Customer Centred Community Application Design
Introduction of the Means-end Chain Framework for Product Design of Community Applications

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Introduction

The importance of virtual communities in research and practice has risen tremendously over the last years. In general, virtual communities are defined as a group of people that are sharing interests or needs through electronic channels (Hagel III and Armstrong 1999). In accordance with Lechner and Hummel (2001), Bughin and Hagel III (2000) or Timmers (1998, p. 6), we consider a virtual community a business model in electronic markets itself, especially when the value “is coming from members (customers or partners), who add their information onto a basic environment provided by the virtual community company” (Timmers 1998, p. 6). In addition to that a virtual community is sometimes described as a complementary part of an existing business model, especially when there is no direct source of revenue related to that community. According to these definitions, the important elements of a virtual community with regard to this article are shared goals, interests, or needs of its members, and the access to shared resources. Due to the huge span and variety of existing virtual communities a classification gets difficult. Often, communities are divided according to their orientation (e.g. consumer, business, or employee) or content (e.g. information, entertainment, or transaction).

As opposed to fruitful opportunities by means of formation and operation of virtual communities, we have seen a lot of community business models overestimating demand, providing products not needed or just failing to communicate their solutions. A lot of these failures can be explained by the fact that a systematic debate with the economic and organisational rules and principles was neglected. The central tasks of a community operator start with the acquisition of a sufficient quantity of community members, the promotion to take an active role in the community,

Abstract

This paper discusses the application of the means-end chain (MEC) framework for investigating customers cognitive structure regarding community applications. It is argued that the understanding of customers cognition is crucial for the development of sustainable communities. MEC analysis is seen as a mean to support the community design tasks, especially concept development. The MEC analysis within concept development helps to improve the success rate of a newly designed community by the early integration of customer needs and benefits. Based on theoretical considerations about the MEC framework and its limitations a case study regarding an information community is illustrated. Data was collected conducting individual laddering interviews online at a major information portal in Germany. Dividing answers into attributes, consequences, and values and using content analysis hierarchical value maps (HVM) for both, messaging applications and information portals, were constructed. To support concept development of a new information community, as a distribution platform for content, the findings of both HVMs were considered. Examples illustrate, that the MEC analysis helps to create a community concept that is focused on the targeted customers. It is supporting the creative process of finding community functions and features that are fitting or can be linked to the existing cognitive structures.

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and the achievement of high customer loyalty (Hagel III and Armstrong 1999). The community application as a basic platform for all activities plays a crucial role within these tasks. Of course, there is no single right answer about how to build or manage such entities, but systematic methods that help to design community applications are rare. The orientation and content of the community and its goals respectively, are defining the specification of the community application. As a further step a proper understanding of the needs of the targeted customers and potential benefits that the type of community should deliver is needed to design the community application from scratch. Uptodate knowledge is taken into account too late. A systematic community application design process must regard the customers needs as early as possible, starting in concept development phase.

In recent attempts the means-end chain (MEC) framework is seen as a general mean to translate customers needs into product attributes and therefore can be used in early stages of product design (Dubé, Johnson, and Renaghan 1999, Herrmann 1996). This article uses the MEC framework for investigating the customers cognitive structure regarding community applications. MEC analysis is seen as a mean to support the community application design tasks, especially the concept development to improve the success rate of the newly designed application.

The goal of this article is to introduce the MEC framework for product design of community applications and to present how results can be interpreted and applied in the product design process. We claim the following contributions to existing research: Using the internet as the appropriate medium for MEC data collection, because respondents are more likely to remember their natural decision process, introducing MEC analysis for product design for community applications combining two hierarchical value maps (HVMs) and deriving a method from communications strategy for identifying product features to be designed.

The article is organized as follows. The next section discusses two general product design frameworks and integrates the MEC analysis in further detail. Thereafter the theoretical MEC analysis section introduces the underlying model also looking at the criticism and limitations expressed. Based on these theoretical considerations the use of MEC concept is illustrated with the example of an application to be designed building a consumer oriented information community.

