

Aspects to Motivate users of a Design Engineering Wiki to Share their Knowledge

Regine W. Vroom, Lysanne E. Vossen, and Aniek M. Geers

Abstract—Industrial design engineering is an information and knowledge intensive job. Although Wikipedia offers a lot of this information, design engineers are better served with a wiki tailored to their job, offering information in a compact manner and functioning as a design tool. For that reason WikID has been developed. However for the viability of a wiki, an active user community is essential. The main subject of this paper is a study to the influence of the communication and the contents of WikID on the user's willingness to contribute.

At first the theory about a website's first impression, general usability guidelines and user motivation in an online community is studied. Using this theory, the aspects of the current site are analyzed on their suitability. These results have been verified with a questionnaire amongst 66 industrial design engineers (or students industrial design engineering).

The main conclusion is that design engineers are enchanted with the existence of WikID and its knowledge structure (taxonomy) but this structure has not become clear without any guidance. In other words, the knowledge structure is very helpful for inspiring and guiding design engineers through their tailored knowledge domain in WikID but this taxonomy has to be better communicated on the main page. Thereby the main page needs to be fitted more to the target group preferences.

Keywords—Industrial Design Engineering Knowledge, Semantic Wiki, User Willingness to Contribute Knowledge to a Wiki, Influence of Website Content to User Activation.

I. INTRODUCTION

WIKID is a wiki focused on industrial design engineers. Industrial design engineering is an information and knowledge intensive job. Industrial design engineers use a wide variety of research fields when making decisions that will eventually have significant impact on their designs. Obviously, designers cannot master every field, so they are therefore often looking for a simple set of rules of thumb on a particular subject [1], [2]. Thus, there exists a need for a database which accommodates the vast amount of information an industrial designer might need. Therefore the predecessor

of WikID - C-DET (Conceptual Design Engineering Toolbox) - has been set up and aims to do this in a way to help designers find information more easily [3]. To enable quick navigation an entrance structure has been developed for C-DET [4], [5], including the following entrance categories to the database: 1) Design Aspects; 2) Design Theories, Methods, Techniques, and Tools; 3) Product Domains. In these entrances the information is stored in a hierarchical integrated structure so the user can search more selectively. Besides these categories, C-DET includes a search function using keywords.

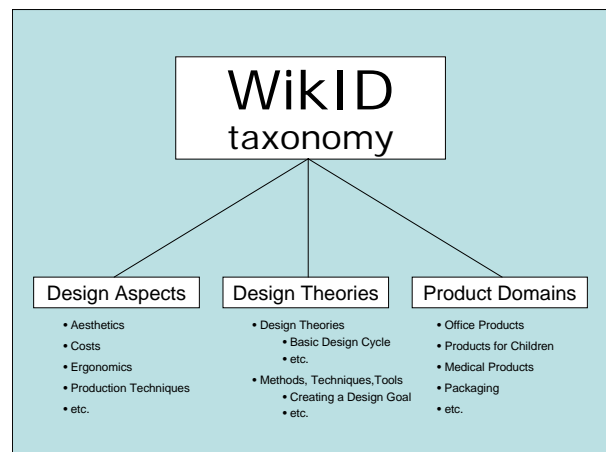


Fig. 1 WikID (and C-DET) taxonomy

1) Design Aspects provides information directly corresponding with aspects encountered during product development. The following subdivision is being made:

- Aesthetics
- Costs
- Ergonomics
- Environment
- Energy Techniques
- Materials
- Packaging
- Production Techniques
- Product Safety
- To be elaborated by Active Users

2) Design Theories provides information about theories concerning design processes. Furthermore, it offers information about existing design methods and techniques that

R.W. Vroom is with the Faculty of Industrial Design Engineering of the Delft University of Technology, Landbergstraat 15, 2628 CE DELFT, The Netherlands (corresponding author, phone: +31 15 2781342; fax +31 15 278 1839; e-mail: r.w.vroom@tudelft.nl).

L.E. Vossen and A.M. Geers are both students with the Faculty of Industrial Design Engineering of the Delft University of Technology, Landbergstraat 15, 2628 CE DELFT, The Netherlands (e-mail: l.e.vossen@gmail.com; A.M.Geers@student.tudelft.nl).

can be used. The following subdivision is being made:

- DesignTheories
 - Basic design Cycle
 - Fish Trap Model
 - Phase Model
 - Product design process
 - Product Innovation Process
 - Vision in Product Design
 - To be elaborated by Active Users
- Methods, Techniques, and Tools
 - Creating a Design Goal
 - Creating product ideas
 - Decision and Selection
 - Design presentation
 - Evaluation Product Features
 - Strategy development
 - Design Drawing Techniques
 - To be elaborated by Active Users

3) Product Domains contains information about product contexts. The following division is being made:

- Children
- Clothing and Accessories
- Electronics
- Household
- Interfaces
- Medical
- Office
- Packaging
- Safety
- To be elaborated by Active Users

Three prototypes for C-DET have been built, tested and evaluated. The evaluations have shown that the main issue was the labor consuming nature of collecting, selecting, structuring and updating the knowledge for the database. In 2006 the decision was made to use wiki-software for building and maintaining the database so that the users themselves could select and maintain the contents of the design knowledge base [6]. In 2008 C-DETwiki is transformed into WikID and is online at www.WikID.eu. WikID is developed in semantic Mediawiki software. WikID aims at functioning as an online designers' community where knowledge is freely shared.

