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Forget the user, do it right or Designers know best!

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Abstract

In todays software engineering projects user participation emerges more and more. Whereas some people claim that the involvement of the user is the key to success of a system, critics point out the drawbacks and say: “Forget the user, do it right!” or “Designers know best!”.
This document analysis and evaluates this development with help of four case studies and concludes the results.

“Forget the user, do it right or Designers know best!”

Imagine there are two different kitchen appliances that perform the same task. One of them has 20 buttons and has a users guide which is not available in your language, whereas the other has just 2 buttons and users guide in your language and fits better to your kitchen. Which one would you buy?
The same problem exists in the software development domain. It is well accepted around the world that the development of an information system has to be based on the needs of a user (3). A design of an information system without user involvement will most likely not be successful and will lead to frustration among the users and possibly makes it impossible to reach their goals. Nevertheless there are opinions areound that state: “Forget the user, do it right!” or “Designers know best!”. The following four case studies aim on disproving these thesis.

IBM´s Audio Distribution System (ADS)

This case study explains how to use a user centred approach. This was stressed by the use of a case study which is explained here. The article was published in 1985 and was written by John D. Gould (IBM Thomas J. Watson Research Center) and Clayton Lewis(Department of Computer Science, ECOT 7-7 Engineering Center).

Background

ADS is a computer based message system which allows users to send and receive messages using a touch-tone telephone as a terminal. It was developed in 1984 and gained an Award of the Human Factors and Ergonomics Society.
All the functionality like changing passwords or reviewing previously received messages, creating and using distribution lists and so on are performed by choices and commands entered on the touch-tone telephone. ADS was intended to be used by people with less computer experience and minimal training. The ease of using and learning the system was important among the design details.
The question here was, how to realize it. A normal software development process with no or less involvement of the user would not fit at all. So they decided on a very user centred approach with a little bit of prototyping in it.

Early Focus on user

The target user was identified very early. Managers and professionals. It was known that in these times those people did not typically use a computer (however, they do

today). Besides these people travel around a lot and because of that the access to the system outside the office was important. So they decided to take the touchpad of a telephone as an appropriate user interface, although there was a lack of visual output. Therefore it was very obvious just in the initial of the project that the developers have to spend a lot of time and effort on the user. The interface should be as self explanatory as possible.
Important on this case is that the initial functions planned for the audio system differs very much from the final product. Initially the system was thougt to be more than an enhanced dictation system. After that it should be more like an electronic mail system where short spoken messages should be transmitted. Only after a prototype it was obvious that the speaking feature is the most important on which was then put the main focus.
The lessons learned from this are.
First, in the initial there was not the intended user focus in the project as the developers want to. The result was that the first command language was cumbersome. Second, there is a problem with the user itself. Imagine you do not know a TV. Would you miss it? Or would you see the advantages of that system? The same happens in software design. The potential users could not capture the advantages of that new system nor give the developers tips or feedback. Not until after a prototype or a simulation was presented the qualitiy of the feedback gets much better.
The prototype systems led to high interaction between users and developers. They told them that they are not alike to push so many buttons (71 for record), the necessity to read documentation and so on. Besides the user put in ther own ideas like having a pending message box to remind that an action is needed.

Empirical Measurement

Throughout the project a lot of different tests were performed. Tested were among other things the speech quality or watching userers learning and performing tasks on the new system. The data was recorded and conclusions were drawn from them. These tests for instance led to many changes in the wording of messages, the organization of commands or the style of training users. Afterwards a simulator was created on a computer where the users can perform tests. This was done with tables where all different actions where stored what the system should/can do.
This is a very effictive way to get the information from the users. With this information you are able to make a good handbook for the system. Besides you can see how users work with the program and you can make sure that they understand the programm or not. (wording changes).

Iterative Design

The simulator turned out to be very good. Out of that reason the developers decided to implement the tables as used in the simulator on the new system as well. Because of that changes to the user interface could be done without programming. The user interface was well saperated from the system so they could implement 3 different user interfaces for different user groups. The iterative design makes it possible, because a user interface was tested and redesigned till the end. If there is a complication in the user interface correct it and try again. For instance in a well tested version the 7 key was used to RECORD messages and the 8 key was used for TRANSMIT a message (in use for 1 year). In a major redesign where new features were added it was felt that S (7 key) for SEND and T (8 key) for TALK

would be better. After testing it turned out that the users just thought of “I want to send a message to Mr.Smith!”, but it was not clear that they had to talk a message before they could send it.(Otherwise, in the old way of doing it they have never tried to transmit a message before recording it). Finally Changing S for SEND to T for TRANSMIT fixed the problem.

