left) shows the balanced breakdown of the sources for the in total 57 reviews.

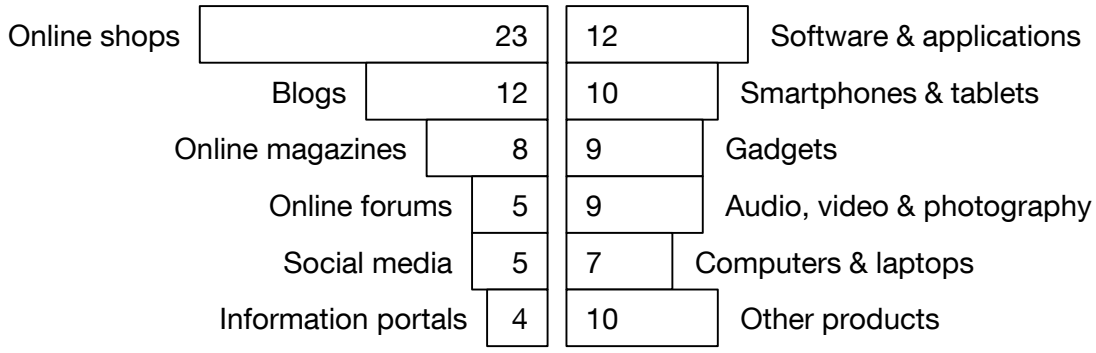

Figure 4: Sources (left) and product categories (right) of the 57 surveyed reviews

In the course of this paper we also looked at several different products and services, in which we set a focus on digital technologies. Figure 4 (right) illustrates the range of different products and services that build the foundation of the derivation process.

Besides classic digital technologies such as smartphones (e.g. iPhone 5s), tablets (e.g. Kindle Paperwhite), computers (e.g. Mac Pro, Xbox One), and laptops (e.g. Toshiba Satellite Click) we analyzed reviews for audio, video or photography products, for example a digital single-lens reflex camera (Canon 6D) or a LCD TV (Sony KD), as well as small equipment and gadgets, for example fitness wristbands (Fitbit, Jawbone, Nike Fuelband) or a navigation system (Tom Tom Go 500).

In addition to that, among the 57 analyzed reports there were several software or application products, for example a review of the Yahoo Mail interface or of the OS X Mavericks. Finally, reviews from non-digital products, such as a coffee pad machine or a battery-operated drill, and web-based experience reviews of services like a movie review, a hotel evaluation and a visit to the doctor round off the types of products and services that have been analyzed.

2.4. Derivation of UX Principles

The procedure of deriving UX principles is based on the qualitative content analysis, i.e. structuring content analysis, according to Mayring (2003). The goal of this type of content analysis is to find commonalities within any type of recorded communication and to draw conclusions regarding specific characteristics of this communication (Mayring, 2003). Figure 5 illustrates the process of the derivation of UX principles using a structuring content analysis.

The structuring content analysis contains several steps: Firstly, a category system to structure and summarize different statements from the product and service reviews has to be developed. In this case, we took the categories and sub-categories from CEIM as it provides a holistic and application-oriented description of a user's experience and has already been tested in other student projects.