Community Design

There are no generic rules for an effective community design broadly available. Some authors state critical success factors with regard to community building (e.g. Panten et al. 2001), distinguish different phases in community building (e.g. Hagel III and Armstrong 1999), or neglect any possibility to create communities (Shafer 1999). Explicit methodologies are rare. The design of a virtual community is not only a task of providing any basic virtual communication platform, where people are able to connect to each other. In fact, the whole community environment, beginning at the target group, the netiquette, and external partners have to be taken into account during design. The application, as the virtual platform with different community features, e.g. to communicate with others, to get newest information, and the possibility to share files, is the central issue in community design.

First of all it is useful to apply general product design frameworks as a conceptual basis for community application design. Two aspects, that are discussed in literature, are presented here, a general product design perspective and a process perspective.

From a general product design perspective, there are two different views on the community application: one from the side of the producer and one from the side of the customer (see Figure 1).

Therefore design consists of two main tasks (Schmid 2001): 1. Customer centred design: The customer centred design tries to transform the problems or needs of the customer into the product. If there is no problem or need of the individual that could be solved or gratified by consuming the product, there will be no stable demand for the product. Indeed, the individual does not have to know all product characteristics that cause a benefit to come to a positive buying or consuming decision. He will rather apply the supposed benefits of the per-
ceived product characteristics as a basis for his decision (Herrmann 1996b).

2. Production centred design: The production centred design consists of the technical and organisational specification to manufacture the product. The technical specification cares about the engineering tasks, giving concrete words and figures for the detailed production planning, while the organisational specification defines the complementary aspects of workflow and management, including the management of interfirm relationships.

While the production centred design is a well known and established technical and organisational task, the customer centred design is still not very effective in reality. The still staggering failure rate of new products, especially in high-tech, is mostly not a result of bad embryonic technology. It is rather the outcome of a product design, that does not fit customers needs (Rifkin 1994).

Aside from the general perspective, the design can be divided into different phases, resulting in a process. The design processes, which can be found in literature, distinguish themselves mainly by different separation and naming of the phases (e.g. Karger and Murdick 1966, Roozenburg and Eekels 1995). Ulrich and Eppinger (1995) differentiate five phases, namely concept development, system level design, detail design, testing and refinement, and production ramp up. Within these phases customer research is regarded as an important task, especially in concept development, system level design, and testing of the new product. Customer research within product design helps to improve the success rate of the new designed product and provides indications for an effective product marketing strategy (Mahajan and Wind 1992).

The MEC analysis, presented in this paper, focuses on the customer centred design side and the concept development phase, where community functions and features have to be defined. To transform problems or needs of the customer into the community application concept, the designer has to have a well-founded knowledge about the customers mindset. As opposed to other methods used in community design, e.g. the technology acceptance model, MEC analysis does not use a specific cognitive structure as a premise. Therefore, it is a technique structured but very open for any kind of customers cognition towards communities, which is an important condition in concept development (Ulrich and Eppinger 1995). MEC results are supporting the creative process of finding community functions and features that are fitting or can be linked to the existing cognitive structures of the targeted individuals regarding community applications.

Means-End Chain Analysis

Since the expectancy value model (Rosenberg 1956) it is assumed that the attitude of an individual towards an object is determined by the individuals cognitive structure. The MEC concept is partitioning this cognitive structure in three levels, namely attributes, needs, and values (Gutman 1982). With the aid of personal interviews, in particular the laddering technique, data is collected to map these three levels. Content analysis serves as a basis for quantitative evaluation and graphical representation of the results.

In marketing the qualitative MEC analysis has been increasingly an object of scientific debate (e.g. Herrmann 1996a, 1996b; Grunert and Grunert 1995; Vriens and Hofstede 2000; Wansink 2000). It has been successfully used for over ten years for communications strategy. The underlying MEC model for most of the work is the one of Gutman (1982). This model is based on two assumptions: (1) values, defined as desirable end-states of the existence, are dominant in the formation of selection structures and (2) people deal with the variety of products by forming classes in order to reduce the complexity of the decision. For the formation of classes, consumers consult the consequences of their actions or purchase decisions. Consumers learn to associate positive consequences, namely the benefit, with certain decisions, like the choice for an application (Reynolds and Gutman 1988). Personal values allocate a positive or negative valence to these consequences (Rokeach 1973). Thus, a correlation between the concrete and abstract characteristics of a product, the functional and psychosocial consequences and the instrumental and target values is assumed (Gutman 1997). Since consumers are believed to form classes to reduce complexity in their decision making process relatively few values are connected to a larger number of consequences and attributes. In this hierarchy the importance of values determines the importance of consequences and attributes (Rosenberg 1956).

