Conceptual Methodology of Developing the User Interface

This paper presents a proposal of a new methodology of constructing software, which gives an application characterized with high usability level and graphic design integrated with company’s marketing image. Designed methodology is intended to fulfil requirements formulated by the new marketing trend described in Jensen’s book “The Dream Society” and “Funky Business” of Ridderstrale and Nordstrom. In order to achieve that goal, selected methodologies of creating software and methods of constructing graphic design have been analysed. To bring closer the way of creating software according to new approach, experimental project has been described in this paper.

1. INTRODUCTION

We live in the world that changes very fast. A few years ago we were forced to buy products that market was offering. Those years were called by the economists information society [11]. The characteristic feature of the information society was the development of companies by gaining new markets. Products were competing with each other by the increase of quality and functionality. The value of the company was built on education and hard work of its employees. Since 1990,
A new economic approach has been noticed. This new trend has been described in Ridderstrale’s and Nordstrom’s work “Funky Business” and the book “The Dream Society” of Jensen. Funky means to add a little more to what is necessary to win the global competition [10]. The good example is Nokia — a global mobile phone producer. Nokia has the best technology, the newest science solutions and professional deliverers. But Motorola and Ericsson work in the same way. How can we influence a customer to choose a specific product from many very similar to each other? The answer to that question is to build a competition on something that we all know but do not discuss in the business world — on feelings and emotions [10].

Companies in the Funky world should concentrate on limited number of markets, competition should be built on feelings and emotions. Company should be managed in the way that creates a structure for employees’ creativity. Jensen’s book [7] presents the market in the new, emotional world. Previously, the value of a company was measured by amount of information it possesses. The emphasis was on high education of its employees. Now, a company has to tell a story. The market in Dream Society is based on the language of emotions and feelings. The company works, employs and fires people in the rhythm given by the story. In the world that we live in, the most popular product is software. For the majority of companies their web pages or applications helping to realize employees’ tasks are integral part of their marketing image. It is very important that those applications fulfil requirements presented in [7] and [11].

The goal of this paper is to present a proposal of an approach of constructing software that will give an application, which has interface integrated with marketing image of the customer and characterised with high level of usability.

2. APPROACHES TO USER INTERFACE DESIGN

Firstly, we would like to shortly review some selected methodologies of software construction, user interface (UI) design, and methods of graphic design.

2.1. USDP METHODOLOGY

USDP (Unified Software Development Process) is a generic methodology of creating software, where project is an instance of the process [6]. Building so-
Software is based on *Use Cases*. Most of the time of software development is dedicated to the construction of an optimal architecture. *Use Cases* are requirements for the system. Every stage of software development is oriented on implementing some *Use Cases*.

The good architecture of the system is very important for the development, reuse of components, organizing work in the project, and understanding the system [9]. However, the application design based only on *Use Cases* is not enough to achieve the high quality of the system.

Iterational process of constructing software in USDP consists of planning a small part of the system. Then specification, design and implementation are made. In the end, integration with existing elements of the system is made, testing and deployment. USDP obliges to more detailed analysis of customer requirements and to not implementing the whole system at once as changes can be very expensive. Disadvantages of USDP methodology are: sporadic contact with the customer, time-consuming changes in the system that is being built, spending a lot of time on trying to find errors, instead of implementing functionality and laborious process of changing requests in the middle of constructing system.

### 2.2. COOAD METHODOLOGY

Complex Object Oriented Analyze and Design (shorten to COOAD) [8] is a method of UI design which follows the common division of UI design process into main phases of: Context of Use Data Gathering, Context of Use Analysis, Conceptual Design, UI technical design, and prototyping. However COOAD specifies precisely the activities to be done during the Conceptual Design phase. During it, the designer should answer the questions: what kind of a *user mental model* (UMM) [2] would be understandable to particular users and what shape of UMM users will be prone to build? From the large set of potential UMM we can qualify some that seem to be easier to adopt by users or better ‘fit’ to the constructed system. Such a UMM, which seems to be suitable for the modelled system and his users is called *desirable UMM*. Desirable UMM represented by object-oriented models is called *user view* (UV). UV expresses a way we would want a user to perceive our system. We can assume, that UV is a description of UI, constructed on semantic level, where the system structure manifested by UI is in the centre of our interest. The way of communicating a model to a user is consequently used in the next phases of system design. UV is used as the basis for
the design of the core of the system and defines also the meaning of UI elements. The integration of COOAD with USDP is presented in [5].

2.3. STAR ANALYSIS

The star analysis is a method of creating a graphic design, which is based on the six orientation points. The description of all those points gives a context which surrounds the multimedia production (Fig. 1).

“The six orientation points are: intention, aim, resources, tradition, situation and motive for the two participants in the visual communication situation. They are closely connected to each other and influence each other. They should be seen more as signposts in the landscape than as boxes with individual and independent meaning. The intention is that careful consideration of these six points will make it easier to find solutions to being a successful ‘communication organiser’ — and to find out what can have been the reason for a particular type of communication to have been arranged as it is.