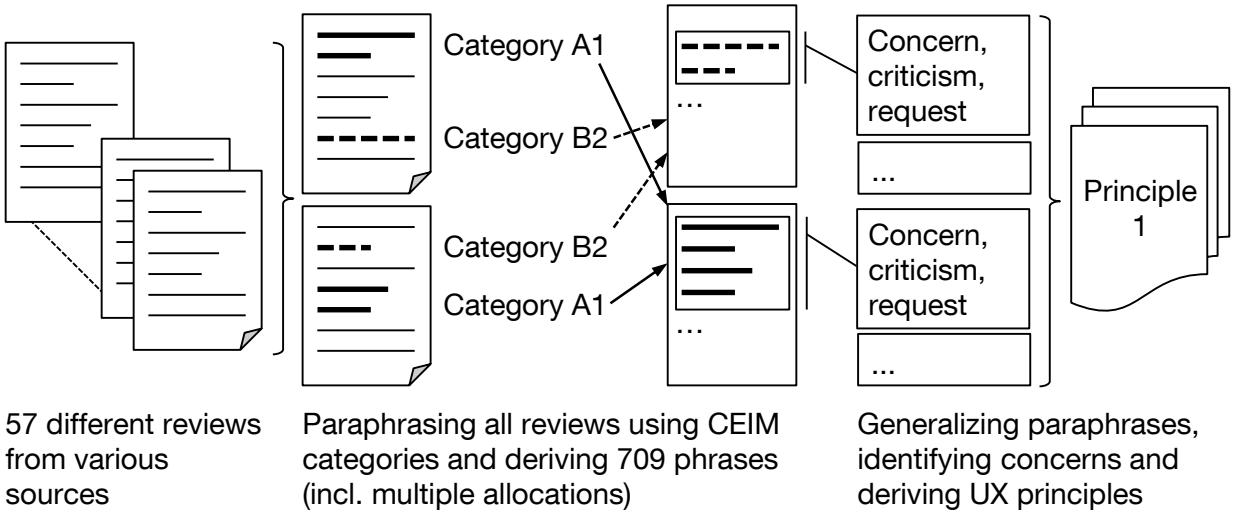

Figure 5: Process of deriving UX principles

All of the reviews have been analyzed due to statements that correspond to the sub-categories of the CEIM. Thus, 709 allocations have been extracted from the 57 reviews and structured according to the CEIM categories, using the spreadsheet software Excel. As sentences included statements that fit into several categories, for example when a user writes about a missing feature in a specific situation, some proposition have been listed in more than one sub-category. This is consistent with the content analysis according to Mayring (2003).

Having structured and summarized the allocated statements from every sub-category, we were able to expediently look for commonalities within each sub-category. Therefore, each sub-category has been analyzed individually and the related statements were translated into simplified phrases, describing the underlying concern, criticism or request of the respective statement.

The next step consisted of matching the commonalities from one sub-category with the concerns from other sub-categories of the associated main-category. Finally, assisted by this classification it was possible to cluster bad experiences caused by similar concerns and formulate general principles. By means of this approach, it was possible to derive 20 UX principles from 57 reviews, based on 709 categorized paraphrases.

3. RESULT

3.1. UX Principles

In the following we provide further information for each of the 20 UX principles that we were able to derive from the reviews and comments based on negative experiences. The principles will be described by explaining the respective characteristics that built the foundation for the particular principle. Real examples from the analyzed reviews thereby enrich the description in order to enhance the comprehension of the principles:

1. **Prevent a bad first impression.** The first impression of a product or service has a substantial impact on the user's attitude and relation towards the product. Thus, from the packaging over the user manual to potential installation processes the first usage has to be a pleasant process. In our review, some users complained about the manual that did not provide the appropriate assistance for the product setup. Another user was frustrated that he was not able to use his camera straight away but had to install an additional firmware first.
2. **Avoid the feeling of inability.** If a user has the feeling that he is not capable of using the product properly, there is no chance to create a sufficient UX. The user of a ticket machine for example felt unqualified for using the machine because the menu navigation was too complicated. Products have to be self-explanatory to avoid such feelings.
3. **Avoid forced interruptions.** I our reviews, forced interruptions due to an unexpected fast draining battery of a fitness wristband, overheating of a video projector or the frequently required recharging of an electric car's battery pack lead to a bad experience. The duration of constant usage has to be enlarged in order to satisfy the users' needs.
4. **Enable a natural handling.** Users want to enjoy a straightforward, natural usage without complex, illogical or inconsistent features. An Xbox One user complained about the complex menu setup that is apparently made for everything but gaming, while in the review of a video recorder the user was confused that volume controlling differs for regular and HD channels.
5. **Prevent inertial functions.** In general, the analyzed reviews gave the impressions that users desire fast and smooth function fulfillment. On the one hand, a user of OS X Mavericks was upset because of the long duration of a video upload. On the other hand, the review of a video recorder criticized the fact that the sound was delayed in relation to the video.
6. **Enhance controlled information provision.** People want to get information and feedback about their usage behavior. However, it is important not to provide too much or unstructured information. In an opera review, the author wrote that he was negatively overwhelmed by the amount of information on stage whereas the user of the fitness wristband did mention the lack of a status bar in order to receive system information.
7. **Realize a natural usage for everyday life.** To avoid a bad experience, products and services have to be comfortably used in everyday life. This is highly influenced by the product's geometry and the way users interact with the system. A user's blog comment mentioned that his smartphone is too big to be comfortably stored in a trouser pocket. Moreover, a Google Glass review described that it is awkward to activate the glasses by throwing the head in the neck.
8. **Minimize necessary user operations.** A navigation system review complained about many confirmation screens before starting the navigation. A smart watch user was annoyed by the fact that due to the idle state he always had to interact with the watch just to read off the time. In general, people expect an interaction to be processed quickly and easily. Hence, users are annoyed when they have to complete a lot of steps to cause the desired effect.
9. **Enable individualization.** It is impossible to create a product that fits perfectly to everybody's need. Consequently, it is important to enable the possibility to individualize or personalize a product or service according the user's habits. Several reviewers demanded more control and configuration options.

