A METHODOLOGY FOR THE EVALUATION OF ONLINE LEARNING RESOURCES

By

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ABSTRACT

Novel and innovative modes of interacting with website information, which necessitate methods and tools for their evaluation have arisen. However, it is essential to develop such methods from contexts of use at a macro (i.e. cultural) and micro (individual use contexts) level.   Activity theory has been used extensively in systems evaluation as it bridges these two levels.   This article will extend activity theory by the development of a method, Analytical Activity Method (AAM). The purpose of this method is to act as a tool to enable web designers and usability engineers to conduct usability evaluations of web interfaces, particularly the mobile web.   Based on the theoretical underpinnings of activity theory, AAM seeks to extend the activity checklist (Kaptelinin, Nardi, and Macaulay, 1999) for evaluation of websites on computers or mobile devices.   The application of this method contains the possibility to make visible that which was not obviously apparent from the theoretical tropes of Activity theory at system, historical and cultural level.   Finally, this paper concludes that the AAM has provided a comprehensive framework within which to conduct website evaluations and informs future designs.   It proposes some exciting new applications based on the AAM which not only extend activity theory but also provide a framework for understanding new methods of information access.

Keywords: Evaluation, Learning Resources, Activity Theory

INTRODUCTION

Human computer interaction (HCI) research attempts to identify generic truths for the improved design of systems through the application of observation-based research methods (Monk & Wright, 1991).   HCI has been more appropriately defined as the study of different ways in which people communicate with machines and through machines in order to derive requirements for applications and systems more sensitive to see how people actually use them (Suchman, 1987), (Page, Lehtonen, and Thorsteinsson, 2006).   Nevertheless, the research question of interest will determine the appropriate application of research methodology in HCI.   The question of interest focusses on whether the results from applied research methods are generic or whether genericity is skewed as a result of variability in context.   This implies that scientific and empirical methods for systems analysis are not necessarily suited to variability in context and may fail to provide generic insights in usability.   The idea of variability in context can provide meaningful insights into what people (not users) are doing when they interact with machines, which is an obvious help for designers (Norman, 2006).

HCI research has sought to create categories of rules and guidelines to enable designers or evaluators of systems to look not only at how well they are designed but how they'll be used.   The notion of identifying such categories either from theoretical-or evidence-based research approaches can provide some reusable places to look for designers and evaluators of systems in context.   Therefore, abstractive approaches to modelling "users" have arisen to derive physical design requirements.

However, HCI has started to change scope from solely the analysis of cognition and computers towards methods of analysing interactions between people and computers in a naturalistic environment. Thus, such activity theory is becoming increasingly used as an evaluation methodology for website design, to bridge the dualistic notion of the human versus computer (Bertelsen & Bødker, 2003); (Quek & Shah, 2004).   This is particularly evident in HCI where situated action versus cognitive accounts of evaluating people interacting with machines, systems

and applications which, in turn, informs data collection methods.

Activity theory comprises systematic enquiry to address particular research questions, the expected results of which may be of use to designers. However, HCI is grounded on methods for gathering data on the nature of human interaction that often fails to consider the systematic ways in which people use artefacts (Suchman. 1987). Nardi (1997), differentiates between the three different approaches in HCI: activity theory; distributed cognition; and situated action. The differences lie in the structure of an activity; in particular, the treatment of motives and goals distinguish the situated action perspective from distributed cognition and activity theory. Thus, "an activity is shaped first and foremost by an object held by the subject; in fact, we are able to distinguish one activity from another only by virtue of their differing objects" (Nardi, 1996). However in the situated action perspective, the reification of a goal is not the main emphasis, as it is a construct created from the subject's own idea of what has been done after it has been done.

Bærentsen and Trevvikk (2002) argue that the practical result of focussing on cognitivism and the mind as an information processor is that HCI is actually based on computer-computer interaction. This reinforces dualism within HCI; the subjective/objective dichotomy of whether the researcher can objectively make generic claims, or whether the data should come from individual situations that are not generic. Furthermore, Nardi (1997), argues that focussing on activity structure whilst concentrating on the reification of the consciousness makes activity theory one way to avoid this dualism. The implicit assumptions from this research is that to focus on the system and the structural tasks the "user" performs in a closed way, such as in distributed cognition that ignores context in which people use artefacts.

Activity theory is therefore a concrete version of the contextual approach (Kaptelinin, 1996). However this theory is not "concrete" in terms of giving, for example, number of participants needed but relies on abstract concepts "development" as guides to evaluation.

