

# Designing Online Knowledge Communities: Developing a Usability Evaluation Criteria Catalogue

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**Abstract.** Usability is a key factor for the effectiveness, efficiency and acceptance of Online Knowledge Communities (OKCs). It is also a critical issue for their existence, success and future evolution. This paper aims at laying a foundation for the development of a usability evaluation criteria catalogue. Usability for online communities is outlined first. A systematic overview of facility-types and technical components of OKCs provides the basis for the development of usability criteria. As main findings of our research extracts from the OKC Usability Evaluation Criteria Catalogue are presented. This OKC Usability Evaluation Criteria Catalogue supports summative evaluation of OKCs as well as the development of heuristics for the designing of OKCs.

## 1 Introduction

Today, the idea and concept of Online (or “virtual”) Knowledge Communities (OKCs) is integral to many KM approaches (see e.g. [1; 2; 3; 4; 5]). Their conceptualisation can be described as a fusion of the preceding concepts of (1) communities of practice [6] and (2) virtual communities [7], and their adaptation to KM. According to their promoters, OKCs are viewed as social spaces for creation, exchange, and conservation of knowledge, especially of knowledge that is difficult to externalise and to codify. The discussion of characteristics of communities, virtual communities, or knowledge communities in more detail is not the subject of this paper, nor is it the appropriate use and analytical value of the term “community” in its sociological sense. The term OKC as used in this paper refers to so-called web-based “community” applications as a software tool or a set of software tools and their use in KM.

## 2 Usability Evaluation Criteria for Online Knowledge Communities (OKCs)

### 2.1 Defining Usability for Online Communities

Research in human-computer interaction (HCI) has played an important role in software development not only since the rising of the World Wide Web. In the early 1980s, ACM’s SIG in HCI (SIGHCI) and IFIP’s Task Group of HCI had already started to focus on usability and user-centered design [8]. However, with the extensive distribution and dissemination of information and communication technologies, especially for end-users, it has gained more and more in importance and popularity. Generally speaking, HCI-evaluation aims at determining whether (or to what degree) needs of the users are met, at the assessing of the suitability of a system in regard to its intended tasks, and at a comparison with other available products

[9]. ISO 9241 defines aspects and criteria on “Ergonomic requirements for office work with visual display terminals (VDTs)”. According to Part 11, usability can be defined in terms of effectiveness, efficiency, and satisfaction [10]. Part 10 formulates seven principles on the design and evaluation of technical dialogue elements of software (which can be viewed as sub-factors of “efficiency” according to the Usability Quality Model by Dzida et al. [11]): suitability for the task, self descriptiveness, controllability, conformity with user expectations, error tolerance, suitability for individualisation and learning [12]. These principles are also relevant in designing online communities. It is a prerequisite to “design software with good usability so that people can interact and perform their tasks intuitively and easily”, which means that “good usability supports rapid learning, high skill retention, low error rates and high productivity” and is “consistent, controllable, and predictable, making it pleasant and effective to use.” [13: pp. 26-27]

## 2.2 Components of OKC Applications

Table 1: Facility-types and Technical Components of OKCs - A Systematic Overview

<b>Facility-type</b>	<b>Typical components</b>	<b>Type of support for OKCs</b>
<i>Home page elements</i>	Web main page, news, static content elements	Assert their existence, describe their domain and activities
<i>Search and orientation</i>	Search, sitemap, index, navigation, membership directory, member profiles	Retrieve information/contents from the whole OKC, esp. from their knowledge base (documents) and discussions, find other community members/experts
<i>Administrative elements</i>	Membership management, moderation, reviewing	Mostly for the community-administrator and (sub-) community-coordinator(s)
<i>Work space facilities</i>	Shared document repository (file-upload), blogs, wikis, shared whiteboard, journals, guestbook	Collaboration, co-authoring, creation of sub-communities, member self-portrayal
<i>Communication facilities</i>	Email (email-interface, internal emailing), listserv (mailinglist), newsgroups, discussion forum, bulletin boards, chat, instant messaging, video conferencing	Conversation spaces for a variety of online-communication modes
<i>Customisation and personalisation</i>	buddylist, alternative interfaces	user-specific facilities and modifications
<i>Interactive elements</i>	credit system, virtual environments	Rate other member’s contributions, create 3D-worlds for visualisation and collaboration
<i>Additional features</i>	Shop, SMS etc. etc.	Additional features to promote or support the community and its activities/goals

