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GOOD PRACTICES IN USER INTERFACE DESIGNING

Introduction

The aim of the article is to present present-day modern methods of developing attractive and user-friendly interfaces[1]. The article points to the methods that are recommendable depending on the technology of the software product implementation, its purpose, the application area and user characteristics. The objective is to convince the reader that the development and a further use of a well-developed interface is an interesting, creative and inspiring activity both for the designer and the future user.

Interface is an interaction channel between the functionality of application, the data it processes and the user. The article presents the requirements for the design of present-day interfaces, compares possible solutions and shows the selection directions for the best one. A particular emphasis was put on interface friendliness to ordinary application users, including the application's maximum intuitiveness and easiness of use.

The issues will be illustrated by the interface that was developed for a universal platform of course management as a part of a diploma thesis[2].

[1] J. Allen, J. Chudley, *Projektowanie witryn internetowych User eXperience*, Wydawnictwo Helion, Gliwice 2013.
[2] Ł. Kozioł, *Tworzenie uniwersalnego interfejsu użytkownika w oparciu o system zarządzania kursami,* Diploma thesis, the School of Banking and Management in Krakow, 2019.

1. User Experience (UX)

When developing a user interface, one should consider the issues of UX (User eXperience)[3] i.e. the overall experience of an individual who uses the product. Thus, one should find out the characteristics of the user of the interface to be developed and to determine how the accepted solution will help the user achieve his/her objectives and provide them with the benefits they expect; these may also include their pleasure of use. The next part of the article explains the use of available methods to find out and to implement the elements that are enjoyed by the users and are crucial in their choices. On the basis of UX, selected aspects and methods of interface development will be presented, including UCD (Under-Centered Design).

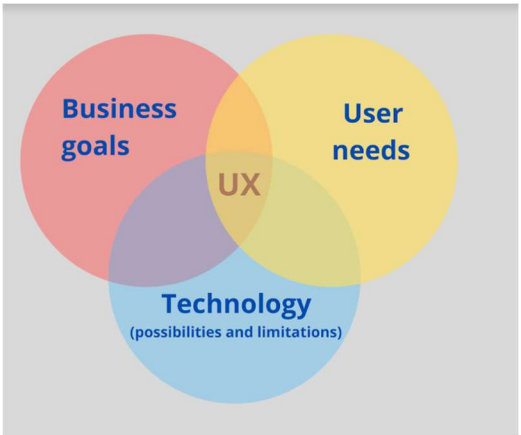
Every user of a website knows very well that there are sites that are liked and the ones that are unaccepted, and these opinions are emotional. The idea of UX is to design an interface that increases user satisfaction and at the same time achieves business objectives. The task of every Designer of User Experience is to study the needs and expectations of future users so that they receive a product that suits them.

The concept of *User Experience* (UX) is frequently associated with the term *User Interface* (UI) which is understood as an element of interaction between humans and machines. The difference is that UX is based on psychology and sociology in relation to the users, while UI includes graphical approach to the development of interface, its visual qualities, interesting solutions, animations, etc.

Every time when a new product is being developed, there is a clash between user needs, business goals and technological possibilities. The common elements of the above-mentioned aspects constitute UX, which is presented in Figure 1.

[3] J. Allen, J. Chudley, *Projektowanie witryn internetowych User eXperience*, Wydawnictwo Helion, Gliwice 2013.

Figure 1. UX compromise



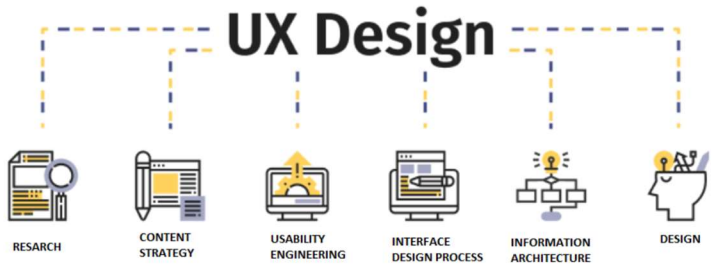
Source: *„User Designer nie istnieje!”,* jestem.mobi/2017/03/ux-designer-nie-istnieje (accessed: 18.12.2020).

