

Acting Accessibility: Scenario-based consideration of Web content accessibility for development and publishing communities

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1 ABSTRACT

Conflict resolution of the ethical aspects of accessibility issues for Web communities can be facilitated by the judicious use of scenarios. Carefully designed scenarios permit real and perceived conflicts to be explored in safe, no-consequence environments. Building on research into scenario use and Actor Network Theory, the Doing Ethics Technique is extended to better cater for the micro and macro-political power negotiations that take place in real life content development situations.

1.1 Categories and Subject Descriptors

K3. [Computers and Education]: K.3.2 Computer and Information Science Education

K.4 [Computers and Society]: K.4.1 Public Policy Issues
K.4.2 Social Issues - design, human factors, legal aspects

1.2 General Terms

Ethics, accessibility awareness, scenario, role-play, actor.

2 INTRODUCTION

Previous work in scenario design, role-play, instructional use of Use-Cases, and Actor-Network Theory, can be extended to help many involved in the development of Web content to explore issues to do with accessibility in a timely fashion.

Web content accessibility, the topic of the work for which this paper is written in support, is defined initially by the authors according to the World Wide Web Consortium Web Content Accessibility Guidelines [1]. This 'accessibility', although not concerned with the lack of access due to lack of telecommunications or economic infrastructure, is concerned with the ability to transform vital content usually accessed via the Web into modalities for which users have available senses at the time of access. This generalises to mean transforming it for the range of access devices. It is critical to the ability of a large number of people with disabilities access to Web content. It is also, as recommended by W3C, a form of device-independence work, as it is relevant, in fact, to all Web users with alternative access devices, including telephones, hand-held and networked products.

Web content accessibility, as a topic and as a practice, is wide-ranging, with many varied and, at times, conflicting considerations. Some conflicts are local to a community, such as when there are, within the same community, participants who have a need for visually instructive diagrams because of cognitive impairments and others who have visual impairments that require limited use of diagrams. Other conflicts affect Web communities that cross borders, as is the case with legal compliance that demands content is made accessible to people in different ways. What is legally required in one country differs from the legal requirements in some other countries. There is also conflict between the guidelines and standards legally required of developers and publishers and what is known, in practice, to make content more accessible and useable.

Richly scripted scenarios can be used instructively to help all stakeholders (developers, policy makers, management and community members generally) explore the various issues pertinent to the problem and their development practices.

Scenarios have been used instructively in many different situations. They have frequently been employed to illustrate ethical principles and particularly conflicts and priorities among those principles. For instance, Anderson et al. [2] employ scenarios to explore the application of a new code of ethics in different professional settings. Clement [3], in writing up experiences in a Computer-Supported Cooperative Work workshop, found that discussing scenarios was a productive means of exploring privacy issues. Similarly, Burmeister [4] used case studies to illustrate the application of the Australian Computer Society (ACS) Code of Ethics to professional practice. Nevile, as a law lecturer, used hypothetical cases and later moot courts to provide students with simulated real-life problem-solving experiences.

In the 1990's, Nevile was responsible for a university project [5] designed to raise the critical awareness of university staff to the potential and relevant issues in ubiquitous computing. She employed, among others, professional actors to promote role-playing to achieve active engagement with the issues, opportunities and stakeholders' interests in mass use of notebook computers.

More recently, Simpson, Nevile and Burmeister [6] have employed a 'Doing Ethics Technique' to help people, both individually and in groups, to work through scenarios to discover for themselves, pertinent ethical issues therein. The technique promotes constructivist learning and the active engagement precludes the need for philosophical training to tease out abstract moral (ethical) issues in a given situation. Another approach to scenario design, which has had mixed results, is that of Liffick [7]. One of the approaches he took was to describe a scenario in terms of the stakeholders that

could be identified. This approach is similar to that of the Actor Network Theory (ANT), which seeks to simplify complex models by involving actors in a situation, in heterogeneous entities (Robinson, 2002 [8]). The ANT and Liffick approaches recognise the importance of identifying the actors ('participants' or 'stakeholders' in Liffick's terms) and the roles they play in the context.