Kaptelinin, Nardi, & Macaulay (1997), create a checklist based on activity theory to ground it within the practices of design and evaluation. In comparing situated action models, distributed cognition and activity theory, Nardi (1996) notes that these three approaches have shifted the approach to studying context from controlled environments "to consider real activity in real contexts". Thus in real activity, the presence of too many variables may nullify design guidelines identified therough a controlled study. Activity theory approach proffers the most comprehensive approach for the study of context, as it can account for such things as intentionality, consciousness and history.

Research in Context

In addressing the applicable methodological aspects of activity theory for HCI, Nardi (1996) highlights two important points to adhere to when conducting research using this theory. First, research should be conducted over a long enough timescale to understand user objects. Second, small episodic fragments of data should be complemented with attention to broaden patterns of activity. This in turn should be complemented with the use of varied data collection techniques, where the evaluators take an empathic view of the users.

It is argued that a concrete method can be derived from activity theory which will assist the evaluator/participant in analysing a website, particular on mobile learning devices. As mobile learning devices have the capability to go online with wireless capability, greater attention needs to be paid to the contexts in which these will be used. Current research on mobile website evaluation requires less focus on the effect of the device constraints and more on their contexts of use.

This work reported here is a continuation of the activity checklist as it attempts to identify the particulars of an evaluation method for mobile learning website design. This work considers whether activity theory can be developed as a useful method for usability evaluation research, highlighting some of the shortcomings of existing activity based methods for evaluation of website usability. Usability refers to the measure of quality and

satisfaction related to the interaction with a device (Benyon et al., 2001).

There has been a paradigm shift by designers of websites in desktop graphical user interfaces that is made to designing with many different user types in mind with the potential of using a variety of different devices. In particular, the use of ones mobile device to communicate with new media applications such as Flickr™. As stated earlier, novel and innovative methods are required to be derived for evaluating these new modalities of interaction. However it is essential to develop such evaluation methodologies from contexts of use at a macro (i.e. cultural) and micro (individual use contexts) level.

Changes to the way people use and interact with the Internet have arisen through the proliferation of mobile learning devices which has given rise to a new mode of interaction with mobile devices. "Activity" is defined as a human interaction with the objective reality (Kaptelinin, 1996). The Mobile Data Organisation recently (when) reported that sixty five percent of mobile phone users had accessed Internet via their mobile device. Moreover, the ways of how information is displayed and its purpose, will change from the traditional desktop model of accessing the Internet. For example, tasks on a mobile interface may be more goal- directed than on a desktop computer interface. So the ways we access Internet information now, may be different in as little as five years time (Buyukkokten, Garcia-Molina, & Paepcke, 2001).

It is hoped that the development of this method will make the mobile Internet more usable. Brooks (1991) highlights that the aim of HCI is useful to designers where the discipline can provide a multidisciplinary approach over many domains, high level analysis to assess the impact of design decisions and suggests actual designs rather than mere evaluation. HCI today has redefined usability from the static model of the user completing activities with a tool to effectively examining a whole range of contextual factors; usability can make or break the ratification of a particular product which satisfies a problem/ need/ desire in society. This then creates new activities and contexts for study.

Background to Activity theory

Taking into account, the notion of context is perhaps the most challenging task for designing learning systems (Preece et al., 1994). The authors define context as a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. Traditional human computer interaction methods have typically analysed context of interaction in a cognitive sense. Dey and Abowd (2001), identify context as any information that can be used to differentiate the situation of an entity. An entity is a person, place, or object relevant to the interaction between a user and an application, including the user and applications themselves. These researchers take contextual factors, in a closed loop of information flow between the system and user and vice versa, then mapping, for example, task decomposition or information flow models, which thus slot into a theoretical framework (Kaptelinin et al., 1997). However, it has been argued that this approach can be complemented by turning this process on its head and starting with theoretical framework - in this case through activity theory, and then mapping this to the representations of design and evaluation (Kaptelinin et al., 1997). Thus the authors derive an activity checklist to this end. It is argued that activity theory offers a powerful tool to combine people and machines interacting. Other empirically driven approaches can thus be complemented by a bottom-up approach through an activity theoretical framework.