The AURA Case Study - Automated User Requirements Acquisition

The Universities of Minnesota and Pennsylvania state in (2) that a majority of projects fail or are delayed due to the lack of high quality user requirements.
To solve this problem, they developed the **Automated User Requirements Acquisition** (AURA) method to integrate the user of a proposed system directly into the design process.
The elicitation of the desired information was done by questioning of users (e.g. Employees), which resulted in well defined objects, methods and attributes for an Object Oriented structure of the problem environment. The questions were related to each other and thus helped to inquire the objects identified by the user in a great depth.
To automate the interrogation of the user, AURA was implemented in a graphical user interface called AURA-BIZ.
AURA-BIZ was tested in a case study in project for a parking facility management system at the University of Minnesota.
The aim of the project was to show the effectiveness and benefits of the AURA method to increase the quality of the requirement specifications, the understanding of the problem domain and the software design by participation of the user.
The input by the users of the AURA-BIZ system could be used as a object oriented analysis.

Understanding the problem domain

The University of Minnesota mentions as one of the reasons for poor user requirements that analysts can not understand the problem domain in the required depth.
This includes the terminology in the user environment and all processes an employee deals with in daily working life.
By asking the user, you ask the expert and get all required information.

User centred, not analyst centred

To make use of the user's advanced domain knowledge, he is not only part of the requirements acquisition but the center (UCD), in opposite to the analyst centred design.
All analyst centred design methods would require improved analysis techniques to achieve the same quality, but could not prevent the misunderstanding of the problem domain completely.
For avoiding wrong assumptions during the early requirement acquisition phase, the user has to play this important role.

The proposed system

The AURA-BIZ application should show its efficiency in the business domain to qualify as a valid approach within the software development.
The parking facility of the University of Minnesota was chosen for a redesign of the parking management system. While there are many things as employees, parking ramps, maintenance and accident reporting to be managed, the study was concentrated on the cash control business function.
It had to be modeled as a computer based system including all related functions like document creation and document flow within the organization.

Study methods

An attendant and a supervisor were asked to use the AURA-BIZ application. Being a full time employee for 10 years, the supervisor had significantly more working experience than the halftime student, who worked there for about 1 year.
They answered the question during their AURA session individually and should use all the documents used in their workdays.
Users had to answer a sequence of questions based on the documents.
Typical questions were:

- What is causing the creation of that document?
- Who is the maker of this document?
- Who is the acceptor?

Completeness of output based on amount of involved users

Based on the different working experience and work area of the users, the results from the sessions differed. The supervisor was able to identify 34 business objects and the attendant could identify 13.
The quality of the output was measured by comparing these objects. This showed 9 identical objects, of which 8 had different names.
Obviously neither of them could identify the whole range of objects or all objects of the other user.
One example shows a difference: The “Memo” document was used by both of them but only identified by the attendant.
This could imply that some of these objects are not important for the parking service business and thus not important for the proposed system. But the difference of objects is based on the different business views and the different weighting of importance on items. Without the attendant, the Memo document, which is an important part of the system, had not been modeled.
This shows evidence that the amount of the users asked in every user centred design is proportional to the completeness and quality of the design. The design in this example had not been complete when only the supervisor was interrogated.

Users view differs from the analysts views

A professional analyst was consulted to model the same problems for the sake of comparison between the results between the user and the expert.
The importance of the user centred design was underlined by the fact that the analyst had a complete other focus. He saw the park ramp managing as the main problems, whereas the employees' major concerns were such things as cash control, scheduling and accident reporting.

The analyst's viewpoint was also different: He modeled the world from the perspective of the patron, whereas the supervisor used the host perspective.
Both the viewpoint and the focus were the reasons for the different objects identified by the two parties.
The supervisor had less identified objects than the analyst, which could be an indicator for some irrelevant objects.
Another possible cause for this phenomenon is the good experience of the analyst in object oriented design. This implies that the user, if left alone, can not produce a complete OOA document, which could act as a basis for the software development process, but is required to identify and emphasize the right major objects.

User involvement in the design phase of web development

User-Centred Web Development

It is said, that it is well accepted that development of an information system has to be based on the needs of a user (3). A web site of course is also such a system and has to deal with all aspects of the user's needs. Within the last six to seven years there have been changes away from the pure information websites. With the growth and maturity of these systems the usability and therefore the user is more focused on the design process, especially to redesign existing sites. One does not get a manual for every web page. Compared to other software it has to be clear and easy to use. Otherwise the user will not be satisfied, leave the page and for example buy the searched product on another website in the World Wide Web. For this reason user-centred web development often equals to the concern of money. Companies all around the globe noticed that bad web design leads to missed opportunities and a smaller profit. The next case will show this immediately.

The redesign of IBM's e-commerce section

In the year 1999 IBM recognized that the most popular feature of its e-commerce section of ibm.com was the "search" button. Reason for this was the bad web design of the site and thus users were not able to figure out how to navigate through the pages. But because the search function was so inefficient the second most-popular feature was the "help" button. So there was no other chance for them than to redesign the complete section. To gauge the effectiveness of the new design they consciously made no promotion for there e-commerce web page. After involving more than 100 employees in this project for about ten weeks of studying what the users expect and can understand, IBM was able to see the results. In the first weeks after the replacement of the old design sales figures increased by 400 percent and the use of the "help" function lessened by 84 percent, although the amount of functions remained the same. Main aspect of the redesign was the consistency of the site. The old design was divided into three different sections (software, PC and a catalogue section for things like hard discs, cables and printers). Each of these

sections displayed the information in another way, loaded in different speeds, and had inconsistent search results. IBM learned that users only feel comfortable if similar functions work the same way everywhere on the site. To reach this they had to develop a consistent template and introduced it as their design standard. A side-effect of it was that loading times were reduced by 70 percent and also users with lower bandwidth were able to use the e-commerce offers.