The star analysis is also intended as both being forward looking descriptive in relationship to creation of an interactive communication, and backward looking analytical in relationship to an already existing interactive communication. [1]”

Figure 1: Star analysis
Agerbæk points out what kind of information should be present in the description of six orientation points. Each description is divided into two parts. The first one is a description from host’s and the other one is from guest’s point of view [1]:

• Tradition:
  *the host* — “It is important to know the host’s tradition in forming messages so that the new message will be in keeping to such a degree that the design can be recognised as coming from a definite host. It is relevant here to be able to follow a line of design or a less organised visual identity and to be able to make the layout within the visual identity.”;
  *the guest* — “The important thing is to be aware of which visual expectations the guests have. The visual expectations often relate to how the branch generally presents itself. One should pay close attention to fields beyond the digital media.”.

• Situation:
  *the host* — “A piece of visual design always has a situation. That means a specific point in space and time where the conversation between host and the guests actually happens.”;
  *the guest* — “[...] relevant to look at what physical situations the guests are in when they actually click into the site”.

• Motive: this point is not divided, because both for guest and host, it is very important to have knowledge about the newest visual solutions for presenting data and interactive tools for guest and host.

• Aim: the aim is the concrete results which both host and the guests expect by taking part in the communication on the site;
  *the host* — “The host may have a specific aim for starting the dialogue - it may be that he wants to write a book together with the users of the site.”;
  *the guest* — “The aim of the guest in looking up the web site can be very different from the host’s. It can be to find a new identity via the products that can be bought on the site.”.

• Resources:
  *the host* — “It is of great importance how many resources the host invests in the project in the form of money or time.”;
the guest — “Guests have in advance a number of resources. They can be economic - it is a fact that an on-line shop owner needs to be aware of his customers’ economic situation, but it can also be knowledge.”.

• Intension:
  the host — “An interactive multimedia production starts with an invitation. Behind this is a host who wants to start a dialogue. With this he has an intention.”;
  the guest — “It is also crucial for the designer to consider the intention of those invited. He or she also takes part in the communication and must therefore have a reason to come.”.

2.4. 12 ARCHETYPES

”The archetype-concept is deeply rooted in Carl Gustav Jung’s theories. Jung defines an archetype as: the manifestation of sense perceived instincts in the form of fantasies or symbolic images. [...] An archetype is in other words a human type, performing in its purest form. [6]”

Brand House company [4] took the concept of archetype as the basis for presenting the relationship between customer and user. The main task of Brand House was to create brand’s marketing image. After the year 1998 they started to build brand identity, in which information about company’s goal, mission, products and employees are indicating a direction of further development, managing and communication inside the company. One of the tools of building brand identity is the method of 12 archetypes. The uniqueness of 12 archetypes method is that it transfers universal and recognized, human values into marketing strategy of the company.

”Archetypes function as models that can provide answers to many dilemmas and considerations related to management and communication. [6]”

Brand House identified 12 archetypes and described them in terms of their wishes, dreams, talents, fears, etc. Method of 12 archetypes is based on matching the company to archetype and creating a visual design by analysing the archetype.
3. THE IDEA FOR METHODOLOGY

The proposed methodology called IDI (Integrated Design of Interface) (Fig. 2), incorporates the approach of presenting a customer and the use the essential elements of methods of constructing graphic design (12 archetype, Star analysis) [7, 11]. Usability software is built on the basis of COOAD. High quality application’s implementation is constructed by applying of the eXtreme Programming (XP) method [3].

![Diagram of Methodology IDI]

Figure 2: Methodology IDI

3.1. MAIN GUIDELINES

IDI divides the process of creating software into six stages. Information gathered in some earlier stage is necessary to continue the process in the next stage. Names of the stages and goals come mostly from COOAD. Each stage includes important parts of XP methodology and elements of 12 archetypes and the star analysis methods.

Elements taken from COOAD’s methodology [8]: customer and user description, identification of users classes, identification of vocabulary used in customer’s environment, discovery of metaphors, construction of desirable UMM, description of the technological environment, and paper prototype of UI.

XP is the basis for the implementation. The elements of XP play a significant role in specifying demands and constructing software: construction of user stories, description of system metaphor, making decisions about technology and defining
the abilities, the architectural project and design patterns, making decision about naming convention, fulfilling the plan, the realisation of the system.

Each stage of IDI includes elements of 12 archetypes and star analysis method: the goal of creating the application, visual traditions of the customer, visual expectations of the user, the latest visual solutions, a paper prototype of UI, the design of user interface constructed in a graphical program.

The description of an IDI stage includes all the necessary information to understand the purpose of this stage. Every stage has a piece of advice and the decision must be made whether it is relevant to the project. IDI does not impose any documentation format, it is only important that documentation of the project is easily understood by a customer and project team.

3.2. DESCRIPTION OF STAGES

IDI methodology consists of the six subsequent stages (Fig. 3):

1. Description of usage context — this stage consists of all information which describe: users — description of the users, their habits, tasks performed
by them and physical limitations; *customer* — organisational structure, his goals and motto; *goals*, which building system has to fulfil. The information gathered in description of usage context stage is a starting point for further stages of building application.

