

# Assesment of Online Bank GUI based on User Experience Evaluation A Case Study

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**Abstract:** The paper presents a case study of User Centered Design (UCD) assessment. The case study is aimed to design and test GUI of online banking application. The procedure is multistep, based on UCD phases. Case study implemented such methods as Contextual analysis, Heuristic evaluation, Prototyping and extended iterative User test. The paper outlines contain description of applied methods and results including survey summary and users recommendations. The adjusted version of GUI is also presented.

## 1 INTRODUCTION

Intuitive and functional interface becomes one of the most important requirements for modern web applications. To fulfill this requirement User Experience (UX) needs to be regarded in the process of application development. According to recent research (Isomursu et. al, 2012) the expanding role of User Experience Design became more and more industry relevant. Interface adaptation to user needs and recommendations and its personalization is a key factor of today ICT project, especially web applications (Prenzel and Ringwelski, 2012). Impact of UX on ITC, business and projects has been explored by numerous authors (Dhir and Al-kahtani, 2013, Blomkvist, 2005; Chamberlain et al., 2006; Dayton and Barnum, 2009; Detweiler, 2007).

User Experience has an interdisciplinary character. A designer needs to: have psychological knowledge, know principles of ergonomics, understand the technology and, that is the most important one – have empathy. The ability to understand the needs of future users increasingly becomes a key factor in the success of the resulting product.

In recent years in the European online banking market we can observe a trend of offering customers modern interfaces, formed under the principles of User Experience. Their projects present new insights into GUI (Graphical User Interface) design.

These changes were initiated by the rapid popularization of tablets and smartphones.

Applications had to adapt to different resolutions and conditions (Resmini and Rosati, 2011).

In addition, mobile devices made it easier to use the Internet by less experienced users, who expect mostly intuitive solutions. Especially for them it was necessary to put more attention to the overall GUI usability and to apply User Centered Design (UCD). The aim of the paper is to apply a set of UCD to design and test GUI of online banking application

## 2 USER CENTERED DESIGN

User Centered Design is the methodology applied to create useful, ergonomic products. It requires understanding of the target users and needs to meet their expectations. This aim can be achieved by putting the user into the center of the design process. The task of the designer is to focus the attention on user and simultaneously consider capabilities and limitations of used technology (Rubin, 2008).

UCD consists of a number of methods dedicated to involve users in the process of the project designing and evaluating. UCD is divided into five phases:

- Planning (i.e. Contextual analysis)
- Requirements analysis (e.g. in-depth interviews, analysis of existing solutions)
- Design (e.g. prototyping, heuristic evaluation)
- Implementation (e.g. lo-fi prototyping)
- Tests (e.g. heuristic evaluation, usability tests)

Simple is an interesting example of UCD-based online bank (Figure 1). The main objective of this startup is to provide a personal account equipped

with innovative web and mobile services. A lot of attention was paid to fulfill requirements gathered from users. That is why Simple is sometimes referred as "Anti-bank".

Home page is focused on presenting transaction history in a way to make quick and efficient searching. The horizontal menu enables to display statistics and to sort data. Its location remains unchanged for all pages, but the searching panel and supportive buttons adjust to currently presented information.

Other interesting feature is *Safe-to-Spend*, a function that shows the available funds. It is calculated based on the free funds, planned expenses and saving plans. This solution reduces visual clutter by focusing on what is important for the user.

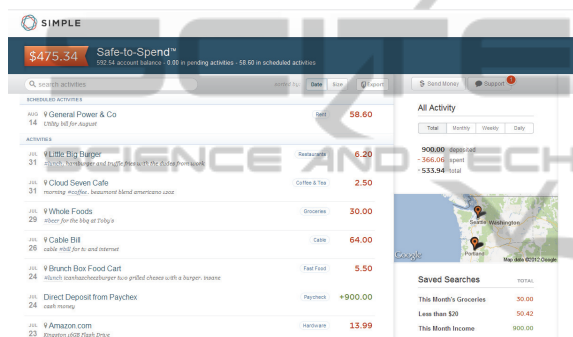


Figure 1: Bank Simple.

### 3 APPLIED METHODS

The most important methods applied in the case study are: Contextual analysis, Heuristic evaluation, Expert Analysis, Prototyping and User tests.

#### 3.1 Contextual Analysis

Contextual analysis of the project consists in preparing a detailed description of the target user and cases of application usage. Performing surveys and in-depth interviews enables to understand the future users profile and user requirements.

It allows to detect the expectations and requirements of the project. In many cases it enables to discover latent user needs and, as a result, they allow to better understand their motives.