Values represent important beliefs about oneself and the reception of oneself by others. They are understood as universal, object, or situationally independent convictions about desirable end-states of life (Schwartz 1994, Gutman 1982). Thereby values determine the personality and are believed to be relatively resistant against changes in the environment compared to attributes (Herrmann 1996b). The MEC framework is used to reveal the connections between time stable values and product attributes directly relevant to decision making. Due to technological improvements community applications offer a wide and evolving variety of possible features to attract users. In such dynamic environments a general and time stable understanding of users cognitive structure is beneficial.

The criticism expressed on the MEC model refers particularly to laddering interviews as a way of measuring chains. Laddering is a relatively com-
plex and particularly costly task. It is based on the assumption that consumers are able to express their cognitive structure. Consumers are asked for distinguishing product characteristics and to reason why these characteristics are important to them. They are then asked to justify their answer again. This process is continued as long as they cannot reason themselves in any more detail. To assist consumers during this process laddering techniques requiring trained interviews are applied (for a further description see Reynolds and Gutman 1988). When these kind of techniques were employed, consumers mentioned in some cases that they expressed cognitive links during the interview, which they did not know before (Grunert and Grunert 1995). Additionally, as a personal interviewing technique laddering has all the disadvantages of influencing interactions between the interviewee and the interviewer (interviewer bias). Interview effects arise not only by verbal but also by non-verbal reactions of the interviewer, like nodding or other facial reactions. Without a thorough interview process and documentation problems will succeed while coding, e.g. distinguishing between attributes, consequences, and values (Johnson 1989).

Data Collection and Analysis

Using internet chat 126 website users were interviewed about information portals and instant messenger applications. Respondents were acquired via a pop-up screen that was displayed to every 20th user on the portals homepage. They were directed into a moderated chat waiting room. It was thereby possible to constantly take out users for individual interviews from the pool of waiting respondents and question them on instant messenger applications and information portals.

Using chat interviews for laddering has a couple of advantages over traditional methods using personal interviews. First of all it is more cost efficient, since it takes less time to question a large amount of respondents. The interviewers are less in the need to try to force users to state reasons if they are unable to reason themselves in any more detail. In these cases it is easy to switch to the next respondent. As Grunert and Grunert (1995) criticised traditional laddering methods may force respondents into unnatural cognitive processes compared with the buying decision process. Since it is possible to ask respondents directly after they chose to use a specific internet application this effect can be reduced further and they are more likely to recall their natural decision process. Communication apprehension as the fear of real or anticipated communication is also reduced compared to face-to-face interviews (see also Montoya-Weiss et.al. 1998, McCorskey 1977). Moving down the chain to more sensitive questions the problem that respondents do not want to answer (Reynolds and Gutman 1988) does occur rarely. The internet chat as a comparably lean medium with low social presence (Rice 1993) for laddering gives the interviewer less possibilities to influence users during the interview. In contrary to face-to-face interviews every influence can be documented and considered during analysis even after the interview. The main disadvantages of using chat interviews are the little control of the interview surrounding and the reduced time available for each interview. Respondents could be surfing other websites while answering questions stimulating unnatural answers. Usually, they are not willing to conduct interviews longer than 30 minutes reducing the number of attainable ladders per respondent.

In analogy to the traditional laddering method developed by Reynolds and Gutman (1988) one-to-one interviews were started by determining important product features. Users were asked for their favourite information portal and instant messenger application and why they preferred the named one. Alternatively, they were asked about the advantages compared to other means of communication and receiving news like phone calls or newspapers. Subsequently respondents were questioned to reason why the mentioned attributes were important to them and to justify their answer again. An example of a part of an actual laddering interview acquiring one chain of attributes, consequences and values is given in the following paragraph.

Interviewer: You indicated an important feature of an instant messenger application is the intuitively easy usability (Attribute). Why is that important to you?

Respondent: It takes me less time (Consequence) using the application.

Interviewer: Why do you want to save time using instant messenger applications?

Respondent: I am able to stay in touch with others and still concentrate on my job thereby being more successful (value).