It is noteworthy that in ANT, actors may include non-human actors. In the case of accessibility of Web content, there are many non-human actors. Unlike Liffick's approach to scenario analysis, the 'network' part of ANT encourages one to think about the interconnectedness of actors; an important consideration in making Web content accessible. When considering the networking issues, ANT encourages exploration of the politics (gauging the strength and power) of influences exerted by some actors over others, in the decision-making process. Associated with this is the idea that actors are not independent of each other and that political power involves political alliances between actors.

In the case of Web content accessibility, there are non-human actors such as legal requirements, economic pressures, and significantly, continuously changing technologies that not only require continuous retraining of developers but, given the way the requirements are usually framed, actually change the requirements.

This paper explores the extension of the Doing Ethics Technique to involve role-play, in which actors assume the roles of major stakeholders identifiable within a scenario. The Doing Ethics Technique as espoused by Simpson, Nevile and Burmeister can be a *passive, locally safe* approach to scenario exploration. It is possible for participants to engage or withhold emotional involvement while approaching the topics somewhat intellectually, in class or group discussion, or in writing. Instead, what is reported here is an extension of that technique to make the process *active*, by having participants interact in a 'holistic way', conversing and negotiating in assumed roles.

2.1 'Just in case' accessibility awareness

Web content accessibility is most likely to be achieved only when content is prepared with: strict adherence to the separation of content from its presentation; the use of valid formatting code; the provision of alternative modal forms of all content, useability of the page, for all devices, not just the most popular PC browsers, and a lot more. Because Web content accessibility was not considered when the first formatting practices were developed, there are legacy practices that are not conducive to accessibility. In addition, developing alternative modalities of established content, as in making separate audio and text files for video or interactive content, can take considerable time. In such circumstances, it has proven very difficult to repair inaccessible content although it is significantly less difficult to produce it *ab initio*. A major principle then, for Web content development is to act 'just in case' rather than 'just in time'.

As always, adding to the development workload is neither popular nor without cost. It is, however, essential in the case of Web content development that accessibility is built into the development process from the beginning. It has been found that it is not even just a matter of ensuring that before publication, content is made accessible. If accessibility has not been planned for, the content usually is not accessible and the

repair burden is prohibitive in effort, time and cost.

Why design and explore scenarios for raising awareness about accessibility requirements? Why not just wait until one is confronted with a dilemma in the workplace and then deal with it as best one can? There are several reasons. In general terms, there is the advantage of using scenarios to explore situations ahead of time, while one can engage without financial or work-time risk in the discussion, without subjective involvement in a critical situation. More specifically, in the accessibility context, scenarios help to strengthen one's knowledge in preparation for 'just in case' attention to accessibility.

Considering accessibility, there are many factors that should be taken into account, as is seen in the discussion following the sample scenario below. Similarly, in other contexts, scenarios can be employed to explore one's knowledge of a particular domain. By asking people what they would do in a particular situation, one can readily identify the limits of that person's knowledge, so the technique may be used for assessing others' competence.

In the case of accessibility, as with useability, it is not, however, a purely rational problem that is to be considered. What is objective and rational is, more and more, being done by machines. Guidelines and applications that can be handled by machines are being built into content authoring, browsing and repair tools. But much of what is required for the accessibility of Web content is related to the context in which the content is located, the purpose for which it is needed and the kind of content. In practice, useability testing often identifies conflicts between accessibility standards compliant content and useable, and therefore accessible, content. User perceptions are often at play here.