#### 3.2 Heuristic Evaluation

Heuristic evaluation is a popular method of usability checking. It allows to evaluate the interface based on

a set of established guidelines called heuristics. Unlike usability testing which needs to be performed with end users, heuristic evaluation can be made by everyone, regardless of skill level (Martin, 2012).

Evaluation enable to assess the conformity of the application with heuristics to identify and eliminate inconsistencies in the project. Consequently, tests usability performed later are more effective.

The most common set of heuristics is a list created by Jakob Nielsen (Nielsen, 1994). It contains:

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users diagnose, and recover from errors
- Help and documentation

#### 3.3 Expert Analysis

In order to obtain the results in a web application testing, the conglomerate of expert analysis might be applied. The expert analysis criteria applied in the paper contain the detailed list of areas and subareas with questions assigned to each point. The group of main areas contains (Milosz et al., 2013): *Application interface*, *Navigation*, *Feedback* and *Content*. Detailed list of questions is presented in Table 3 in the paper's results sections. Table 1 presents the grading scale used to assess each evaluated assessed area.

#### 3.4 Prototyping

Prototyping is a technique consisting in creating mock-ups (interface schemas). They allow to detect any potential problems with the application early on. They present the look of individual application elements and enable performing heuristic evaluation. They assure minimum cost of changes. Minor modifications of the interface can result in significant changes in the implementation. It contributes to a significant increase in production costs (Mathis, 2011).

#### 3.5 User Test

User test is the best way to verify the effectiveness of the interface. It shows if the application is

understandable to users and what areas might be difficult to navigate for them (Mathis, 2011).

Table 1: The grading scale applied to the LUT list.

Grade	Description
1	Critical usability errors were observed, preventing normal usage or discouraging user from using the application.
2	Serious usability issues were encountered, which may prevent most users from task realization.
3	Minor usability issues were observed, which if accumulated may have negative impact on user performance.
4	Single minor usability issues were observed, which may have negative impact on user work quality (e.g. poor readability).
5	No usability issues influencing either user performance or work quality were identified.

In order to ensure the effectiveness of the test it is necessary to define the most important tasks for users (Allen, 2012). Only one user should be tested at a time. Thinking aloud protocol might be applied in order to achieve better results.

## 4 CASE STUDY

The presented case study describes the analysis of created GUI of online banking application. Performed multilevel analysis consisted in: Planning and requirements analysis, GUI Design and implementation and Usability testing.

### 4.1 Planning and Requirements Analysis

Contextual report was the result of the planning phase. Table 2 focuses on general information about members of chosen user group, their abilities and the tasks they need to perform.

At the end of this phase competitive analysis was conducted to understand possible solutions for main problems and to locate potential unaddressed issues. In result twenty EU online banks were subjected to cognitive walkthrough and heuristic evaluation.

### 4.2 GUI Design and Implementation

During the design phase two low-fidelity interfaces were prepared (presented in Figure 2 and Figure 3).

They show two different approaches to fulfill the project requirements.

Table 2: User type description.

<b>User type</b>	Bank account owners
<b>Skills and knowledge</b>	
Training and experience in the business processes	Nearly all experienced
<b>Experiences</b>	
Using other product with similar main functions	Majority familiar
Using products with the same interface style	Majority familiar
<b>Physical attributes</b>	
Age	14+
Typical age	16 – 65
Gender	50% male, 50% female
<b>Motivations</b>	
Attitude to job and task	Highly motivated
Attitude to the product	Varying
<b>List of tasks</b>	
Tasks identified	<ul style="list-style-type: none"> <li>▪ Checking transaction history</li> <li>▪ Making money transfer</li> <li>▪ Making payment</li> <li>▪ Expense analysis</li> <li>▪ Credit card management</li> </ul>
Tasks for usability evaluation	<ul style="list-style-type: none"> <li>▪ Checking transaction history</li> <li>▪ Making money transfer</li> <li>▪ Expense analysis</li> </ul>

Ten experts representing the target user group were selected to test both solutions. They filled the survey presented with collected data in Table 3.

The results conclude that the overall assessment of both interfaces was good. The second interface got a slightly higher score. In addition it was considered a more interesting alternative. Although, its readability could use improvement. Moreover, feedback section shows users weren't as sure about what needs to be done to complete each action.

### 4.3 Usability Testing

Based on the user feedback the second interface was improved and redesigned as a high-fidelity mock-up (Figure 4) dedicated for the usability testing.