In this way different attributes were questioned for their importance and multiple chains were acquired per respondent.
In this case interviews were documented via chat log files. The resulting transcripts were analysed separately for instant messenger systems and information portals using the traditional method suggested by Reynolds and Gutman (1988). Using this method answers were divided into attributes, consequences, and values and categorised further using content analysis. The absolute number of concepts and the number of linkages between concepts (the reasoning of users) was counted to construct the HVMs (Figure 2 and 3) to represent respondents’ ladders in aggregate. They are used to summarise the main results of the ladderising study conducted and show from top to bottom the values-, consequences- and attributes-levels. Constructs mentioned more often are indicated by lines and shadowed boxes. The HVMs are not interpreted as an estimate of the aggregate cognitive structure and the economy-of-storage assumption (Chang 1986) is relaxed. Redundant connections are drawn as well (see also Grunert and Grunert 1995).

**Interpretation of Results for Information Portals**

Regarding information portals interesting conclusions can be derived directly from the HVM (figure 2). For example when asked about important features of information portals very few respondents mentioned “Personalisation”. “Personalisation” is merely believed to save time using information portals. Users do not feel better informed because they get the “information they personally need” as some information portals seem to believe. The key concepts are “Feeling well Informed” and “Time Saving”. Users check information portals several times a day for news. Because these websites are usually “Up-to-Date” and grant an “Easy Overview” of relevant information users feel well informed while not having to spent a large amount of time on information gathering. Being well informed in this way is felt to be helpful for success on the job or in education.

**Interpretation of Results for Instant Messenger Applications**

Users questioned about instant messenger applications mentioned closely related concepts (figure 3).

Interestingly “Success” was named as often as “Social Affiliation” as an important value in the context of instant messaging. The key concepts in this case are the benefits “Time Saving”, “Maintaining Contacts” and “Making new Contacts”. As information portals enable their users to regularly check on the latest news instant messenger applications enable them to save time checking on friends, e.g. to “See when Friends are Online”. Consequently a “Large Amount of Users” connected to an instant messenger system was mentioned most often as an important aspect. Some respondents even mentioned that they use two to three messenger applications in parallel in order to reach more people. Reaching other users was mentioned more often than “Being Accessible” to others indicating the importance of being able to get active whenever needed. Primarily users feel loosing time having to learn how to use instant messenger applications. Only subsequently the overall “Speed” of applications was mentioned enabling “Time Saving”. Finally “Versatility” is perceived to be important for time saving issues, e.g. communicating via SMS, fax, or e-mail using one application. At the same time “Versatility” makes it easier to get in touch with previously unknown persons, e.g. using voice or video chat or virtual postcards.

**Use of Results for Concept Development of Community Applications**

New product features may not always be immediately understandable to consumers. In order to consider features demanded by consumers today and those that might be communicable in the future, concept development should especially consider the connections between concepts derived from the HVM. Consumers have to be enabled to view an application as a strong link between attributes, benefits and values. There are four different strategies generating ideas for concept development (see also Reynolds and Whitlark 1995). These are designing features

1. using already mentioned connections,
2. strengthening presently weak associations,
3. building new associations, and
4. adding new attributes.

While strategy (1) and (2) involve improvements of existing features, strategy (3) and (4) require product innovation.

Since respondents were questioned about their preferred instant messenger the HVMs can only reflect important existing features. Therefore, considering HVMs separately strategy (1) is particularly useful catching up with competition. By focussing on the way important features are beneficial to users today concept development is supported designing a competitive application. But considering both HVMs strategy (1) might already yield ideas for new product features. For instance, instant messenger applications like AOL Instant Messenger or Yahoo! Messenger offer already “News Feeds” from various sources. But as Figure 3 illustrates users view this feature as a chain separate to the ones originating from traditional messenger attributes. This is surprising considering figure 2 which reveals a strong link between features of information portals, e.g. “Up-to-Dateness”, and “Social Interaction”. Users stated that being better informed enables them to either participate in talks regarding current events, to know certain facts better or earlier than friends, or to avoid feeling ashamed because of a lack of knowledge. This indicates that users do not feel supported by existing messenger applications in the interaction about news feeds received. Indeed
Figure 2: Hierarchical Value Map regarding information portals (representation of users’ cognitive structure)

Values

- Success (Job, Education)
- Excitement
- Social Interaction
- Independence

Consequences

- Time Saving
- Feeling Well Informed
- Improving General Education
- Support Building Opinion
- Understanding Background

Attributes

- Desirable Overview
- Import News
- Easy Overview
- Personalisation
- Loading Time
- Selection of Information
- Short Information
- Width of Information
- Immediate Availability
- Up-to-Dateness
- Everything Worth Knowing
- Editorial Quality
- Depth of Information

Shadowed boxes and lines indicate constructs mentioned more often.