As outlined in [14; 6; 15] for communities of practice (CoPs), OKCs can be characterised through mutual engagement, joint enterprise, and shared repertoire. These basic characteristics constitute the technological requirements of OKCs. Typical facilities useful to an OKC are: a home page, a conversation space, a facility for floating questions, a directory of membership, shared work spaces, a document repository, a search engine, community management tools, the ability to spawn subcommunities [15]. As a result of our own empirical study

Table 2: Human Factors in OKC Usability Design (see also [8])

<b>HCI - human factors</b>	<b>Relevance in OKC-design</b>
<i>Normative references</i>	Design “usable” systems for communities, i. e., to support their users, tasks, purpose and policies
<i>Information design</i>	Present information embodied in the community discussions and its knowledge base in a way that it responds to the members’ knowledge about community objects, concepts and categories and their mental organisation (information architecture)
<i>Information perception</i>	Adequately design according to circumstances of individual community members’ information perception (reading, writing, speaking, listening etc.)
<i>Information processing</i>	Support information perception and information processing in regard to attention, memory, and learning mechanisms of community members
<i>Dialogue design</i>	Guide human-computer interactions as well as human-human interactions facilitated by computer mediated communication (CMC) tools (this includes information and visual perception, object recognition, object localisation, perceiving motion, and color perception)
<i>Personality differences, cultural and international diversity</i>	Take into account cognitive and perceptual abilities of community members and differences in personality, i. e., their different preferences on the use of computers and their participation in online community activities, as well as differences based on different cultural backgrounds and traditions
<i>Users with disabilities and elderly people</i>	Consider special needs of disabled and elderly community members who may be operating in very different contexts

on web-based communities, we developed a systematic overview of the technical components of online communities that covers nearly all typical state-of-the-art community features and facilities (see table 1). We distinguish components of community applications according to (1) home page elements, (2) search and orientation, (3) administrative elements, (4) work space facilities, (5) communication facilities, (6) interactive elements, (7) customisation and personalisation features and (8) additional features.

### 2.3 Developing an OKC Usability Evaluation Criteria Catalogue

With regard to OKCs, usability aspects primarily focus on human factors. Preece [13] introduces three “basic building blocks of usability” for online communities: tasks, users, and software. Community “tasks” aim at exchange of knowledge and information, mutual support, cooperation, problem solving, creation and discussion of new ideas, enabling people to communicate and socialise informally etc. The “users-block” is about human diversity, like physical, cognitive, perceptual, cultural, social and economic differences as well as differences in personality, gender, age, experience etc. “Software” is about usability in the narrower sense of its meaning, i. e., to design a “consistent, controllable, predictable system”. The GigaMobile Project [8] worked out aspects of human factors in HCI (as basically outlined in [16]) of which especially those shown in table 2 are relevant with regard to OKC usability.

A combination of (1) the systematic overview of technical components of OKCs as outlined above, (2) the three basic building blocks of usability according to Preece, and (3) the community-related relevant aspects of human factors in HCI according to the GigaMobile Project results in a usability matrix for the analysis of OKC usability (extracts from the matrix are shown in table 3).