One of the first researchers to deal with this issue was Jakob Nielsen[4]. The most important observations that were the bases for his considerations are the following:

1. Application or website users want to find the information they are looking for as soon as possible;
2. Even if they do not know what precisely they are looking for, they still want to browse the Internet and its content to find subsequent information.

These two basic opinions show that UX Design involves several different aspects. They are presented in Figure 2. Each component is a success factor, and the omission of any of them reduces the product quality.

Figure 2. User Experience Design



Source: *„Czym właściwie jest ux-user-experience”,* www.overlap.studio/pl/wiedza-ux/ux-user-experience-czym-wlasciwie-jest (accessed: 18.12.2020).

2. Significance of a good user interface; universality

[4] J. Nielsen, *Projektowanie funkcjonalnych serwisów internetowych,* Wydawnictwo Helion, Gliwice 2003.

In the process of developing an interface, one should pay attention to its usability and user-friendliness. A user-friendly interface means first of all intuitiveness. Every application user should be able to sense intuitively how the site functions, where to click to find the required contents. Some websites are often ignored simply because navigating is counterintuitive.

Another factor is the clarity of the interface. Some websites have too much content and too many tabs or links. This leads to chaos and discourages from using the product, which should particularly be taken into consideration.

The next issue is the selection of the colors adequate to the contents of the interface. According to research, colors have substantial impact on the reception of the content. In the interface development process one should determine whether colors match the contents. Developers have their own preferences and frequently insist on ideas that may be wrong. Above all, one should remember that the interface is for other people and not for the developer. If there is an opportunity to learn the opinion of other people – the application receivers – it is worth doing it.

3. Principle of usability

Interface users prefer the simplicity of use, the ease and speed to find the required information, i.e. the *usability,* rather than aesthetics values.

According to the ISO report[5], *usability* is a set of human product features that are characterized by the ease-of-use. The term refers to "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, when developing a user interface, one should strive for the highest possible efficiency, good information content, search effectiveness and the satisfaction of the application user.

J. Nielsen defined 5 principles of the concept of usability as a product quality regarding the ease of use of the interface:

Learnability – how easy it is to learn and use the application by users who do it for the first time.

Efficiency – how quickly and conveniently the application interface can be used.

Memorability – how easily the users can perform the tasks on their return after a long break.

[5] *Report ISO 9241,* https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-2:v1:en (accessed: 20.12.2020).

Error susceptibility – how often the application makes errors, is counterintuitive and does not perform tasks in accordance with user wishes.

Satisfaction – how pleased the user is with the application. The satisfaction level can compensate errors and shortcomings and it is the major decisive factor whether the user will return to the application.

In order to meet the above-mentioned principles of designing usable interfaces, one should take advantage of the findings of a wider multidisciplinary area of knowledge: Human-Computer Interaction HCI, which deals with the interaction between people and computers and is situated at the intersection of computer science, graphics and industrial design, psychology, media science and social communication. With the consideration of HCI results and UX approach, main principles can be formulated of the UCD (User Centered Design) development process.

UCD consists of four phases[6], viz:

- Planning – a general concept is developed,
- Analysis and requirements – requirements are collected and specified to enable the implementation,
- Design and implementation – the interface is developed,
- Testing and evaluation – evaluation is conducted whether the product meets user expectations. Users are frequently involved to test the application themselves and to give advice or recommendations regarding modifications.

4. Designing graphical user interface (GUI)

The first stage in the interface development process is designing its layout, i.e. a visual format. The guidelines that should be followed to facilitate the task are mentioned further on. Firstly, the name of the website should be in a visible place so that it stands out from the content. This will make it easier to remember the website when the user needs to return to it.

The next requirement is to determine information hierarchy. It should be decided which information is the most significant, what elements should be emphasized and what can be placed in deeper interface layers.

[6] J. Allen, J. Chudley, *Projektowanie witryn internetowych User eXperience*, Wydawnictwo Helion, Gliwice 2013.

Then, clickable areas should be highlighted, i.e. the ones that the user can click to obtain more details on a given issue. However, there should not be too many of them as this causes chaos and confusion and discourages from using the interface.