10. **Support controlled socializing features.** In a film review it was clearly recognizable that the reviewer wants to socialize, mentioning the lack of memorable quotes or sayings that can be used for conversations. The Xbox One reviewer however was upset that you obligatory get logged into your Skype account and other present persons can see your private messages.
11. **Prevent the feeling of insecurity.** Expressing security via your product or service can lead to a positive experience; the contrary will definitely lead to a bad experience. Besides data and software security whereof some reviews were dealing with, the user of a drill mentioned the missing GS-sign for tested safety (Germany) that made him feel less secure.
12. **Avoid limited compatibility to the system's environment.** If it is a game console where you can play only a limited number of games, a music box of which the sound is only satisfying for a few music genres or a fitness wristband that is only compatible with the iPhone – these restrictions limit the utilization and consequently the UX.
13. **Exclude incompatibility of different versions.** The user of a text-processing program was frustrated that he could not use any of his documents with the new version of the program. Other reviews described a bad experience with new versions or updates of their products and services that missed general features they were used to use. It is important to enable the user to compensate the lack of common features if they are not integrated in the new version.
14. **Fulfill expected fundamental functions.** Sophisticated features, materials or design may lead to a distinctive joy-of-use, but only if basic functions are fulfilled. Among others, a reviewer of a smart watch came to exactly this conclusion as he missed basic features he expected a wearable companion device to have.
15. **Ensure technological advance.** From photo-editing software over a smart watch and a video camera to a review of a visit to the doctor, several reviewers mentioned missing features as shortcomings or even compared their product or service with competing solutions. As the mentioned reviewers missed a recognizable technological advance or benefit, they were dissatisfied and sometimes even thought they would have been better of buying the competing product.
16. **Orientate the product impression towards the context of use.** Design is a very important influence factor affecting a user's experience. Characteristics such as geometry, material or color have a recognizable impact on the reviewer's judgment. In our reviews it could be seen that users associate the design of products or services with the context it is used in. The reviewer of a fitness wristband complained that the wristband doesn't look sportive, as it is very rigid.
17. **Minimize design-related complexity.** Design-related characteristics do not only influence the look and feel but also the usage of objects and services. In a TV review, the miniaturization of control elements was criticized, making it difficult to control the product. A coffee pad machine was hard to use because the complex geometry of the pad drawer did not allow a trouble-free usage. Reduction in complexity is crucial to avoid a bad experience.
18. **Realize a product-service system.** Nowadays, when users buy a product they expect to simultaneously buy the belonging customer service. In our reviews, products from six out of the seven product categories included a comment, describing a bad customer service.
19. **Convey a holistic experience.** A product or service on its own can be as pleasing as possible, when accompanying accessories are either obligatory or are of low quality the overall experience suffers. One of our reviews, evaluating an MP3 Player, criticized the ear buds that seemed to be sub-standard.
20. **Avoid a bad price-performance ratio.** Several reviews, where users were unsatisfied with the experience of the product or service, established a connection between the quality and the price. The user of a fitness wristband missed several features he or she expected due to the associated price segment whereas the reviewer of a hotel evaluation complained about the poor quality for the given fare.

3.2. UX Principle Form Sheet

Since a simple listing, as shown in section 3.1, of the derived UX principles will hardly support a designer during the development process, it is of fundamental importance to provide a structured guidance with multiple examples. For this reason we developed a UX guideline with detailed information for each principle in the form of a one pager. This section addresses the structure and layout of the one-sided principle form, which is illustrated in figure 6.

The form is divided into three parts. The upper section gives a brief introduction into the principle, explaining why or in which contexts the principle is relevant. On the basis of this objective or explanation, the principle is named and fully described by the associated design parameters. From our perspective it is important to include the principle attributes that we can derive from our analysis but also enrich the description with our own expertise. This means that we include parameters that are part of the principle but have not been a subject of our selected reviews. Consequently, we ensure a holistic consideration and completeness. An Icon for each relevant characteristic enhances the perception of the particular characteristic.