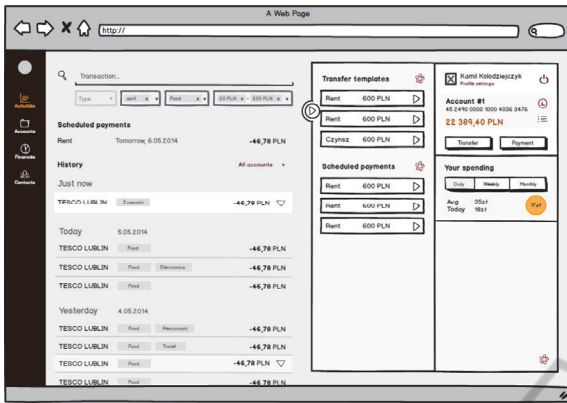


Figure 2: First interface.

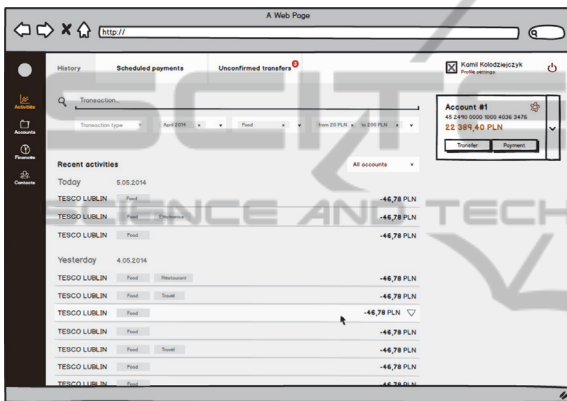


Figure 3: Second interface.

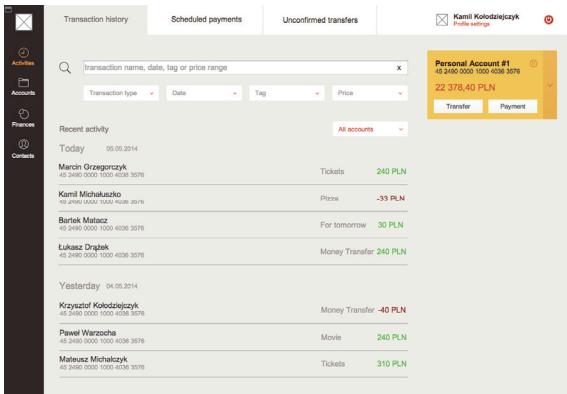


Figure 4: High-fidelity mock-up.

Conducting expert analysis helped to reduce the number of potential issues, thus making the study more effective.

Usability testing consisted of two series of studies. They were separated by the design phase, which focused on fixing the most important issues discovered during the first round of tests.

Table 3: Results of Expert analysis.

Questions	Interf 1	Interf 2
<b>Application interface</b>	<b>4.4</b>	<b>4.425</b>
Is the interface readable?	4.7	4.4
Are the interface elements arranged properly?	4.4	4.4
Is it consistent?	4.6	4.7
Is it clear why the interface is arranged this way?	3.9	4.2
<b>Navigation</b>	<b>4.4</b>	<b>4.5</b>
Is the access to all sections and functions easy and intuitive?	4.3	4.4
Is it easy to get around the application?	4.6	4.5
Is the menu easy to use?	4.5	4.5
Is it easy to find required information?	4.5	4.4
Is the navigation well planned?	4.1	4.7
<b>Feedback</b>	<b>4.15</b>	<b>4.2</b>
Is it easy to perform all the main actions?	4.2	4.5
Is it clear what needs to be done to perform each action?	4.1	3.9
<b>Content</b>	<b>4.35</b>	<b>4.4</b>
Are labels and headlines easy to understand?	4.5	4.6
Is the application content easy to understand?	4.4	4.8
Is there an access to all actions you consider necessary?	4.5	4.4
Is it possible to customize the interface based on your needs?	4	3.8
<b>The entire interface</b>	<b>4.353</b>	<b>4.413</b>

Five people participated in the first study. Their experience in online banking varied from average to high. Each subject received a set of tasks to perform using the mock-up. They were also asked to think aloud during the test.

Instructions were put in a form of typical everyday scenarios, which required users to perform tasks chosen during the contextual analysis.

The list of tasks contained such items as:

1. Making a regular money transfer from the main account and saving the wire as a new template.
2. Making a self-directed money transfer between personal accounts.
3. Checking details of one of the incoming transfers.
4. Changing primary account in the sidebar.
5. Checking current week expenses summary.

Each test took place at participants home, on personal computer. The session length varied from

ten to twenty minutes, and was followed with post-test interview about the overall experience.

The goal of this round of tests was to verify reactions and feelings about the interface. It also allowed to identify the most apparent issues.

Prototype was appreciated by the participants. The widget with quick access to the main account was assessed as helpful. All users admitted they check the history after each transaction. That's why the integration between new money transfer form and the history view was considered useful.