Clarity of the displayed text is another important issue. A situation should be avoided when the screen shows a wall of a text. The text is disordered, illegible and tiring, which may lead to a quick decision to resign from using the website. It is worth applying headings, highlighting links, introducing text columns, and highlighting important fragments of the text to make reading easier.

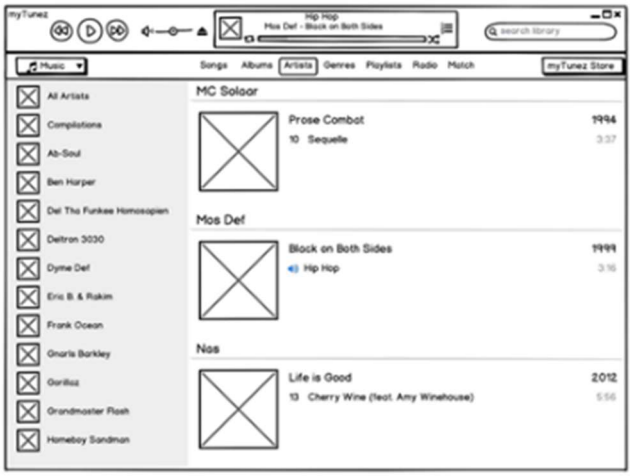
Mocking up

Before developing a user interface, it is advisable to apply the network method. This is a technique of arranging interface elements with an emphasis on the length, width and the spacing between components. A draft interface can be developed by graphical software such as Corel Draw, Photoshop or any other that makes it possible to arrange the elements in a precise way. When the network is completed and accepted by the user, one can verify whether the developer's intensions coincide with the user's expectations or not.

There is an alternative to networking and a more effective way to plan a user interface. It is the method of mocking up an interface[7,8]. Due to its precision it is an increasingly popular method. The method makes it possible to show the designed interface with the use of simple symbolic controls what and where will be located. Then, it is visible whether everything was planned in line with the user expectations or if modifications are necessary in the design. Interface mockups help communicate with the user and also during tests with user groups. They are clear and easy to understand. Mocking up can be conducted in various ways, starting with a pencil and a piece of paper and ending with software programs dedicated for this purpose. Such programs as ProtoShare, Axure or any other like Moqups, Balsamiq or Visual Paradigm (see Figure 3) are the most effective and convenient tools used in interface planning; they have functions that facilitate work and make it possible to develop professional mock-ups that can be presented to the customer.

[7] J. Nielsen, *Projektowanie funkcjonalnych serwisów internetowych,* Wydawnictwo Helion, Gliwice 2003.
[8] B. Rogoś-Turek, I. Mościchowska, *Badania jako podstawa projektowania User eXperience,* Wydawnictwo Naukowe PWN, Warszawa 2015.

Figure 3. An example of a Balsamiq mock-up



Source: balsamiq.com/wireframes (accessed: 12.12.2020).

Contents layout of a website

Designing the layout of a content is another stage in layout development; it is the way how the site content will be presented. There are three types of layouts: vertical, horizontal and centered[9,10].

Vertical layout is currently the most common way of presenting the contents; the application user scrolls the text up and down. An example of such an interface is the widely used online encyclopedia Wikipedia which applies this kind of text presentation.

Centered layout is very common in applications and websites, where there is no need to scroll the presented contents and everything can be seen on a single page. When there is a need to continue, the application moves to the next page.

Vertical layout is the least popular way of presenting the contents. Users are accustomed to scrolling texts up and down and, consequently, most of them are reluctant to scroll the text left or right. Nevertheless, this kind of layout is applied in photo galleries where browsing through presented elements is performed by moving the cursor left or right.

There are two methods of contents composition; their application depends on the requirements regarding the presentation and the contents itself. One of them is paging, that is dividing the contents into subsequent pages which are turned by the *next* button or the number at the top or the bottom of the page depending on needs. The method is popular for sites with a

[9] B. Rogoś-Turek, I. Mościchowska, *Badania jako podstawa projektowania User eXperience,* Wydawnictwo Naukowe PWN, Warszawa 2015.
[10] M. Żabińska-Rakoczy, *Systemy informacyjne* – lectures in summer semester 2017/2018 at the School of Banking and Management in Krakow.

big-sized content. Paging is very frequently used in texts where comments are displayed. This method works better in applications that are run mainly on computers or laptops, where one can easily click to next pages. This does not work so well with touchscreens. Imprecise clicking may be troublesome and inconvenient.