Table 3: Extracts from the OKC Usability Evaluation Criteria Matrix

<b>Technical Components</b>	<b>Community tasks</b>	<b>Community users and software</b>
<p><i>Home page elements</i></p> <ul style="list-style-type: none"> <li>- main page / other static content elements</li> <li>- news</li> </ul>	<p>community location, assert existence, describe domains of interest, activities, policies</p> <p>show actual existence and living, ongoing activities, changes</p>	<p>present contents / information according to OKC members knowledge, their individual information perception, their information processing capabilities and principles of HCI dialogue design (consistent, controllable, predictable)</p> <p>provide information that is important and relevant to all community members according to principles of information processing, update news regularly</p>
<p><i>Search and orientation</i></p> <ul style="list-style-type: none"> <li>- search</li> <li>- membership directory</li> <li>- member profiles</li> </ul>	<p>quickly and systematically find information, knowledge and support</p> <p>quickly and systematically find experts</p> <p>know who is in the community and domains of expertise</p>	<p>design search input (search options like e.g. to search only in knowledge base or discussion forum resources) and output (relevance ranking etc.) dialogue as detailed as possible and as necessary according to community members' needs and capabilities</p> <p>properly design search input (search options like people and domains of expertise) and output dialogue</p> <p>promote community expertise by individual competencies and domains of interest, provide detailed information about members while assuring privacy and security</p>
<p><i>Administratiion facilities</i></p> <ul style="list-style-type: none"> <li>- membership management</li> <li>- moderation / reviewing</li> </ul>	<p>assure professional excellence of community members as well as privacy and security, levels of participation, assign different community roles, build sub-communities</p> <p>assure excellence, relevance, and compliance with policies</p>	<p>enable managers to control community access, participation and roles</p> <p>enable moderators to control contributions of community members and content, mediate in case of intra-community problems and conflicts (also those based on cultural, personality, cognitive, perceptual etc. differences), encourage members' active participation</p>
<p><i>Work space facilities</i></p> <ul style="list-style-type: none"> <li>- shared document repository (file-upload)</li> <li>- shared whiteboards, blogs, wikis</li> </ul>	<p>exchange and store community knowledge (community knowledge base)</p> <p>enable for collaborative group work, create new common knowledge</p>	<p>provide fast, secure and easy-to-use upload-mechanisms, provide an easy-to-adopt or -modify content classification (structure) according to principles of information architecture</p> <p>provide easy-to-use collaboration tools (like those that are similar to well-known office applications)</p>

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Technical Components	Community tasks	Community users and software
<i>Communication facilities</i> - discussion forum, bulletin board  - chat, instant messaging	provide mutual support, foster community knowledge creation, form (sub-) community networks form webs of personal relationships, foster community retention, personal support	support (sub-) community communication threaded by topics or (sub-) domains of interest with a variety of classification, search and response options according to principles information design and dialogue design provide synchronous private (one-to-one or -few) communication among community members according to principles of HCI and human-human CMC dialogue design (consistency, control, response times)
<i>Interactive elements</i> - credit system	foster community commitment, rank topics, assure quality and trust, give feed-back to contributor and show value of contributions to others	encourage members to acknowledge and grade contributions of others by means of an easy (especially quickly) to handle credit system with adequate ranking options

Based on this matrix, a “OKC Usability Evaluation Criteria Catalogue” can be derived: all the elements of the matrix have to be extracted and put down on a list, each of its entries representing one usability-factor which can be defined in terms of detailed measurements. To evaluate the usability of an OKC, first, assign relevance and relative weight on each of these factors. The second step is to determine, for each selected factor, whether (or to what degree) needs of the users and their intended tasks are met. The outcome provides a detailed catalogue to improve an OKC according to the users’ needs and its intended tasks. Or it can be compared with other existing OKCs. Moreover, the catalogue provides a basis to assess and to compare the usability of available community tools and applications in detail.

### 3 Conclusions

We will add some remarks on usability evaluation methodology and the empirical use of the OKC Usability Evaluation Criteria Catalogue to conclude this paper. Usability of human-computer interfaces may take place as “formative evaluation during the development phase in order to improve a system iteratively” or as “summative evaluation of a final design regarding guidelines, standards, or other objectives” [17: p. 151]. This applies also for the evaluation of OKCs. However, in contrast to the designing of other products, communities cannot be treated as entities; in fact, community is “a process” [18]: “Communities develop and continuously evolve. Only the software that supports them is designed.” [13: p. 26] Thus, sociability comes into play. Sociability focuses on social interaction in regard to the purpose of an online community, its people, and its policies [13]. There is a strong interplay between sociability and usability aspects of OKCs which lead to a continuous process of (re-) planning, (re-) designing, (re-) implementing, and (re-) evaluating. Evaluation criteria catalogues, as outlined in this paper, primarily support summative evaluation. Moreover, the development of heuristics to designing OKCs can be based upon the OKC Usability Evaluation Criteria Catalogue as well. Those heuristics include: (1) Why should I join this OKC? (2) How do I join or leave? (3) What are the rules? (4) How do I participate? (5) Can I do what I want easily? (6) Is the community safe? (7) Do I profit for myself and support

others? (8) Why should I come back? (based upon [13] – see also [19] – with modifications according to OKC specific characteristics).

*Note:* In case of acceptance, the KM Summer School 2003 presentation will demonstrate the empirical use of the OKC Usability Evaluation Criteria Catalogue on the example of Knowledgeboard.com, The European KM Community. This presentation will be a result from the authors' research course "Sociability and Usability of Community Applications" at the Institute for Media and Communication Studies, Free University Berlin (summer term 2003).

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