Figure 3: Hierarchical Value Map regarding instant messenger applications (representation of users’ cognitive structure)

Values

- Success (Job, Education)
- Entertainment
- Social Affiliation
- Excitement

Consequences

- Time Saving
- Conversation
- Maintaining Contacts
- Making new Contacts
- Exchange of News
- Informed Up-to-date
- Stability

Attributes

- Easy Usage
- Fast Information Exchange
- Speed
- Possibility of Filesharing
- Being Accessible
- Immediate Reactions
- Large Amount of Users
- See when Friends are Online
- Versatility
- News Feeds

Shadowed boxes and lines indicate constructs mentioned more often.
looking at today’s applications features of this kind are either missing or poorly integrated. Additionally users stated that an information portal presenting “Everything Worth Knowing” would enable them to know things about certain subjects that friends do not. Topics delivered by instant messengers should therefore enable users to look up related articles to find in depth knowledge that they can share with friends via instant message. Along this line of thought strategy (1) can be used to generate ideas for achieving competitive advantage.

Using strategy (2) presently weak associations and technical possibilities should be identified consequently improving the way features address user benefits. Few users of information portals perceive “Personalisation” features as “Time Saving”. Because saving time is also one of the major benefits of instant messengers this existing linkage can be used and strengthened designing a messenger application. Looking for repetitive tasks in information gathering while considering time needed for (re-)configuration of personalised services, a connection appreciated by more users can be achieved.

Strategy (3) involves the creation of presently unknown connections between existing concepts. For example in both HVMs there is no connection between “Personalisation” and “Social Interaction”. Since users feel it is important to be “well Informed” in order to socially interact with others but do not yet see personalisation as an important feature in this context, a new linkage might be established. Users might be enabled to copy personalised configurations of news feeds from their friends to their own messenger. In this way personalisation would make them feel better informed for participation in talks about current issues.

Finally using strategy (4) new attributes can be added to users cognitive structure. For example a feature “hot topic extraction” might enable users to get a notification whenever a specified amount of their friends has read a certain article. Alternatively users might be offered to view a hit list of the most requested news in their group of people. This would be a new attribute to both HVMs enabling users to know what friends know or what might be talked about. They can then choose to read articles or to follow up the topic to know about it in more detail offering the variety of benefits subsumed under “Social Interaction”. It will also enable them to easier “Maintain Contacts”. Although not yet known to users to date these features have a good chance of being appreciated if they are designed serving the mentioned user benefits.

The described examples of ideas for product design derived from the two HVMs show how the four strategies can support concept development to respect customers cognitive structure. In most cases a sound approach will be a combination. In our case suggestions derived using the four strategies are closely related. Features will be more valuable to users if they are integrated together into the new messenger as the virtual platform for the information community. For example, a personalised feature where users can copy configurations from friends might save them even more time and might also support them using features like the “hot topic extraction”. However, the latter strategies require an increasing amount of creativity and are less based on the ladderling interviews conducted. Therefore resulting product concepts need to be tested and refined in the following phases of product design.

Conclusions

Based on the traditional model the value of the MEC framework for community research has been shown. The case of the information community shows how fruitful ideas even for products yet to be introduced might be derived from customers cognition. The visualisation of this cognition with HVMs has supported this task.

Using internet chats as a method for data collection has been shown to be cost efficient and closer to customers natural decision process. We argue that the yielded results represented by the HVMs are highly relevant for the creative task of concept development. In our case the community was seen as complementary to the existing business model of an information portal. Therefore, the two HVMs lead to additional suggestions.

Interpreting the HVMs it is generally important to focus on the connections between concepts as opposed to the concepts itself. Using this approach the four strategies derived from communications strategy can be applied. This understanding of customer centred product design especially considers new features that customers might not understand immediately, but that will be communicable.

Further research on this kind of customer centred thinking and on how community applications foster community building processes will be a valuable complement to existing community research.

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