This paper describes a study to the influencing aspects for improving the user experience when visiting WikID, especially considering first time visits. The study is focused at the quality of the communication of the contents at WikID.

II. PROBLEM DESCRIPTION

A. About Wikipedia

The concept of Wikipedia was proposed by Ward Cunningham in 1995 as the Portland Pattern Repository. Originally, its goal was to create an environment for co-workers in which they could share documentations and specifications for software design. In 2002, a Wikipedia

without any articles was introduced online. Through the years it profited from an explosive growth and nowadays it already has a total of 9,052,584 members and 15,933,470 pages [7]. Of course there are other collaborative technologies (like discussion boards) available on which information can be shared, but a considerable part of the popularity of Wikipedia can be attributed to the successful application of a new technology at the right time. A project in which not a select number of experts put a lot of time into building a new encyclopedia, but which is in fact an online open-source encyclopedia based on Wiki and the GNU Free Document License [8]. This GNU Free Document license is a license which is used to make texts under certain conditions free for documentation. It gives readers the rights to copy, redistribute and modify a work and requires all copies and derivatives to be available under the same license.

As noted, at the moment Wikipedia has a total of more than 9 million registered users. But less than 170.000 of them are marked as active users (users who have performed an action in the last 30 days). This amount results in an active user percentage of only 1.8%. For other wikis there are similar numbers to find. For WikID, according to [9] there is a potential international user base of approximately 50.000 people. But their advice was to introduce WikID at first at a smaller scale. This so the percentage active users is higher, which results in a strong and active community, for which they conclude, is really the core of any successful wiki.

B. WikID

Currently WikID is gradually introduced into the industrial designer community, starting within the IDE faculty (the Industrial Design Engineering Faculty of the Delft University of Technology). For a successful introduction - WikID becoming more popular - it is required that there is enough information available on the site. It is common that there is seed posting by the founders to create such an environment, to stimulate further establishment of the website by a strong community.

A study of Frolich et al [6] noted that if there was already some information available on a particular wiki page (in the predecessor of WikID), their participants were more inclined to adding and modifying the information on the page.

Another way of recruiting more users to contribute to the site is the creation of a tool which facilitates contributions to the site. This tool, as it is already created and available in WikID, has as its core function the modifying of general information from Wikipedia into design relevant information in WikID. Recent studies investigate the creation of guidelines on design relevance to assist the contents selection when using this described tool. Besides the guidelines, templates are being developed to facilitate the writing of WikID-articles [10]. In spite of these previous studies and actions, the main problem is still how to motivate visitors to become regular contributors?

WikID has a solid knowledge structure. This structure is clear to insiders and people who participated in previous user

studies and they highly appreciate the structure. But other industrial design engineers (and students) do not see this structure in WikID from the start. Somehow the site fails to communicate essential information well to its visitors. That is why this study focuses on the communication on the site and its relation to user motivation for sharing their knowledge.

III. RESEARCH QUESTIONS

The communication on a website and its relation to user motivation is the main topic of this study. Regarding this topic, some fields of interest were identified, namely the quality of the communication on the site, the structure of the site, and in general, what does motivate people to become a contributor and what is it that is holding back visitors of WikID to become active users.

During the first visit to a website by a possible member, this visitor quickly forms its opinion. This first impression is imprinted into the visitor's memory and likely has an influence on the further connection between the visitor and the site. There are a number of factors to be noted which influence a first impression. Following these factors there has to be investigated how these do count for WikID. Of course the first impression is only a small part of the user experience. The duration of the learning curve followed to reach a complete understanding of the site, will be influenced by the clearness of the offered information about the goal of the site, the entrance structures, the tools available and how to use the site. Besides these internal factors, the users behavior is also influenced by external factors which deal for instance with the character and beliefs of the user. These influencing factors will be observed so that the set-up and content of the site could be optimally adapted to the target group, hopefully resulting in a more inspired and motivated user base.

De main research question is: *How does the set-up of WikID stimulate industrial design engineers to add information to the database of WikID?* In literature the question of: *How can people be motivated to add information to a Wiki internet page in general* has been studied. The sub questions for the main research question are:

1. First impression of a site:
 - *General conditions for a first impression of a site.*
 - *What is the first opinion of people when they visit WikID?*
 - *What is the influence of the first impression of WikID on the willingness of industrial design engineers to add information?*
2. Structure:
 - *How to make a site accessible?*
 - *How to apply this on WikID?*
 - *Is the knowledge structure within WikID noticed by its target group?*
3. Motivation:
 - *What is the barrier to become an 'active user'?*
 - *How to make it attractive to become an 'active user'?*
 - *What would people like to see on a first page?*

IV. METHOD

The approach to find answers to the formulated research questions includes three steps:

- Literature study
- Apply theory on WikID and formulate a hypothesis
- Verify the hypothesis with an enquiry - Conclusion

At first the main topics of accessibility and usability of a webpage, and the general conditions for a first impression of the website are studied in literature. With this information the site of WikID can be analyzed.