To enrich the educational potential of scenario analysis, scenarios should be neither self-evident nor simple. Instead, there should be ambiguities that require reflection, leading participants to develop what is not always a single 'right' solution but rather more towards a solution that is satisfactory. Involving others in the activity of reflection also is useful as it often yields alternate and, as shown by Simpson et al [6], sometimes better solutions than those suggested by the original participants in the discussion. The Doing Ethics Technique could be done individually, whereas what is reported in this paper is an *active* scenario analysis technique that involves multiple people through group role-play.

Recognition of the pedagogic value of role-play is not new. Role-playing has been used widely for many years in as diverse areas as working with pre-service early childhood classroom teachers and corporate leaders in cross-cultural business situations. Dalton [9] advocates the use of role-play in early school teacher education. Her work with children showed that this was an effective technique whether it involved only two willing actors or a large group with many children willing to take on roles. Dalton's work showed that it is important to have only one actor speaking at a time. She advocates that the facilitator ('teacher' in Dalton's terms) manages the interaction. Turns are taken, with listeners becoming talkers and talkers becoming listeners.

Dalton also advocated that teachers use a questioning technique, giving multiple examples appropriate to classroom settings. In terms of this paper, the facilitator should use the questions of the Doing Ethics Technique to guide actors through the process to derive the best possible solution to the problem at hand. Another useful observation from Dalton is

that in larger group settings, it is helpful to take breaks from the role play and have the whole audience, including all actors, brainstorm about questions currently being considered. Again, doing this has been shown to help invigorate the Doing Ethics Technique.

It is important to recognise that scenarios are also an effective tool in cross-cultural business training. This is exemplified by the Centre for Asian Business Cases [10] which supplies Asian-context based business case studies around the world, through Harvard Business School Publishing and the European Case Clearing House. One reason for their popularity is that cases set in western democracies cannot be used to teach about the intricacies of dealing with the Asian governments. Through their international networks, trainers have found that the case method is one of the most effective teaching methods used in Business Schools around the world. This seems to be because carefully designed cases are relevant to the every day needs of business. For developers learning about accessibility, being able to relate this learning immediately and directly to their real-world practice has proved useful in the same way.

A significant outcome of role-playing of scenarios can be to raise awareness of issues and tensions or conflicts. For instance, with little re-working, the case study below could be phrased so accessibility issues are inconspicuous. Then, in an audience of Web designers, discussion can be used to raise awareness of the need for accessibility considerations, through simple 'what if' additions ... What if a user was visually impaired? What if a deaf person tried to access the video clip? Scenarios are useful for testing accessibility knowledge; one's own knowledge and that of others as well as that of system and content design. Why might this be done? It could be useful in a job interview to determine the true extent of an applicant's accessibility knowledge. It could also be useful for training exercises, such as for training content developers. Similarly, scenarios are useful for teaching accessibility in more general contexts. They can be used for raising awareness amongst management and policy makers.

3 'DOING ETHICS TECHNIQUE'

The Doing Ethics Technique involves asking six simple questions, particularly in the following order:

1. What is going on? What are the facts?
2. What are the accessibility issues?
3. Who is affected?
4. What are the ethical issues and implications?
5. What can be done about it? What options are there?
6. Which option is best? Why?

3.1 Q6 Which option is best? Why?

Non-core extensions include asking, for example, how the context (work culture and or natural) is affected by extending the third question (Who is affected?). Similarly, Question 5 can be extended to include:

- What would be 'the right thing' to do?
- Who/what suffers if you do not do the right thing?
- What additional costs will be incurred if you do the right thing?
- What indirect benefits might accrue from doing the right thing?

A further extension is a sub-question for Question 6, namely, Who gains if you do the right thing? This is particularly useful

in the role-play activation of the Technique, as reported in this paper.

Finally, Simpson et al [6] suggest multi-disciplinary extensions that ask:

- What does the law say?
- What chance is there it will be enforced?