Scrolling is the other method which is very popular due to a widespread of devices with touchscreens, where the contents can be scrolled by a finger moving across the screen. To see the contents on the next page, the user must scroll it. This method is popular for applications with a small or a medium-sized content.

At present, both methods are used jointly. Thus, scrolling is used to a certain moment and then the user turns to the next page. This is helpful in case of sites with a big-sized content. A good example of such a solution is Allegro, a popular e-commerce service which presents dozens of offers for different products on one page. They can be scrolled down but to see next pages, the user has to click on the next tab. The use of these two methods is a very practical way of dividing the content on a page.

Content hierarchy, navigation

Another extremely important issue in user interface design is the content hierarchization[11]. Every application or a website includes the content that is important, more important and of the lesser importance. Interface users appreciate it when everything is well structured and the high priority content is highlighted and easily accessible.

The interface designing process should consider another issue: navigation – i.e. the method how users can access the necessary information in an easy and pleasant way. Good navigation makes it possible to find the required information through clicking or typing the right words into the search engine. Navigation is a key element as it, in a way, constitutes the backbone of the application and user interface. It should be user-friendly, intuitively and it should provide fast access to the content. Thus, the contents should be organized in a logical way. Abbreviations should be avoided; an abbreviation that is obvious to the developer may be obscure for the user.

During development of websites or when applying the existing ones, one can encounter navigations consisting in switching between subsequent cards. This is a classic example of tabs. Tabs enable moving within pages; a card – when active – shows some content and after clicking

[11] *Report ISO 9241*, https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-2:v1:en (accessed: 20.12.2020).

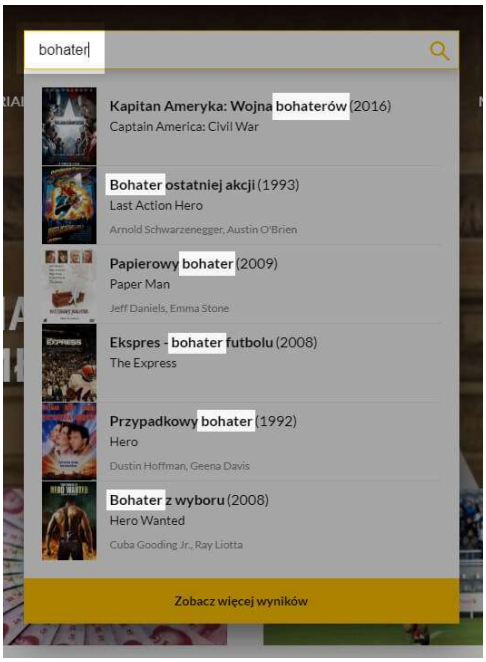
another card some other contents is presented. This is a very interesting navigation method frequently used in present-day interfaces due to its intuitiveness.

Interface interactive elements

Other important elements are all kinds of forms and search engines, i.e. interface interactive elements. The facilitation of access prompts in the forms, or other solutions that make using an interface either convenient or time-consuming and impractical implies user satisfaction or dissatisfaction. Google, which is the most popular search engine, is a good example. It offers prompts for queries and it also displays the most relevant search results at the top of the answer list, which is the result of algorithms applied in the searching process. Using a search engine in a design should involve the consideration of additional search criteria, i.e. the use of advanced search.

Another important issue to be considered is the appearance of the search engine and its location. Visibility of the search engine is crucial as well as a clear statement that the function of an empty box is to look for information, e.g. by preceding it by the word *Search* or by a commonly used icon of a magnifying glass (cf. Figure 4).

Figure 4. The use of a search engine



Source: Filmweb.pl (accessed: 15.12.2020).

Registration form is another frequent element of applications. This is one of the most frequent forms of interaction with the user whose task is to create his/her own profile and password, to give personal data and email address. A well-constructed form should be simple

and easy to complete. There are several basic rules that must be followed. Firstly, the user should be informed which fields are required. Secondly, the link to the form should be in a visible place. It is becoming trendy to register with the application of existing accounts. Easier registration procedures will encourage potential customers to use the offer.