Based on these results a questionnaire for an enquiry will be created. The enquiry will include questions about the first impression of the website, the structure of WikID, and the motivation of the visitors of WikID. This way the subjects will be gradually informed about the website during the enquiry. During this enquiry the subjects have to take a look at the WikID site. They start the enquiry without information about the website to form a good (first) impression. First they have to take a short look to gain this impression. This is however only valuable for the subjects which are not familiar with the WikID website. Later on the subjects have to take a more extensive look and fulfill two short tasks. This is to make clear whether the subjects understand the structure of WikID. In the last part will be tried to depict a user profile concerning the user motivation characteristics.

The enquiry will include multiple-choice, Likert-scaled and filter questions and options for the respondents to write down their opinion about the questions. The digital enquiry will be made with the online software ThesisTools [11].

The enquiry is intended to indicate whether people are motivated and willing to add information to WikID, and if not what the barrier is to become a registered or active user.

V. THEORY

A. Accessibility and Usability of Websites and Wikis

The research field of the accessibility and usability of user interfaces is very broad. Even if it is narrowed to literature published about websites (or in this case, wikis), there is still a great amount of information available. By approaching the topic from different angles, using different sources, and summarizing from this information the most important accessibility and usability guidelines, an overview can be created. This overview is addressed in the following paragraphs.

Maintaining a consistent web design through the whole website raises the user's trust [12]. Moreover, if the goal of every page is instantly made clear to the user, the user knows what to expect when clicking on a link. This reflects well on the usability of the site. To a further extent, the structure layout should enable that all web pages are (or, in case of pages possibly created in the future, can be) placed within a certain category part of a larger picture. This so the visualization of the structure within the navigation to the user will be much easier. It is advisable to incorporate a way for the user to easily correct errors made during clicking on links without having to return to the main page or begin from the

start in the navigation tree. This way the user will navigate more freely through the site, resulting from less uncertainty about making mistakes [13]. A widely used technique is the breadcrumb trail navigation which refers to the tracking of the path you followed [14]. Furthermore incorporating a search field on every page also improves the flexibility of the site. But what counts here and with every other added interactive element, it is needed to give clear and fulfilling feedback to the user. If it is possible, offer some simple error handling.

Another aspect is the size of the site. The site has to be loaded in the browser very quickly; otherwise possible visitors will turn away. With the ever changing technology it is hard to say what an acceptable size of your webpage is, but it has to be kept in mind that the site needs to be loaded within seconds. When designing the site it is also important to consider all different kinds of browsers, and different sizes of computer screens. Nowadays most people work with a minimum resolution of 1024x768 px so it is advisable to keep the width of the space in which content is placed below 1000 pixels [15]. Keeping the images and other multimedia to a minimum (only using it when it adds something important to the content or overall layout) also greatly reduces the file size and besides that it improves the survey ability.

Considering the content of websites, there are a lot of advices and tips to be found in all kind of sources. The advices differ of course for sites with different goals, but besides that there are some general rules of the thumb which can be applied to all sites. Such as the way of writing and the layout (headings, lists), it needs to be as explicit and consistent as possible.

B. Influence of First Impression

People create an opinion when they see the main page for the first time. This opinion mostly depends on the first impression. Visitors are able to make a reliable decision to like or to dislike an internet website in about 50 ms. They know if it is reliable, usable and whether they trust it or not [16]. This first impression is formed quickly and is consistent.

Visual appeal factors are detected first, these could influence how visitors judge subsequent experience, usability, and ultimately do influence their final decisions whether they make use of a website or not. But a decision can also be influenced to other concepts concerning overall impressions of design layout, color and so forth. Overall, the first judgment has a long-term effect for the web surfer during his site visit. This long-term effect is called the 'Halo Effect'. The 'Halo Effect' refers to a cognitive bias whereby the perception of a particular trait is influenced by the perception of the former traits in a sequence of interpretations [17]. As said before, when visitors of a website form their first opinion value judgments of web pages precludes much cognitive thought. So, though a website has good and interesting information and can be very useful for the visitor, an initial negative from a poor or slow design can steer visitors away. Websites only get one chance to let visitors create a good first impression.

C. Motivation Factors Influencing User Behavior

In [18] there are some hypotheses tested on the matter of the capability and motivation of the individual user of an online community. According to them there are a few factors to depict which influence the users' motivation to contribute to the site. Among them are the quality of self-efficacy and the presence of professional experience of a user. These positively influence the motivation of the user. Furthermore it is concluded that the intention to be reciprocal to others does not influence the knowledge contribution in an online community. (Reciprocity is the level of belief of the user in how much their own contribution helps other users. Self-efficacy refers to the confidence which the user has in his or her capability to perform a task well.). It has to be noted that the reputation of the user will probably influence his or her willingness to post since WikID is not an anonymous community. This all are factors which tie into the characteristics of the user (personal factors). From this discussion a conclusion is that based on these described characteristics probably more experienced designers will be more motivated to post in the community. Nevertheless, in the enquiry the above mentioned factors will be incorporated in statements, from which after the analysis of the results a general user profile might be observed for the target group.

D. Analysis of WikID

Guidelines mentioned before will now be stated and applied on the WikID website.



Fig. 2 WikID Main Page – February 2009

1. *Recognizable* - Does the site express to whom and what it is?

At the main page of the WikID website it is explained what and whom the website is for, though it ends with a very basic description. Basically the site satisfies to the first rule.