Activity theory (derived from the work of Russian psychologists Leontjev & Rubinshtein) arose in the 20s and 30s to transcend the typical behaviourist and psychoanalytic accounts of the mind within that period. The fundamental premise involved unifying the notion of the human mind by analysing "activity". Thus the activity is the unit of analysis. This theory is based on a model of the artefact mediation and object- orientedness, adhering to conceptual principles of:

1. Object orientedness.

2. Duality of the concepts of Internalisation and

externalisation.

3. Tool mediation.

4. Hierarchical structure of an activity.

5. Development.

Rules and Contradictions are also important theoretical tropes within Activity Theory. It should be noted that although this conceptualisation of activity analysis seems fixed, the concepts are interrelated and not static. This is because activities themselves are not static but more like nodes crossing hierarchies and networks, which are influenced by other activities and other changes in the environment (Uden, 2007). The notion of an activity can be distinguished from an action or operation (Leontjev, 1978). Activities are oriented to motive. Each motive is an object, material or ideal, that satisfies a need. Actions are the processes subordinated to activities; they are directed at specific conscious goals.

Object - Orientedness starts from the premise that an activity takes objective forms which interrelate with one another. This is in direct contrast to cognitive model of the mind as a basic information processor of input and output objects. Development is not something which can be obtained, but is a process (Kaptelinin, 1996). Engeström (1990) analyses how contradictions, both internally in a considered central activity and between the central activity and related activities, are the driving forces in development. According to Engeström, any activity system has four levels of contradictions that must be attended in the analysis of a working situation. The first level is the primary contradiction. It is the contradiction found within a single node of an activity.

A further investigation into the nature of activity theory will reveal why this theory is now being used for CSCL (Kuuti, 1996), mobile learning (Uden, 2007), the design of learning technology (Kaptelin et al., 1997) and problem based learning (Chernobilsky, Nagarajan and Hmelo-Silver, 2005). The unit of analysis with this theory is the activity. Rather than providing merely a research framework to analyse the structure of an activity, this theory upsets the traditional research paradigm, which focuses on either the individual or the social, and the

macro - or the micro-level. Instead, it links them, and provides some conceptual tools for application and analyses of them together, such as the notion of context. Engeström (1987) formulated the context of activity as a hierarchy or network of different parameters or elements that influence each other. Thus the activity context is a triangulation of mediation, the subject and the object (see Figure 1).

Kaptelinin et al., (1997), created a checklist to move activity theory to ground it within the practices of design and evaluation of computer- mediated tools Table 1, but there are two variations on the checklist one for design and the other for evaluation. This paper seeks to extend this activity checklist into a more comprehensive method called the Analytic Activity Method. One of the benefits identified of using the Checklist was it steers the evaluator into the correct directions without making any prescriptive and therefore confining categories within which to look.

The checklist of Kaptelinin and others relies especially on the activity theoretical principles of mediating tools. In activity theory, a tool mediates an activity, thereby
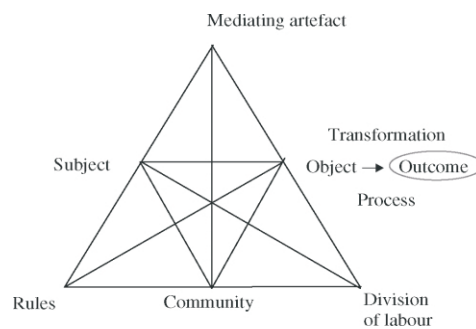

Figure 1. Triangulation of mediation, the subject and the object.

1	Means and ends: assessing the amount the technology facilitates and constrains the realisation of peoples' goals and measuring the role of technology in creating or resolving conflicts between different goals.
2	Social and physical aspects of the environment: Integration of designed/ evaluated technology with requirements, tools, resources, and social rules of the context and environment.
3	Learning, cognition, and articulation: internal versus external components of activity and support of their mutual transformations with target technology.
4	Development: developmental transformation of the foregoing components as a whole.

Table 1. Activity theory checklist

connecting a human being not only to the world of objects, his or her physical surroundings – but also to other human beings. Computer applications and websites mediate human activity in three different ways: as being a system, a tool or a medium (Bodker, 1991). A tool is transparent (i.e. not in focus) mediating the persons shaping of some material. A medium is transparent in mediating the communicative relation between human beings. A system may not be transparent to a person because the purpose of the system is placed outside of the use of context. People may focus on the goal rather than on the systems capabilities. Therefore, we can use AAM to map out the interrelationship between the technology, the learner and the contexts in which they occur.