The login form[12,13] is the consequence of the registration form. Every application user with a profile should have the possibility to log in to his/her profile. Most Internet users like login forms to have a specific shape, common or similar to the majority of forms they are already familiar with. Thus, a login form should have a field with the login, which may be the name of the user or the email address. The next field allows for putting in the password. It is important that the fields for the login and the password are clearly described or marked so that the user does not have problems to distinguish them. Many users use the tab key to change fields. The interface should make it possible. It is advisable to provide the options to remember and recover a forgotten password.

Other interface features

One of the key aspects in creating a website is the appearance and presentation of the text. It is important that the text is presented correctly, without errors, and that it is user-friendly and pleasant.

Various applications use links to other websites. Their location in the text should not cause confusion. There should be a suitable place for them, for example at the bottom of the page, where anyone can find them and use as needed.

Nothing is probably more annoying to the user than the unexpected and disturbing pop-ups and advertisements. Moreover, when completing forms or doing other actions, users expect to have the possibility to go back, which is worth considering by developers.

Another aspect of the user interface is the recommendation to create a good list of operating tips. Every application should have such guidelines if it is to be considered professional.

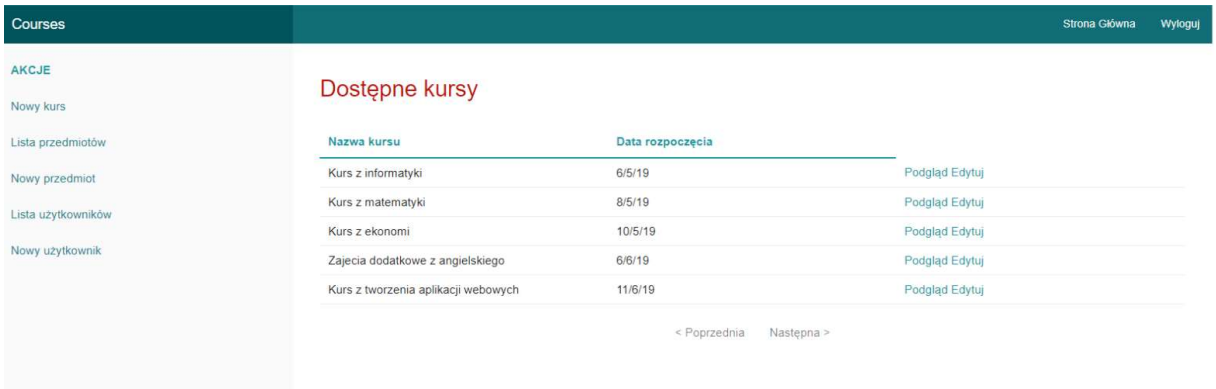
5. Exemplary implementation of a user interface for a course management system

[12] J. Nielsen, *Projektowanie funkcjonalnych serwisów internetowych,* Wydawnictwo Helion, Gliwice 2003.
[13] „User Designer nie istnieje!", jestem.mobi/2017/03/ux-designer-nie-istnieje (accessed:18.12.2020).

Based on the good practices and guidelines that were discussed above, an interface[14] was developed whose elements are presented below.

A box of „available courses" which is presented in Figure 5 was developed in line with the tips presented above. Thanks to the clarity of the text, simplicity of the interface, the presentation of information in the center of the page, the navigation in one place with a concise menu, the „edit" button which makes it possible to edit the data concerning one particular course and to return immediately to the home page, the application users can easily understand what actions can be performed and it does not take them a long time to learn how to operate the interface.