2. *Navigation* - Is there a standard primary navigation structure on each page?

The WikID website has a very clear navigation structure, namely the menu on the left side of the page. This menu is the same on each page of the website. It is always possible to return to the main page. With respect to the deeper levels of

the website, the navigation becomes less clear.

3. *Speed* - Does the site load itself within 10 seconds?

The site loads even within one second.

4. *Search* - Can visitors find what they are looking for immediately?

The WikID website does not comply with this rule. The search button needs to be in one of the upper corners of the website. On the WikID website the search-button can be found in the left bottom space. But as a remark, on all wiki-websites the search-button is on the left.

5. *Style of writing and content* - Does the site provide as much information possible with fewer words?

The main page of WikID provides a lot of texts. It is important to only give important information on the main page and keep these texts short.

6. *Hyperlinks* - Are hyperlinks clear?

The WikID website meets this rule. All the hyperlinks are recognizable.

7. *Interaction* - Can the visitor 'do' things on the site?

Wikis are based on interaction. WikID applies to this rule.

8. *Accessibility* - Is the site accessible for everybody?

WikID is accessible for everybody. Though the website is namely for Industrial Design Engineers, it is also possible for visitors who are not an Industrial Design Engineer to register and add to the database. Maybe some aspects on the site can be improved for minorities.

9. *Pictures and multimedia* - Do the pictures and multimedia not take more than 5 to 15% of the surface?

On the WikID site is little or no use of pictures.

10. *Lay-out* - Is the site readable on each screen?

It is important to use a sans serif font on a website, which is best readable on a screen. On the WikID website is all text in a sans serif font, except for all titles. So the WikID website is inconsistent with its font and does not satisfy this rule.

Looking at the comparison of the WikID website with the guidelines for a good first impression, it turns out the website does not always comply completely or not at all.

E. Conclusion

As becomes clear from the literature study, the first impression, the usability and the motivation of visitors are all three important factors influencing the further visiting time and following user actions on a website. A good first impression is made very quickly and gives an initial positive or negative to start with. Further investigation of the users' wishes is needed and will be done by incorporating this topic into the enquiry. It is important to make sure a website is accessible and usable on a high level; this raises the trust of visitors. Accessibility and usability can be achieved with measures like making the goal of the site more visible, having a good navigation structure and ensuring the visitors know what they can expect when they click on a button. Several of these measures can possibly be implemented to improve the user experience.

Moreover, the motivation of visitors is important for websites. Especially when looking at the WikID website it is

important visitors are motivated and willing to add to the database. Experienced users (in this case meaning users having previous experience with wikis) seem to be more motivated to interact with sites like WikID. The enquiry will have to provide more insight in the profile of the target group, observing their opinions, needs and wishes.

VI. FIELD RESEARCH

A. The Enquiry

The enquiry has been created in consensus with the results of the literature. Analogous, the questions are divided in three different parts: 1) the first impression of the user; 2) the user approach towards the structure and 3) the user motivation. Aside from these topics, some general questions are asked to depict the background of the subjects filling in the enquiry.

To get a general overview of the first impression of the main page on the users, the subject is asked to react on a number of statements. Complementary to this there is a possibility of adding comments to reflect more on the answers given. Finally, to establish what users want to see on the main page and which modules positively influence the user's experience, questions are asked.

In the second part, the users' approach of the structure is studied in a non-intrusive way. The approach used within the enquiry is the asking of several questions complementary to the exercises of browsing towards specified pages. This is to ensure several domains within different ways of approaching are covered.

In the user motivation part, statements deduced from results in [18] are asked. This information about the attitude of possible users towards using the wiki and sharing information will hopefully provide more insight in the target group. For further research on the user's willingness to contribute in this special case also a number of motivation factors within the wiki is discussed.

B. Results

66 Subjects filled in the enquiry, including design students and including staff members of the Faculty of IDE. In this section the results are clarified following the structure of the enquiry:

1. General questions;
2. First impression;
3. User approach to the structure;
4. Motivation factors;
5. Final questions.

During the analyzing of the results of 2 and 3, the group of subjects was split in two groups. Namely, the subjects familiar with WikID (from now on called the F group) and those who are not familiar with WikID (from now on called the NF group). In this way the influence of familiarity with the site on the subject's answers is taken into account.

1) General Questions

a) Design Experience

Approximately 75% from the subject group has or has less than three years of design experience.

b) Wikis

77%, 47 subjects are familiar with the wiki principle. Of course, nowadays it is most likely that most people have used Wikipedia or a similar site at least once as an information source. To a lesser extent, from this group, approximately 31% (15 subjects) is a registered user of a wiki and thus surely known with the method in which information is gathered. Around 13 subjects (20%) from this group are actually active users (meaning that they did at least once edit or contribute information on a wiki).

c) WikID

The previous paragraph is including all wiki-like websites. If the questions are centered on the WikID website, only 33% is familiar with the site. So, from the total group most people do not know the concept of WikID. From this limited group of people who do actually know the site, only eleven people did actually ever retrieve information from the site. Furthermore, only 9 people are registered and only 3 people indicate themselves as an active user.