Existing Activity Theoretical Methods for Website Evaluation

Ideally, usability testing should be made before the system is implemented. Mock-ups and prototypes are well known methods for involving users in the assessment before design. Analytical methods like heuristic evaluation (Nielson & Molich, 1990) and cognitive walkthrough (Lewis, 1997) bypass the needs of users, letting the designers, as expert evaluators, to do the assessment themselves. Cognitive Walkthrough is based on the theory of exploratory learning where the expert evaluator identifies some typical tasks, and break these tasks down to a sequence of steps.

Different walkthrough methods, such as cognitive, activity and heuristic walkthrough methods have been identified

Figure 2. Engestrom's Triangle
source from Uden, 2007

as useful methods for analysing websites (Ryu, 2007). The author illustrates the application of useful aspects of the three different walkthrough methods to a website, concluding on their respective advantages and weaknesses. Activity walkthrough (Bertelsen, 2004) is based on a combination of activity theory and cognitive walkthrough methods. The author identifies six phases conducted by the expert evaluator. In the first phase the evaluator identifies some of the typical tasks to analyse. The second phase is the procedure for contextualisation, where the activities have to be identified together with all sub-actions from those activities. The third phase involves the verification of each task identified in the first phase. The fourth phase, task analysis, involves breaking down the tasks into operations at the interface. The fifth phase involves a walkthrough which is carried out for each task. The sixth phase involves task analysis verification sequence of machine operations matches the users' operations and actions. The major issue with this method is that in being an expert review method it is hard for the designer to check whether the model between system and user is accurate due to their own bias of design.

The focus of human computer interaction research leans towards the structural analysis of the user interacting with a mediating tool, such as a user interface. For example, methods such as GOMS and Task Analysis advocate the participant moving through; e.g. an interface in a logical manner to identify whether an interface makes sense to the user. This confines the researcher to obtain data which is not naturalistic or contextual in real world uses. Therefore, Activity Theory has been used to obtain data from human beings in their natural environment, accounting for cultural and contextual factors. Thus, the AAM method has arisen to bridge this gap, the data obtained using this method is of a qualitative nature, and provides design implications for the particular human computer interaction context.

Further work on deriving a method from activity theory is the Analytical Theoretical Iterative Evaluation Method (ATIEM). ATIEM, (Quek & Shah, 2004), which aims to make the abstract concepts of Activity Theory into a method for evaluation. They illustrate how the method was
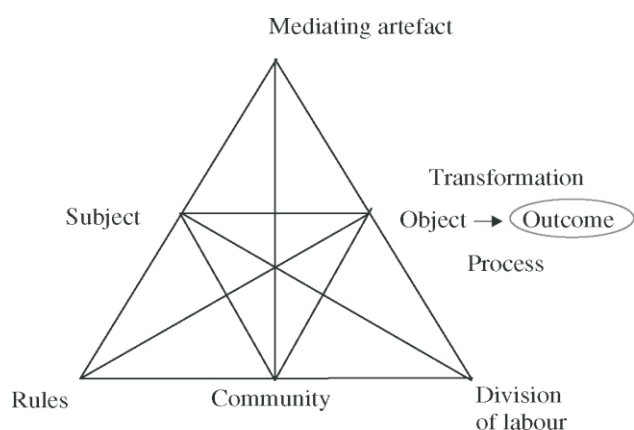
developed, its connections to Activity theory, demonstrating how ATIEM is applied in a case study. The method has six main activity theoretical components, and it is iterative as the evaluator will have to return to use the results to provide additional information. This method does involve users in the design, and importantly the analysis focuses on contradictions to reflect on the method. While this method is very useful, it does not adequately provide for the investigation of context. Therefore it is asserted that a more thorough method for analysing websites for particular purposes needs to be developed.

Components of the Analytical Activity Method (AAM)

This section identifies the aim of AAM and the features of this method. Finally, this section will elaborate the procedure and participants for use with the Analytic Activity Method. Kaptelinin (1996), states that activity theory is a synthesis of the objective, the ecological and the sociocultural, which should be focussed on to categorise the status of the behaviour which is being researched. This involves looking at whether the behaviour is oriented to a motive, goal or actual conditions. According to the author, this implies that we should look to humans in their natural environment and considers cultural and developmental categories. The AAM aims to synergise the subjective/objective in the method by combining user evaluations with expert evaluations. This thus nullifies the "evaluator effect" (Hertzum & Jacobsen, 2001) where multiple evaluators evaluating the same interface using the same usability evaluation method that identified very different sets of problems. Instead it is hoped that the whole context of the use of the website will be of use to designing an application.