Liffick (1995) [7] described his technique for scenario analysis as analogous to the programming methodology known as top-down analysis or step-wise refinement. That is, taking a large problem and breaking it into successively smaller and thereby easier to solve problems. Liffick also describes this as an initial process of decomposition, followed eventually by a process of composition, in which the smaller pieces are recombined in an appropriate order. That is, the final solution is constructed through a careful recombination of solutions to the smaller problems. The Doing Ethics Technique described above follows a similar methodology. This paper effectively suggests further development of the methodology, following the constructivist pedagogy, encouraging participants to construct an appropriate solution for their situation .

3.2 Acting Accessibility: extending the technique

Question 3 needs to be extended in 2 ways. First, following Liffick's (1995) [7] first step in scenario analysis, "List Participants and Their Actions", the primary, secondary and implied participants need to be identified. Secondly, the extension Simpson et al [6] suggest that includes the environment as part of Question 3, should be combined with the ANT focus on the Actor Network in terms of the corporate culture or organisation. In that case, actors do not analyse a scenario independently and there are political and personality factors that influence the decision-making process and role-playing.

Further, the order of the questions is changed, in particular the order of Questions 2 and 3. This is not to make it easier for the participants but rather to increase the benefit of having multiple roles at play: everyone in the audience can participate in the first step (Q1) of identifying what is going on. Then actors can be chosen for the roles that have been identified by asking Who is affected? Q2 (formerly Q3)

The reason the question 'What are the issues?' has been moved to third place is that it is a question dependent, at least to some extent, on who is asking it. One actor's role will require greater attention to particular aspects than another's. In fact, the same issue will attract different solutions, depending on the viewpoint of the actor. In a Web development community, a single issue such as whether all tables should be linearised, will be understood differently, depending on whether the actor is a policy maker, a developer, a commissioning agent or a community member with vision-impairment.

4 SCENARIO DESIGN

The design of scenarios, such as the example below, follow the design advocated for the Doing Ethics Technique (2002) [6]. In addition, the consideration of actor issues means one needs to consider the way in which the scenario analysis will be conducted. When training is about accessibility issues, the facilitator may need to choose between having a single group of actors and a wider audience, or small groups, so that each person gets to play the role of one of the actors in the

scenario. Both methods are possible but require organisation. In terms of scenario design, it is helpful if the scenario engages actors with conflicting interests. This encourages active interplay by the audience and other actors. Without this, the exercise is likely to be less enjoyable for participants and also less realistic. Ethical conflicts, financial pressures, available skills, cross-border legalities, interpersonal power politics and more are experienced in real development and make for better learning issues in role-play. Lastly, scenarios should not be totally hypothetical or absurd. The more realistic the case being examined, the more easily the facilitator can obtain 'buy-in' from participants. The following scenario was based on a real situation, with only minor changes made to safe-guard the confidentiality of people involved.

4.1 Case Study

The following scenario with the role-play as described below, was part of the assessment of a final year undergraduate subject at an Australian University. It involved 132 students, the majority of whom had, as part of their courses, completed at least one period of industry-based learning of 6 months or more.

4.2 A typical scenario: ensuring the health of Scottish feet

Think of a location about as far away as you can. Imagine you are in Australia and then the far away location might be the outer islands of Scotland. Now try to prepare an in-service, professional development course for people who are choosing to upgrade their knowledge, and who will not be able to communicate with you about the course on which they are about to embark - or when they are engaged in it. Imagine that such a course does not have to certify the competence of the participants as it is for them to work through if they wish. But the course does need to provide suitable opportunities for participants to determine if they have learned their work properly. (Incidentally, participants can print up a certificate of their choice on completion of the course!)

Now, developing such a course [11] assumes that the connectivity is not always good, so it is a good idea to make 'heavy' files available on DVD or CD. It is also good to anticipate the need for participants to interact with others in the course, so it is good to have a chat facility. How accessible should all this be? What sort of multimedia resources might be useful and should they be accessible? Does it make sense to make Braille-accessible resources for people who are blind, given that we do not expect them to be able to do all the clinical tasks that the course teaches?