2) First impression

a) Impression main page

The impression of the subjects about the main page is in general negative. This is both true for the subjects not familiar (NF) and the subjects familiar (F). In the questionnaire the following statements have been presented to the respondents about the first impression:

Statement: The main page is inviting - The reactions on this statement lead to the conclusion that the site is perceived as not inviting.

Statement: The main page is positive - The main page is perceived not that positive. The difference between F and NF is minimal.

Statement: The main page is attractive - People feel that the site is not attractive. Layout elements are remarked on as being not very attractive. Again, subjects without any experience (NF) with the development of the site do have a more extreme opinion than the F group.

Statement: The main page fits the target group - The subjects considered the atmosphere created by the layout of the site as an important factor considering the target group. Many additional remarks here include the users' negative impression of the layout (too much text, dull colors, too cluttered, et cetera).

Statement: I think the goal of the website is made clear - The slogan 'Welcome to WikID, the Industrial Design Engineering wiki' is perceived as the most informative factor on the current website, but it seems that this slogan in

combination with the links offered does not provide enough information about the kind of content offered. On the other hand, an observation needs to be made that since WikID is still in the development stage, there is a lack of clear boundaries which define what kind of content WikID will provide. In the future, this will need further attention.

Statement: By looking at the main page of WikID I feel like taking another/further look at the site - Contrary to the previous statements, here the NF group is considerably more negative than the F group. The NF group is not that much interested in taking another look at WikID (only 20% agrees with the statement) while a more notable part of the F group indicates that they want to look further (57% agrees). It has to be noted that the answer on this question is probably only based on the first impression on the site of the NF group, and with the F group based on previous experiences plus the current impression, and the solidarity with the site. Most likely there can be concluded that overall people's first impression of the main page is not very positive, and people do not get inspired by the current site.

Statement: After having just a short look at the WikID website it is clear what kind of information the site contains - The NF group is clearly conflicted about this statement. With the exception of users totally agreeing with the statement (3%), the percentages lie very close together (Agree: 27%; Neutral: 27%; Disagree: 23% and Totally Disagree: 20%). Apparently from the information offered only on the main page, people can not comprehend what kind of information is available on the rest of the site.

Statement: Just by scanning the main page of WikID I know most of what is on the page - From reactions from the included comment section can be gathered that some people feel that there is too much information on the site and that clustering of the topics is much needed. Considering the content of the main page; people often feel that more can be accomplished with less. Minimizing the use of text and using more images will help the customization to the target group.

Statement: The structure of WikID is clear to me after having a short look at the main page - The subjects' reactions from both groups, are again equally distributed over the answer options. Within both groups a slight tendency towards the negative can be observed. There is a single remark within the comments which proposes to put more information about the structure on the main page.

Statement: I feel invited to add information to the database of WikID - Most of the people do not feel invited to add information to the database. It is probable that the current manner of promoting the site lacks in persuasion with respect to lowering the threshold for all users to post and share information. The current approach might not explain well enough the principle that everyone is invited to share information. The NF group feels even stronger about this than the F group, most likely since their perception is only based on this first impression.

Statement: If you had to describe WikID in 5 words, what would these be? - This question is approached in different

ways by the subjects. Where some try to put the reason for existence of WikID in five words, others describe their impression of the site. These different approaches together make it difficult to extract conclusions from this question. When dividing these different approaches, it is fair to say that the comments delivered on the look and feel of the site are consistent with the response earlier.

People often feel that the lay-out is not attractive (old fashioned, boring) and that the current site tries to communicate too much information which makes the site look chaotic and not user friendly. But certainly more than once, it is remarked that the site clearly has potential and is recognized as a potential source of information on an educational level. It just has not reached its possible level yet with the current content.

b) Elements on the main page

The respondents have been asked to indicate which topics on the main page they considered relevant or on the contrary unnecessary. The most often chosen relevant topics by both the F and NF are Browse by category, Search, and First time using WikID.

On the other hand the topics that have been indicated as being the least important of the present topics on the main page of WikID by both the groups F and NF are 1) Most active users, followed by 2) Statistics, (giving the number of users and the number of articles in WikID). This is supported by the results of the previous question where these two topics also in fact were never picked by any subject as most important. So, these two could be moved to the community portal. For the rest of the provided topics, answers are ambiguous.

Finally, considering the topics on the main page, the subjects were asked to give their preference for six topics on a future main page. Within the options, the existing topics and several new topics were given. Moreover the respondents could provide suggestions of their own. From all the suggestions the following ones were picked most often:

NF group:

1. Browse by category
2. Search
3. Most popular pages
4. In the news
5. Latest articles
6. First time using WikID

F group:

1. Search
2. Browse by category
3. First time using WikID
4. In the news
5. Latest articles / Help / Most popular pages

The results from both groups are very similar. It seems that both first-time users (NF) and experienced users (F) want the basic functions offering pathways to finding information (Search, Browse by category) on the main page besides some interactive modules which indicate the liveliness of the

community (latest articles, most popular pages) and links to supporting help pages.

c) Interaction with the site

When asked within an open ended question which topics are especially relevant for designers, the present and new topics were provided for inspiration. Looking at the answers, people are strongly opinionated about what is relevant. From the existing topics, subjects often reference towards topics containing design process and aspects information (like bachelor design guide, design methods, etcetera) or the search function as those are deemed very important. In general, the reactions are somewhat consistent with the results from the previous question (six most popular topics). Furthermore, the interactive modules as latest news, articles, in the spotlight, and contests are also named multiple times. As new domain, for example pages with references to other relevant sources are named. It is interesting to see that more than one subject mentions towards adding more user support or references to user support sources for design related software.