Figure 5. Box of available courses

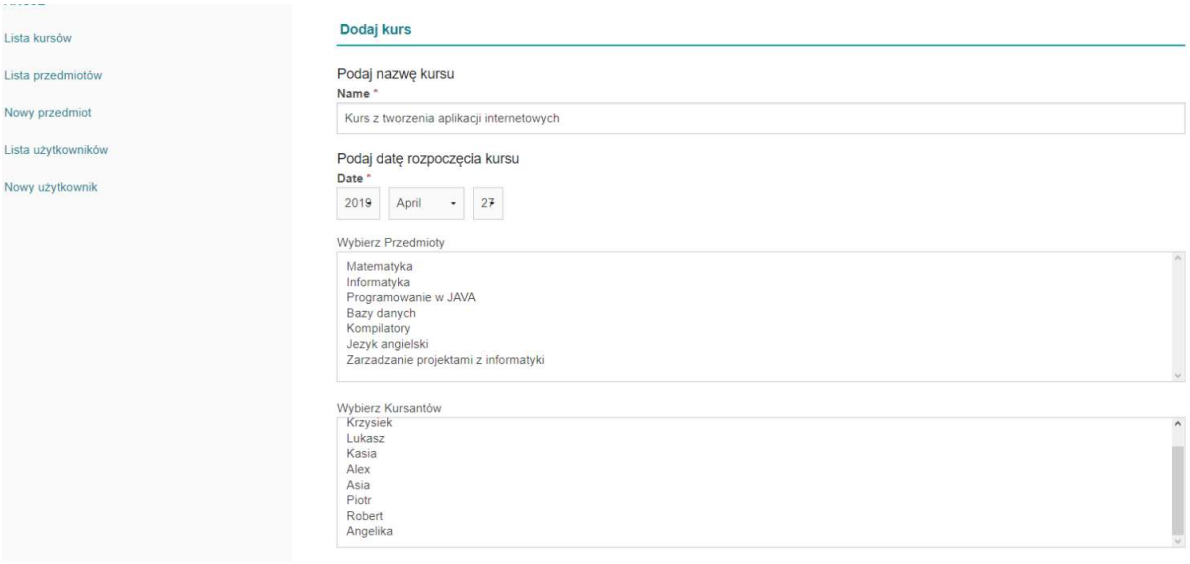


Source: Ł. Kozioł, *Tworzenie uniwersalnego interfejsu użytkownika w oparciu o system zarządzania kursami,* Diploma thesis at the School of Banking and Management Krakow, 2019.

Figure 6 presents an example of a box for creating a course; the box makes it possible to add a particular course with its commencement date, to put in the names of the course participants, and – most importantly – to choose the subjects that will be covered by the course.

Figure 6. Box for creating a new course

[14] Ł. Kozioł, *Tworzenie uniwersalnego interfejsu użytkownika w oparciu o system zarządzania kursami,* Diploma thesis, WSZiB in Krakow, 2019.



Source: Ł. Kozioł, *Tworzenie uniwersalnego interfejsu użytkownika w oparciu o system zarządzania kursami,* Diploma thesis at the School of Banking and Management in Krakow, 2019.

The development of a user interface is a very interesting issue from the point of view of scientific research and it is too wide to be presented fully in a single article. The presented elements and the examples should encourage the reader to get acquainted with the issue. They are based on the cited above diploma thesis at the School of Banking and Management.

Conclusions

Undoubtedly, a user interface has an impact on the success of an application or a website. The way it is developed may result either in the increase or decrease of the interest in the product. The article, and the diploma thesis[15] that the article is based on, aim at the presentation of the issue in the way that would encourage interface developers to do their work better and more reliably. The interface in question was developed in line with the presented principles. The application of the above-mentioned guidelines results in the achievement of design objectives as well as user satisfaction. The recommendations can be followed for various applications; their presentation illustrated by a course management system facilitates their implementation in other cases.

In conclusion, the principle that guided the article should be repeated: *User is crucial to the system, the system is for the user and not vice versa*. Every future UI developer should have this in mind. Users should be involved in the development process so that improvements can be added and user satisfaction from the product is achieved. As a result, the interface is popular,

[15] Ibidem.

and the application or website are eagerly visited, which has an impact both on the reputation of the developer and a company that ordered it.

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[1] Allen J., Chudley J., *Projektowanie witryn internetowych User eXperience*, Wydawnictwo Helion, Gliwice 2013.
[2] balsamiq.com/wireframes (data odczytu 12.12.2020).
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[4] Filmweb.pl (data odczytu 15.12.2020).
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Abstract

The article presents issues related to user graphical interface (UGI) design. It discusses good practices against the background of the main factors affecting interface quality and its reception by the users, i.e. their general impression and assessment in the form of User Experience (UX). It presents the application of good practices in a practical example of a usable software design system developed as a part of the diploma thesis.