Two issues took place during each session. Users weren't sure how to switch their account in the widget and they had problem with editing money transfer form. For a few participants proximity between elements led to confusion and some phrasing proved to be ambiguous.

Table 4 presents task completion rate for the study. The average rate for a task was 76.67%. It is worth noting, that the most important tasks got 100% completion rate.

Table 4: Task completion rates for the first study.

Task	1	2	3	4	5	All
Making a money transfer	1	1	1	1	1	100%
Saving it as a template	0	1	0	1	1	60%
Making a self-directed transfer	1	1	1	1	1	100%
Finding particular transfer	1	1	1	1	1	100%
Changing primary account	0	0	1	1	0	40%
Checking average spending	0	1	0	1	1	60%

Based on user findings a list of needed changes was created. It contains such items as:

- Main menu needs visibility improvement
- Money transfer should be easier to edit
- Information architecture should be improved to emphasize the connection between search, filters and the activities
- Widget should provide easier way to switch between accounts

The list of changes for the interface, based on the summary of findings, was used to improve the prototype. It consisted of a total of twelve improvements that needed to be addressed in five areas of the mock-up.

The second series of tests was conducted in a laboratory setting. It focused on discovering remaining usability issues. Improving the mock-up allowed to invite unexperienced users as well.

Eight participants were asked to perform the set of instructions on the revised interface. Each test

took place on a computer connected to eye-tracker. This allowed to obtain more accurate data.

Table 5 presents task completion rates for the second study. This time the average rate was 95.83%. Usability tests helped to improve the interface and to achieve much better results.

Table 5: Task completion rates for the second study.

Task	1	2	3	4	5	6	7	8	All
Making a money transfer	1	1	1	1	1	1	1	1	100%
Saving it as a template	1	0	1	0	1	1	1	1	75%
Making a self-directed transfer	1	1	1	1	1	1	1	1	100%
Finding particular transfer	1	1	1	1	1	1	1	1	100%
Changing primary account	1	1	1	1	1	1	1	1	100%
Checking average spending	1	1	1	1	1	1	1	1	100%

Collected data was used to generate series of heat-maps visualizing eye fixations for specific areas of the interface.

Figure 6 presents heat-map for the first five seconds of the test. The biggest hot-spot was detected over the widget. This is where the most of the attention was focused during the first task.

Average time until the first fixation is shown in Table 6, to present users' behavior in more detail.

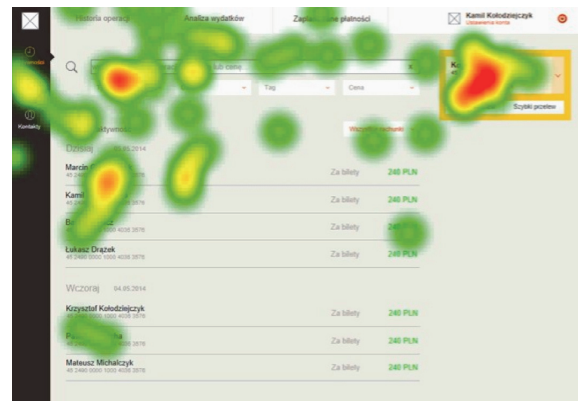


Figure 5: Heat-map.

Table 6: Average time until the first fixation for Main Menu (M) and Widget (W).

	1	2	3	4	5	6	7	8	All
<b>M</b>	197.5	141.8	4.6	91.6	131.7	3.9	3.3	8.3	72.8
<b>W</b>	0.6	0.4	35.7	1.8	2.23	2.9	0.9	5.2	6.2



As concluded by the heat-map, widget grabs more attention. However, some people decided to focus on main menu, even though the widget could also be used to complete the task.

Similarly to previous study, a list of needed changes was created. It contains such items as:

- The button for sending money transfer should be more visible
- Emphasize the fact that the money transfer form has three steps instead of one
- Search and filters should have visible labels
- Search results list should have visible label

The list will be the foundation for the final design phase, which will result in creating the final graphical design for the application.

## 5 CONCLUSIONS

The paper provides evidence for the positive impact User Centered Design can have on a designed interface. The process equips designer with the necessary tools to come up with appealing solutions that will benefit users. It helps to gain better understanding of users' habits and expectations. That's the reason why the interface, created as a result of the case study, brought positively-surprising experience to the usability study participants. We trust that applying user centered approach is a necessary step towards crafting better interfaces for the users.

User Centered Design is an iterative process, that is why our case study project was subjected to two series of design, implementation and testing phases. Second series of studies helped to eliminate all important issues and get optimised design solution.

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