3) User approach to the structure

The subjects have been asked to fulfill two tasks with a different character. These tasks are finding the articles about 'rulers' and about a 'Harris profile'. During the first task of finding the ruler article a browsing method (to use the Browse by category) is given, during the second task there is not. These tasks are to study whether the structure of the WikID website is clear to the subjects. The subjects have to start navigating from the main page. From there they are free to find their way to the articles.

The first task the subject are asked to do is finding the article about rulers. By typing 'ruler' directly into the search engine, the subject can get immediately to the page of the article of the ruler. This is the quickest way to get to a specific subject. The second way to get to the page of the article of the ruler is the go to 'Product Domain' under 'Browse by' in the navigation menu. See Fig. 3. From there you have to go to 'Tools' – 'Measurement Tools' – 'Ruler'.

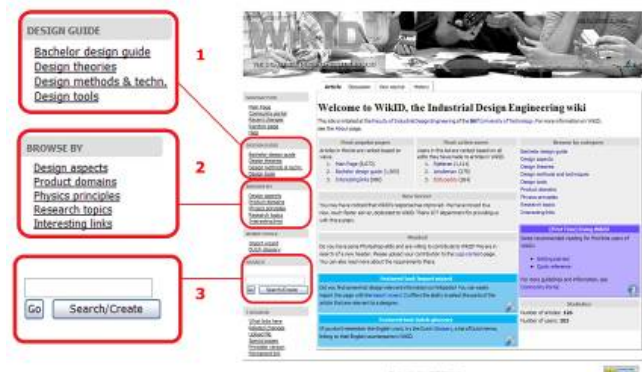


Fig. 3 Navigating in WikID

The second task the subjects have been asked to perform, is finding the article about a Harris profile. Just like the first task the quickest way is to type in 'Harris profile' directly into the search engine. The second path is via the 'Design methods & techn.' under the 'Design guide' in the navigation menu. The following path from there is 'Decision and selection' – 'Harris Profile'. (see Fig. 4).

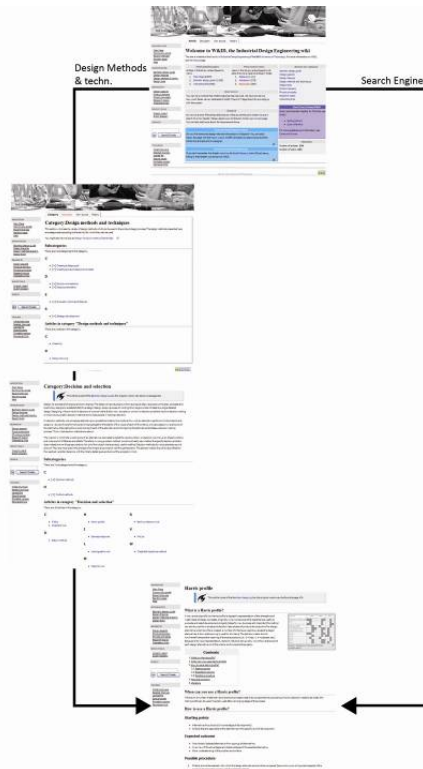


Fig. 4 Navigating to the Harris profiles

a) User experience

The majority of the subjects are familiar with using a navigation structure which uses categories and subcategories and becomes more specific on each deeper level. Nevertheless, this does not mean that everyone could find the ruler article immediately or with the prescribed method. While almost everyone from the NF group reached the goal, approximately 46% (NF) and 31% (F) ignored the category structure and directly searched for the article. Furthermore from the remaining groups somewhat more people did find the article only after browsing repeatedly through the categories. It has to be noted that the F group did find the article more often using the prescribed way likely as they are more familiar with the current arrangement of categories. People have answered that they prefer to use a category structure when they have not yet specified completely what they want to find.

Within the second task no guidance was given. When asked what the preference of the users was by finding this specific article, the majority of the people answered the search button. Therefore, it is likely that if you have a context, you browse,

and for a specific article, you search. To a lesser extent, people still used the browsing categories option for inspiration.

Considering help pages targeted towards first time users, there is a need for complementary pages. The actual first time users (NF) are interested in more information about the goal of WikID, what is its mission, information about the content of different topics and an overview of the available tools. On the contrary, the already familiar users (F) think that more information about the structure is needed.

b) User remarks

While the subjects most often feel comfortable dealing with the category navigation structure through the site, within the enquiry it is noted that the information about where you are in the site is not yet sufficient (slightly negative (NF) and negative tendencies (F)), even so are the options to change within a category or through levels.

By silently checking the clearness of the descriptions of the domains (e.g. by asking where does the article about Harris profiles belong?) the quality of communication of the goals of the domains is explored. People have in general a good notion about the domain in which the Harris profiles belong. The observation that in general people have an idea of where the domain titles stand for is supported by the answers of the respondents. The majority of the titles is clear but some of the names cause trouble (likely the before mentioned Design tools). People are not very sure if the knowledge structure is natural but if the taxonomy is further explained the appreciation will be better.