2. Analysis of usage context — the result of this stage is a set of functionality of application that is being build, dictionary and metaphors, which can be used in target user interface.

3. Conceptual project — it is the most important part of IDI, because it is the point in which the transformation from collecting information to technical level of building system is being made. The source of information needed for that stage are documents created during the work over the analysis of the usage context stage. User’s stories are the functionality of building system, dictionary is a base of naming objects and activities performed by the user in the application and classes of users reflects roles in the system.

4. Graphical system project — getting known customer goals, mission, products, strategies and user’s tasks that have to be assisted by the building application, there is the right time to design UI. This stage includes information about how to start the work and what documents are needed, as well as practical hints and methods of designing interface.

5. Technological analysis — the goal of this stage is to get to know the technical parameters in which application will be working, making the decision about technology in which application will be built, system’s architecture and design patterns. In this stage, the naming convention is chosen, which will be followed by every programmes during the implementation.

6. Creating software — the software is being built. The sub-stages of planning and developing application can be repeated many times, because they are in the beginning of each iteration. The number of iterations depends of customer’s decision and the number of functionalities to be implemented.

4. EXPERIMENT
The purpose of the experiment was to carry out a project and build an application according to stages of IDI and verify the results. As a result, IDI should give software with interface integrated with marketing image of the customer and UI characterised by high usability level.

Three students of the Faculty of Computer Science and Management of Wroclaw University of Technology took part in the experiment. The subject of experimental project was to build an application that will help students to sign in to obligatory and optional courses. The students created thirteen user’s stories and seven of them were implemented in two iterations. At the end of each iteration, usability tests were performed. The tests included a list of tasks to perform and a questionnaire to fill in. The questionnaire had eight questions about visual aspect of the created UI. After two iterations, the summary test was applied in order to evaluate the tasks, which were identified as often performed.

The results of all tests were the basis of tentative evaluation of IDI methodology. The evaluation of the visual aspect of the interface was always between 6 and 7, in seven-point scale (1 means disappointment and 7 — full satisfaction of performing a task). 80% of all tasks included in the test were evaluated by the users as “very easy to do” and there was no value lower then “neither easy nor difficult”.

It is very important that marks given in the second iteration were higher than the marks given by the users in the first one.

Despite the very high evaluation of the experimental project, a tentative evaluation of methodology IDI cannot be done. The reasons for this are: the project was carried out by one person, the application was build by the creator of methodology IDI, the subject of the experimental project was well known by the creator, and not all user’s stories were implemented. The evaluation of the methodology cannot be done after only one realised project. One needs to create many applications and analyse the results, in order to be able to evaluate the methodology.

5. CONCLUSION

The goal of the work was to propose a methodology, which would fulfil the requirements of marketing trend [11, 7] and give software with high usability of UI. Requirements formulated by Ridderstrale and Nordstrom impose the creation of marketing image of the company, employees and products as a whole. The way
to distinguish one company from many similar to it is to compete referring to feelings and emotions. The company should tell a story and work, employ and fire people in the rhythm of the story. This trend requires from methodology of creating software to build application integrated with the company’s image.

Existing solutions of creating software like USDP and COOAD have been used gaining a lot of success for many years. USDP concentrates to build optimal architecture for the project. But the main disadvantage of USDP is a very rare contact with the client; they are limited to a few approval meetings. All changes in functionality are laborious, because the project needs to be redesigned and re-implemented.

COOAD is a methodology that should give UI which provides the user with effective, satisfying and efficient way to perform tasks with the help of the application. The main disadvantage of COOAD is a lack of hints about how to create a graphic design of the user interface that will be integrated with marketing image of the company. COOAD is also oriented on desktop applications. It is troublesome in the case of web pages.

The reviewed methodologies do not fulfil requirements of marketing trend described in [11] and [7], but they are a starting point for a new one. The new approach — IDI combines COOAD’s features with 12 archetypes and star analysis elements; methods of designing graphical interface, integrated with company’s marketing image. The practices and recommendations of XP lie in the base of project implementation.

IDI is divided into six stages that include all necessary information to understand the purpose of each of them. IDI puts emphasis on building software, which is characterised with high usability level and graphic design integrated with company’s marketing image.

For the tentative evaluation of the methodology, the experimental project was carried out. The visual aspect of the application was evaluated very high in usability tests, performed in the end of each iteration. Despite of the high evaluation of the project in usability test they cannot evaluate tentatively IDI. The Evaluation of a methodology can be done only after analysing results of many projects performed using IDI approach. The experiment is an example, pattern, how to build software using IDI methodology.

In this paper an attempt to create a new methodology was undertaken. This methodology should fulfil requirements of marketing trend presented in [7] and [11]. Stages of methodology IDI are the first step to achieve that goal. Besides
that new approach was based on elements of appreciated methodologies, only after performing many projects using the proposed stages one can evaluate IDI and give advice for its further development.

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