The redesign of kodak.com

A second case study also will show that the user have to be the main aspect of the design process. Therefore we look at Jack Yu's study about kodak.com, the web site of Eastman Kodak Company, the world's largest marketer and manufacturer of imaging products (5,6). After an enormous growth of the page in the mid 90's and roughly 250.0000 views a day it became inevitable to redesign the whole top level domain. Regarding the information they collected from the users of the old site they recognized very quickly that they have to develop their site hand in hand with the former users. First step of this was to define which mission the corporate group intends to achieve with the web site depending on the different user groups within the target user population. The new design should meet the needs of all the groups like "consuming-imaging" visitor, "commercial-imaging" visitor, corporate visitor, Kodak partner as well as the surfer who visit the page without any special interest. To specify the user-centred requirements for the redesign, Kodak had to collect as much information as possible referring to the user's demand and behaviour. Beside usability testing, focus groups and interviews with the different Kodak business units, to get information about their customers, the available web logs and search logs were very useful. During the design process the team recognized very interesting things.

The „Kodak Picture This" postcard feature and Employment pages

Having a look to web server logs they had seen their assumption that the "Kodak Picture This postcard" feature was the most requested (13.144 times a day) and causes the most traffic. But what they had not expected was that it also was the most popular search topic. This circumstance showed that it had to be reachable a lot easier than it was at that moment. Looking at the search logs there was also another surprising thing. "Employment" was with 4.934 queries a day the third most-searched topic. They had not thought that this would be a popular topic for a user and had no page available. Consequence was that in the redesign these topics were directly linked from the first-level main page.

Pen-and-Paper usability study

In the design phase of the site the designer also recognized that it was very essential to look at the user. Short after they reasoned how they wanted to name each section the team made a pen-and-paper usability study. Therefore they painted a raw design and asked the test persons (20 participants, out of the whole target population) what they would expect "behind" each link. There were some links the designer thought they had clearly described where nobody of the test participants hit it. This problem could only be solved by renaming the links.

Conclusion

All of the four case studies show aspects of user centerd design or user participation. And in all cases it led to an improvement of the overall results. These four projects took place from 1984 to 1999 and cann still be used today to emphasize the importance of user participation in current projects. For a successful software engineering project it is very important to look at all fields where the user gets in touch with the proposed system. This could be for example the installation, administrative tasks and the usage itself as well as the handbook. For all these areas you have to find the best solution according to the users needs.

Appendix

Definitions

Method: "A method is a colleciton of procedures, techniques, tools & documentation aids which will help the systems developer in their efforts to implement a new I.S"(Gillibrand, David)

Methodology: "A methodology is a coherent collection of concepts, beliefs, values and principles supported by resources to help problem-solving groups to perceive, generate, asses and carry out, in a non-random way, changes to an information situation." (Avison, D.E.)

System: „A system is a combination of components acting together to perform a specific objective. A component is a single functioning unit of a system."(Ogatha Katsuhiko. 1992).

User: A user is a person who consumes any kind of service of a system. Possible forms of interactions are: installation, administration and usage of a direct purpose.

User-Centred-Design: "UCD is a highly structured, comprehensive product development methodology driven by: 1st clearly specified, task-oriented business objectives, and 2nd recognition of user needs, limitations and preferences. Information collected using UCD analysis is scientifically applied in the design, testing, and implementation of products and services. When rigorously applied, a UCD approach meets both user needs and the business objectives of the sponsoring organization." (Charles L. Mauro)

Resources

Journals:

(1) Gould, John D. and Lewis, C. (1985) Designing for Usability: Key Principles and What Designers Think. *Communications of the ACM*, Volume 28, p. 308-311

(2) Drake, J. M. et al.(1993) Approach and case study of requirement analysis where end users take an active role. *Proceedings of the 15th international conference on Software Engineering*, May 1993, p. 187-196

Books:

(3) Norman, D. and Draper, S. (1986) User-*Centred System Design.*

(5) Lazar, Jonathan (2001) *User-Centred Web Develop*ment. Jones and Bartlett Publishers

Newspaper articles:

(4) Tedeschi B. (1999), Good Website design can lead to healthy sales. *New York Times*, August 30 1999

Websites:

(6) Yu, J. et al. (1998), *A user centered approach to designing a new top level structure for a large and diverse coperate website.* Proceedings of the 1998 Human Factors and the Web Conference. http://www.research.att.com/conf/hfweb/