With completing these two tasks, and answering additional questions which are also likely to provide further insight, most people agree with the statement that they (now) understand that there are multiple entrances to find information. Understanding all this different ways is another league, and naturally the F group feels surer than the NF group

Complementary with the six most popular topics on the main page, a question was included about what topics or domains in the user's opinion will be the handiest during possible future use of the site. Domains, positioned according to popularity for both groups:

NF group:

1. Design Methods & Techniques
2. Search
3. Design Theories

F group:

1. Search / Design Methods & Techniques
2. Design Theories / Bachelor Design Guide
3. Design Aspects / Physics Principle

Apparently the product domains category is less interesting than the other two main categories, design theories and design aspects.

4) *Motivation factors*

a) *User characteristics*

The introduction question of general willingness to contribute gives 45 % negative answers.

When describing the user group's confidence in being able to make useful contributions to the site, many people feel somewhat confident. About 70% of the subjects admit that they feel like they have some experience in designing. Within this group 40% is confident enough in its capabilities as a designer to add or edit information (36% is neutral on the matter). Furthermore when asked about computer skills, 86% says that this is not seen as a problem when considering adding or editing information.

In addition to the previous observation, about 85% answers positive when considering sharing information with other designers. So, there is a willingness to share information. About 48% (additionally, 30% is neutral) feels like being a part of a larger designer community, acknowledging that they share a connection with fellow designers.

In general, in support of the present community spirit, people do not feel that apprehensive about making personal knowledge available to everyone. Approximately 73% have no or almost none objections to sharing information. To a lesser extent, 48% has no problems with other people editing and changing their contributed information. Of course, this is the case with all websites using a wiki principle. But there is indeed a substantial group which can be recruited to contribute.

b) *Willingness to register*

People see as the main tool on WikID the possibility to add or edit information. When asked if people are satisfied with the offering of only the possibility to change information after registering, only 9% answers negatively. Apparently they deem this editing possibility the most important but nevertheless they do not yet feel inspired enough to actually register on the site. When asked if the barrier to register would be lower when there were more privileges offered for registered users, the answers are gradually spread around neutral. People are not persuaded enough yet.

5) *Final questions*

People are not yet sure if they are going to use the website in the future, and thus also unsure if they will recommend the site to a friend as in its present state (the number of articles has to increase). The potential value of WikID is recognized. Besides the initial (negative) impression, people also see the incompleteness and unclearness as a barrier to become active users. As becomes clear, within the target group there is willingness to contribute to an online designers' community, but not enough target group enthusiasm to contribute to the current site.

C. *Conclusion*

While using and exploring the site, the different approaches

will probably slowly become clear to the user. The question is how to communicate this to a first time visitor of WikID. Information needs to be clearly design related and concrete, users want information they can handle and which they can immediately apply.

It is likely that problems concerning understanding multiple entrances can be tracked back to the domain definitions and name giving. If these definitions are better explained, understanding the entrances will be easier, and to an extent, using them. These statements should be validated in the future if there are much better definitions of what different domains contain and when there is more information available.

VII. DISCUSSION

A. *The First Impression*

The target group of WikID is the Industrial Design Engineer; a group that feels strong on topics like design and layout. WikID needs a lay-out which is more visual attractive and is more fitting to the target group. The main page contains too much text that makes it hard to scan the page. Instead of providing a lot of information, the visitors assimilate almost no information. Several topics are considered to be unimportant, not clear or not right for the main page. E.g. the topics 'Most active users' and 'Statistics' should not be showed on the main page, these topics could be included in the community portal.

Updates of WikID or other interactive modules should be presented at the main page to show that the site is alive.

Topics appreciated at the main page are the topics 'Search', 'Browse by category' and 'First time using WikID'.

The goal of the website should be better presented to visitors. Respondents to the enquiry (NF) and (F) both stated that by looking at the site for a first time it is not clear what the site is for and what kind of information the website contains.

B. *The Structure*

A navigation trail on each page would help visitors to see where they are and enables them to go several steps back, without having to start over again with browsing. E.g.: Product domain > Electronics > Audio > Home audio > ...

Moreover, the goal of topics is not always clear for first time visitors. More explanation and guidance might improve this. As mentioned before, some of the domain definitions need more explanation.

C. *Other*

WikID needs more Help pages which offer more extensive information targeted towards first time users, e.g. guidelines for writing articles. A template for materials is already available [10]. This makes editing information easier and prevents the user to make mistakes.

From the user preferences for the existing domains can be concluded that the assisting domains are more popular; apparently there is a need for guidance during the product

developing process, and less a need for WikID to focus on specific product information. Thus maybe it is advisable WikID should emphasize more strongly the educational and assisting domains.

Expansion towards other domains: for example multiple users expressed their wish for a database or such in which links and sources are summarized of user support for software used during the design process). Nowadays more and more skills in computer software are asked from designers and support is hard to find.

VIII. CONCLUSION

The main research question was: How does the set-up of WikID stimulate industrial design engineers to add information to the database of WikID? This question was subdivided in several topics.

A. First impression of a Site

Subjects reported a negative impression when having a first look at WikID. The first impression can make the difference whether a visitor stays on the website or decides to leave.