The first aspect of the method is to contextualise the use of the website into possible use contexts using principles of the checklist. The second aspect is to use sample questions based on the principles of activity theory to analyse how people use or will use the website. Thus the questions in Appendix 1 form a list of evaluation criteria. It is a Matrix in the sense that it involves interrelated application of the concepts - they are not in isolation to one another, for example when identifying developmental factors this will tie into contextual factors.

The Tables in Appendix 1 are the "Questioning Categories" from which a set of requirements and usability issues can be drafted, to assess the usability of the interface in many particular contexts, at different levels of activity. For the purpose of implementation of the Evaluation Matrix , the questions have been placed in Tables according to the Activity theory principle and the activity checklist (see Appendix 1). The sample questions are used to summarise and predict how people will use the website. Furthermore, it can be shown how evaluation using this method can actually assist with the design of future mobile learning research.

Using the AAM, the division of tasks and goals follows the activities which can be performed on the websites; these are linked to the activity of the person, in this case with student participants and education. Attention is paid to the particular contradictions which can be inherent in the conflicting activities. This certainly makes Engelstrom's triangle more than three dimensional in the analysis of activities. While the tasks are being performed at the interface, the student participants are encouraged to talk about the tasks as their experience might have provided them with some insight into the answers to some of the questions. The evaluator is responsible for keeping this dialogue going where necessary.

To summarise the above, important assertions can be made about using the AAM as a basis for evaluation of mobile websites:

1. It models system, user and context, and thus makes using RSS technology on mobile websites more usable: Thus the AAM can assist to understand the person's use of a mobile website for a particular activity or identify the higher goal levels such as learning, education, communication and/ or fun.

2. It reflexively includes the activity of research within the analysis; thereby curing HCI of its subjective/ objective arguments and dualistic nature. It looks at the context of the research itself, and thus has reflexivity.

3. It bridges macro and micro levels of analysis; So in

future research this method looks to education within a wider societal context and at the actual usability of the interface for education.

4. It emphasises the interrelatedness of the categories identified but also questions their underlying assumptions. For example, some students are on the process of development in educating themselves.

Application of the Method

The activity analytical method (AAM) aims to produce a tool based on activity theory and the checklist (Kaptelinin et al., 1997) to evaluate web usability and to identify problems connected with websites. It is possible to use this method on a live website and a website under development to apply the website into a particular context. So the first application of AAM is the mobile website evaluation for education, in particular, using the web for student participants who are studying sustainable design. This module was chosen from identifying that there are many websites on sustainable design, which make it harder for the student to assess the strength of those sources. In paying attention to the goals of the student, we implement RSS web technology for mobile student research. This will cure two of the students issues that they likely to be on the move, between term and dates. They do not have enough time to research everything on that subject they are studying. Thus, mobile RSS can potentially keep track of all media on that particular subject. The questions should be collaboratively applied by the evaluator/ researcher and one user.

The rise of Web 2.0 and New Media has changed how we manage knowledge and information on the Internet. Two future directions for Analytical Activity Method are proposed. The first research direction aims to apply the Analytical Activity Method (AAM) as a tool to enable web designers and usability engineers to conduct usability evaluations of RSS web applications, which can be used particularly in a mobile learning situation. RSS technology is a type of new media. It is proposed that the AAM can be a comprehensive evaluation method for making sense of new and confusing web applications, where the

goals may accord to a recognition - based interaction style (Ryu, 2006).

Ryu (2006) comments that two common website navigation interaction styles exist based on the "typical situations which people use a website" (p.228); recall-based and recognition - based interaction styles. The AAM seeks to extend the interaction styles by focussing on other interaction styles more typical to the way people use the Web with the advent of new media; i.e. through a creativity and communication- based interaction style.

It can be concluded that this method will be particularly useful for mapping out the new contexts which will arise for using websites, such as with mobile devices, mobile learning, new media and RSS (Really Simple Syndication) web technology. RSS technology has many facets and thus the potential of the RSS web applications can support a variety of different types of resources, such as blogs and podcasts. As Harssch (2003) notes, RSS has the potential to be the next "killer app" [killer application] for education, so far as it does not assume or require technological capabilities of the user. It saves the user from having to retrieve the content manually from the websites by forwarding the relevant RSS feed to the users RSS application, email or mobile device. Data has been collected using this method on RSS resources used to enhance teaching and learning of a sustainable design module at second year undergraduate level at Loughborough University. However, this paper seeks to deliver the details of the method and thus future articles will go into more detail on the application of the AAM to a case study.