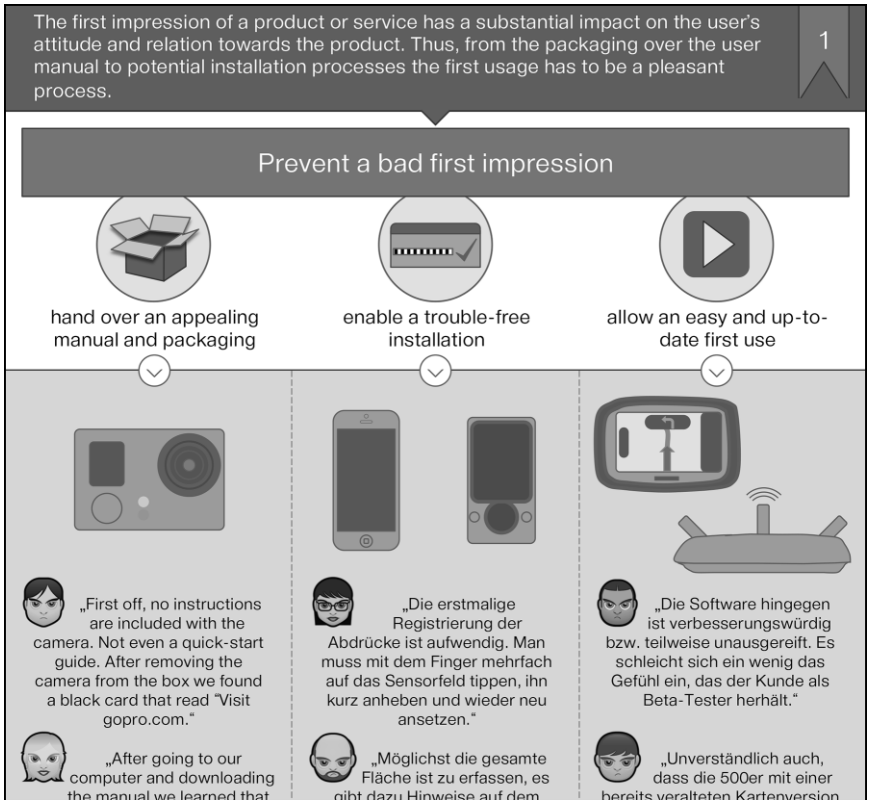

Figure 6: Form sheet for the first UX principle

The second part illustrates the principle by representing a descriptive example. Firstly, a picture or sketching of a product or service that does not realize the respective principle will be shown on the left side. Based on this counter example we show a second picture or sketching where the principle is applied. Thus, this illustration helps the designer to understand how the principle can be applied in a certain context and is encouraged to adopt the UX principle.

The third part finally states several related comments from the reviews we have selected for our analysis. Storytelling, i.e. incorporating real comments, is a way to guarantee a comprehensible and memorable assistance for designers during the development process, as it can demonstrate new opportunities for experience (McCarthy & Wright, 2004).

4. CONCLUSION

4.1. Summary

We showed the Customer Experience Interaction Model which combines different perspectives and aspects of UX and thereby helps analyzing observable experiences. Furthermore, we presented our synthesis approach to support developers in UX design. We gathered and analyzed negative product reviews and experience descriptions, mostly taken from internet sources. These reviews were classified by CEIM elements, paraphrased according to the proceeding from Mayring (2003) which finally allowed us to derive UX principles from them.

These principles were illustrated as one pager with a standard from sheet. These one pagers consist of a principle description and give extracts from the investigated product reviews as quotes enriched with pictures. With these UX principles, inexperienced developers can be supported in considering UX aspects and be given concrete hints with examples taken from other products.

We ran a first evaluation in the context of a Bachelor Thesis. The student could apply the principles in a use case triggering new UX-related ideas. The evaluation showed that even without previous knowledge concerning UX, the approach helps in asking the right questions and getting hints for appropriate solutions. Other approaches like the need-driven one by Kim et al. (2011) can be included in terms of an own principle.

4.2. Outlook

The presented principles, mostly based on student's works, were derived only from a few examples. Many more reviews from different sources need to be included to get more principles to inspire concrete ideas. We plan to expand the investigated reviews by looking at other branches besides physical product development like entertainment, sports, gaming, cinema, theatre etc. We suggest that product developers can profit from being inspired by looking at other disciplines that aim at creating experiences.

Our evaluation within a student's project showed first good results but the student had a deeper previous knowledge about UX including the inner motivation to deal with this topic. As our goal is to support inexperienced designers within real industrial development projects, we will run several evaluation loops in this context to prove the benefit of our approach.

Furthermore, we see a high potential for improving the illustration of principles. So far we only created and applied paper-based one pagers; this can become confusing with a higher number of principles. Based on the one pager design a web-based solution could help finding the appropriate principles and examples easily to support understanding by use of icons and images. Moreover, potential connections between different principles could be easily linked within a web-based solution. Furthermore, a more detailed storytelling approach would also help in clarifying the principles and application examples.

Finally, the approach should be enriched by more existing UX theories, approaches and corresponding literature sources. Developers should be enabled to deepen their knowledge about a specific UX principle and underlying scientific basics – our framework serves no more than a top-level overview on various UX perspectives.

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BIOGRAPHY

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