Literature study showed that the first impression, usability, and the motivation of visitors are three important factors for the actions on a website. These factors can positively be influenced by building the website according to guidelines (section 5). By influencing these stated factors the right way, visitors start their visit to a website with a positive first impression. And, by providing essential information directly on the main page, the less experienced visitors will also be more motivated to add information to a Wiki internet page. The main page needs modification of the shown components and the layout to become more adapted to the target group.

B. Structure

Many subjects declared to be familiar with the structure of WikID. These subjects approach the navigation structure of WikID the right way and appreciated this guidance. Subjects not familiar with the structure approach the structure with trial and error.

Most people are familiar with the knowledge structure in WikID, only some of the domain definitions are not clear. Expected is that the different options to approach the structure will become clear to the users while exploring and using the website.

So, currently the negative first impression of the set up of WikID causes that visitors do not navigate further on the website and do not feel stimulated to add information to the database. By improving this first impression, the visitors, will be stimulated to have a further look and exploring the website. Offering more clear information about the structure and the possibilities concerning adding to the database will in the end stimulate the visitor to add information to the database.

C. Motivation

The barrier to become an active user of WikID is influenced by the user's amount of experience with wiki's. More

experienced users of wiki's are more likely to register and to add information to become an active user.

Visitors of WikID do not feel invited or motivated to take a further look on the website. This, while the subjects said to like the idea of a wiki especially for industrial design engineers. The subjects strongly agreed that the lay-out of the website is not fitting the target group.

D. Final

People feel like being a part of a larger design community and in theory are willing to contribute; only the current site is not inviting and clear enough for this to actually happen. In general, this opinion is shared by visitors familiar and not familiar with the WikID website. By offering more explanation of the taxonomy on the main page and through the whole site, the user experience will also be improved. With improving the WikID site according to these findings, likely the industrial designer's enthusiasm will be higher and thus another step to establishing an active and inspiring community will be made.

REFERENCES

- [1] Chowdhury, G.G. 2001. Information sources and searching on the World Wide Web, London, Library Association.
- [2] Vroom, R., Kuiper, C. & Wassink, M. 2004. Knowledge Search Problems And Strategies Used By Design Engineers, 4th International AED 2004 Conference.
- [3] Vroom, R.W. 2003. Towards a toolbox for conceptual design engineering known as C-DET. In McGrath, F & Remenyl, D (Ed.), 4th European conference on knowledge management. (pp. 937-948).
- [4] Vroom, R.W., Herkel, C. ten, Blomaard, S. 2005. Structure and Grouping of Product Domains for Organizing Design Engineering Knowledge", Proceedings of the CAID 2005, Delft, The Netherlands.
- [5] Vroom, R.W., R. Pape and E. van Vulpen. 2006. Design Engineering Information Search through Design Aspects Tree, Proc. of the 5th Conference on Advanced Engineering Design AED 2006, June 2006, Prague, Czech Republic.
- [6] Zinkstok, M. & Frolich, J. 2007, C-DETwiki: Een onderzoek naar het toepassen van het wiki concept bij het creëren van een Design Toolbox, Internal Report, Faculty of Industrial Design Engineering, Delft University of Technology, Delft.
- [7] Wikipedia Statistics, 2009. Available at: <http://en.wikipedia.org/wiki/Special:Statistics> [Accessed 26 February 2009]
- [8] SHIH, W., TSJENG, S. & YANG, C. 2007, Wiki-based rapid prototyping for teaching-material design in e-Learning grids. Computer & Education, vol. 51, pp. 1037-1057.
- [9] Vroom R.W., Joris van 't Ende, Raymond Jelierse, Alex Olieman, and A. Kooijman. 2009, Creating A Community Base For WikID; An Industrial Design Engineering Wiki, in: Proceedings of 8th European Academy Of Design Conference - April 2009, Aberdeen, Scotland
- [10] Vroom, R.W. and Olieman, A. 2010. Forming the identity of an industrial design engineering wiki. Submitted for publication.
- [11] ThesisTools, 2009. Available from: <http://www.thesistools.com> [Accessed 10 March 2009]
- [12] Kassenaar P. & Van Rijswijk, O. 2003, Handboek website usability, Academic Service, Den Haag, The Netherlands.
- [13] Saffer, D. 2007. Designing for interaction; Creating smart Applications and Clever Devices, New Riders, Berkeley.
- [14] Breadcrumb (navigation), 2009. Available from: [http://en.wikipedia.org/wiki/Breadcrumb_\(navigation\)](http://en.wikipedia.org/wiki/Breadcrumb_(navigation)) [Accessed 3 April 2009]
- [15] W3Schools, 2009. Available from: http://www.w3schools.com/browsers/browsers_display.asp [Accessed 10 March 2009]

- [16] Lindgaard G., Fernandes G., Dudek C. & Brown J. 2006, Attention web designers: You have 50 milliseconds to make a good first impression!. Behaviour & Information Technology, vol. 25, pp. 115 - 126.
- [17] Website optimization, 2009. Available from: <http://www.websiteoptimization.com/speed/tweak/blink/> [Accessed 9 March 2009]
- [18] Chih-Chien Wang and Cheng-Yu Lai, 2006, Knowledge Contribution in the Online Virtual Community: Capability and Motivation Book Series Lecture Notes in Computer Science, Publisher Springer Berlin / Heidelberg, pp 442-453.