The Method Analysed

Human beings live in the social, cultural world. According to activity theory, human beings achieve their motives and goals by active transformation of objects in their environments. This section of the method identifies the objects involved in the target activities and constituents of the environment of the use of the website. Kaptelinin et al (1997) labels this category of sample questions in social and physical aspects of the environment. The questions focus on the integration of target technology with

requirements, tools, resources and social rules of the environment.

Human beings have hierarchies of goals that emerge from attempts to meet their needs under current circumstances. It is important to identify the goals of target actions, which are relatively explicit, and then extend the scope of the analysis both 'up' and 'down'. Kaptelinin et al., (1997) call this category "Means and Ends". This is concerned with the extent to which the technology facilitates and constrains the attainment of the users' goals and the impact of the technology on provoking or resolving conflicts between different goals.

Activities include both internal (mental) and external components that can transform into each other. The web site should support both internalisation of new ways of action and articulation of mental processes, when necessary, to facilitate performing user tasks. Kaptelinin et al., (1997) call this the learning, cognition and articulation category. Here, the focus of inquiry is on internal versus external components of activity and support of their mutual transformations with target technology. Activities undergo permanent developmental transformations. Analysis of the history of target activities can help to reveal the main factors influencing the development. This is the last category of the questions covering development, that is, the developmental transformations of the above components as a whole.

Future Directions & Conclusions

Future research will detail a case study illustrating how the AAM can aid understanding of the usability of an RSS web-based interface as a learning resource. In particular, this theoretical and analytical tool is applied to the evaluation of RSS web interfaces as a tool for student research. Data has been collected using the AAM to assess first time use of an RSS (Really Simple Syndication) website for student research. The AAM will map out the interaction between the students' use of the Internet with mobile RSS websites, identifying a new way of search and retrieval (and information management) on the World Wide Web. Using the AAM has helped to gain an overall contextual analysis

of the use of the RSS web-based application and interface, Bloglines. Cold (2006) identifies Bloglines as most suitable for bringing RSS data into one location for the purposes of individual student research, on the basis that it is a free web based system, which can be accessed at any Internet - capable computer or mobile device. The results of the case study demonstrate the suitability of AAM in customising (designing) an interface for a particular context.

As noted above, Brooks (1991) identified the idea that HCI research and methods should be able to suggest actual designs rather than mere evaluations. Further work using the AAM has contributed to the design of a context - aware of RSS web based application for website interaction. This is to support student research at a metaactivity level. The scenario is that students want to search the web for any related topics; for example, sustainable design. The context aware application would help to know, where you are, and would thus give you the nearest events on sustainable design. Other features this application would contain are:

1. Top ten latest blogs.

2. Top ten latest people who have searched on this topic with optional viewing and personal messaging options.

3. Top ten accessed podcasts on the subject.

4. Links to new media sites such as YouTube©, which return results related to that subject.

This web application will not only keep track of a large amount of new information for students study, but will also give rise to new interaction styles with the information on the web. The AAM can elicit some new design ideas for applications, whilst evaluating what the participant can do and wants to do on the mobile web. In questioning categories, it tries to shake off assumptions that are held by evaluator and participant and analyse activity on many different levels.

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APPENDIX 1: QUESTIONS USED IN AAQM

Questions
IDENTIFY THE USES   What necessary uses must the website support?   What frequent uses must the website support?   What inexpedient uses must the website support?   What other uses must the website support?
CONTEXTUAL ANALYSIS- CATEGORISING THE WEBSITE AND FUTURE USE   What is the purpose of the website? Is it a site that sells products or provides service?   Is the website aimed at an intranet, extranet or internet audience?   What characterised the user/target groups?   What characterises the originators?   What characterises the design?   Who are the users/managers/designers?   What are their goals in using the website?   What are the roles of the users/managers/designers?   What are the beliefs, assumptions and methods that are held by the users/managers/designers?   How do individuals refer to their experiences in their roles?   How is the work divided among the people involved in the task?   Are there certain rules that constrain the use's actions on the website?   Situating the website and Future Use: Is it a versioning or a future development; redesign or new website?   Experiences with existing website (if any)?   Reason for redesign/future development?   Influence on existing/user procedures?   Are there any corresponding websites? What are their characteristics? Experiences with these websites?   What type of limitations are placed on the activity by the organisation or outside agencies?   How are the tasks divided or shared among the participants?
ASSESSING OBJECT ORIENTEDNESS   What are the objects of the task of the user, manager/ designer?   Can the objects of the task be achieved by the different users?   What are the objects of the disabled?   Is the layout of the screen consistent?   Is the searching object obvious?   What is the object of searching?   Is the navigation obvious?   Is there a map to assist the object of knowing where the people are in relation to the system?   Is content well structured and relevant?   Is text readable and concise?   Are the concepts and vocabulary of the system consistent with the concepts and vocabulary of the subject?

Are there conflicts between users and objects?
Is the browsing function clearly shown?
Is the forward and backward navigation obvious to users?
Can the user go back to the home page from anywhere in the site?
Can the application support different browsers?
Does the website support users who do not want to download graphics?
Is the information accurate and up-to-date?
Are contact information and telephone numbers always available?
Are all links workable?
Have dead-end and broken links been taken care of?
Is the menu easy to navigate?
Can you print from the page?
Is the text readable?
Is the dialogue box clearly defined?
What are the main motives of the website?
Is it easy to determine whether specific information is available/not available?
Does the website have browsing facilities?

ASSESSING HIERARCHICAL STRUCTURE

Does the website have browsing facilities?
Identifying the hierarchical structure
What are the activities of the different users?
For each activity, what are the actions that need to be done to achieve the activity? Identify these actions.
Are all target actions actually supported?
Is there any functionality of the system that is not actually used. If yes, which actions were intended to be supported with this functionality? How does the user perform these actions?
Are there actions, other than target actions, that are not supported, but users obviously need such support?
Are there conflicts between different goals of the users? If yes, what are the rules and procedures for resolving these conflicts?
What are the limitations of the current website?
Is it necessary for the user to constantly switch between different actions or activities? If yes, are there emergency exits that support painless transition between actions and activities and if necessary, returning to previous states, actions or activities?
Are there conflicts between activities/actions/operations?

INTERNALISATION/ EXTERNALISATION

What kinds of internalisation and externalisation must the website support?
Does the website teach the user something? If so, what?
Do users cooperate/communicate via the website?
What are the actions that users can learn to automate?
How long do users have to learn to use the website?
Are short cuts available to experienced users?
Are help facilities available?
Is the whole action life-cycle from goal setting to the final outcome supported?
Does the system help to avoid unnecessary learning?
Is the structure of the website logical?
Is the language of the website understandable by the user?
Are the icons appropriate for the task?
Does the design map well with the Psychology of Everyday Things?
Does the interface conform to visible constraints?
Is externally distributed knowledge easily accessible when necessary?
Does the website facilitate help in selecting their goals and evaluating actions?
Does the website help when the user faces problems and requires help?
Are clues provided to users to help them perform their tasks?
Are the error messages clear to the users?
Is the feedback appropriate to the users?
Are the language/expression appropriate to the users?
Are appropriate icons or metaphors used?
Is affordance built into the task?
Are visible constraints built in?
Has appropriate mapping been used for the task?
Is the culture of the users taken care of?
Is the website to learn?
Does the website design for the conceptual models of the users?

MEDIATION

What kind of mediation does the website support: System, tool and/or medium? What consequences does this have?
What tools are used in this activity? How readily available are these tools? e.g. browser, add-on tools, keyboard, mouse, other software, manuals, online documentation?
Does the website support plug-ins, applets, video, sound frames?
Is broadband technology available to the users?
Are graphic files used and can they be downloaded fast?

Does the website cater for colour-blind people? Can the website work with different devices   - laptops, hand-held devices, mobile phones? Is adequate security provided for the web site? Are there alternative facilities provided for, such as auditory and visual content? Are appropriate style-sheets used? Is the website text-based only? Does the website work with various browsers? Does the website cater for different languages? Does the website have search facilities? Does the website cater for slow connection modems?
DEVELOPMENT
What are the consequences of implementation of the website? Did expected benefits actually take place? Did users have enough experience with the system website at the time of evaluation? Does the website require a large investment of time and effort in learning how to use it? Are users' attitudes toward the website positive? Are there any negative or positive side effects associated with the use of the website? Is the updated website apparent to the user? Are all the links monitored to check there are no broken links? Is the website up-to-date with its content?

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