At this point the students were asked to analyse the case. They began brainstorming together about the first step in the questioning process of the Doing Ethics Technique.

4.2.1 Q1: What are the facts?

Some of the facts about this situation that participants came up with include:

- A self-contained Web-based course on podiatry care is to be developed.
- Need to explore cultural and legal issues that may exist in Scotland, where the course is delivered, as opposed to Australia, where the course is being developed.

- Heavy files may need to go on DVDs or CDs.
- DVDs and CDs need to be created and delivered to participants in a timely fashion.
- Multimedia on DVD, CD and the Web needs to be accessible.
- Alternative content may need to be created for the visually impaired.
- Visually impaired people probably do not study podiatry.
- The overall level of accessibility required needs to be determined.
- Chat facilities are probably needed.
- What about on-line white boards so course participants can help each other?
- Are on-line whiteboards accessible to everyone?
- Pedagogical decisions need to be made concerning the best instructional approaches to take in the circumstances.

The next step was to identify the scenario participants. In a facilitated session, categories had been chosen tentatively by the facilitator but the process, as for the first step, called for the students to brainstorm about who they thought the actors might be. In this process, the aim was to identify human and non-human actors, and whether they were primary, secondary or implied.

4.2.2 Q:2 Who is affected?

Participants in the role-play for this scenario were found to include:

- The educational institution's administrator.
- A potential student.
- Someone who is not getting very good treatment for a foot problem.
- The podiatrist responsible for the content of the course.
- The funding agency's representative.

Next, people from the audience were chosen from the audience to become the actors, playing all of the above roles and some others identified by the audience.

At this point the skills of the facilitator were exercised, as each actor in turn was encouraged to consider the next question, while the others listened. Following Dalton [9], who advised the facilitator to periodically stop the actors in order to involve the audience and actors in a brainstorm, our experience also found that benefits resulted from waiting, before moving on to the next question, for a brainstorming interlude. The facilitator encouraged each actor to consider *What are the accessibility issues?* (Q3) and then paused the process to involve the wider audience in considering other aspects of the question, before moving on to Q4, *What are the ethical issues and implications?* and successive questions in the Doing Ethics Technique.

In this case, the 'Superintendent of Podiatry' may have been involved in an accident that has resulted in a vision impairment that prevents her from continuing her practice of podiatry. Clearly, she wants to be up-to-dated in her disciplinary knowledge, so participating in practice up-date courses is of particular interest to her. Planning for her podiatrist service not only involves scheduling the podiatrists, but making decisions about future developments for the service.

Balanced against the Superintendent's need for a course that is accessible to those with visual impairments are the interests of the developer. Videos of the different types of feet and how

they may respond to particular treatments are readily available and the production of more is not a problem. But every video will need to be captioned and this requires good writing and editing skills and the use of new technologies to make the captions operating system independent - or does it? It will also require someone synchronising the captions with the video and someone determining when a user may want to use these captions and needs to be notified of their existence and told how to switch them on.

The course designer does not usually work on the infrastructure that will use the metadata or catalogue records of resources and course components to ensure they come together in appropriate ways for a particular user. Whether or not the course can respond to such user differences requires, of course, a major decision to be made and it may have cost implications. Interestingly, it is often a detailed description of potential users and their purposes that enriches the scenario and simultaneously draws attention to aspects of accessibility work that make it both difficult and satisfying. The opportunity to think of the difficulties, costs and resource demands and those who will benefit, informs participants in ways that tend to be remembered better than a list of dos and don'ts. (This is not surprising, of course. The legal world has depended for centuries on precedents and anyone who has been involved in legal reasoning is familiar with the power of the details to support the constant awareness of the legal aspects of the precedent.)

4.3 Case study outcomes

At the conclusion of the session, students were surveyed concerning the use of the teaching technique. The data collected were made available to all students in the course. They were required to write up a formal reflection on the scenario and were encouraged to use the survey data about the audience participation to help them understand why the audience reacted as they did.

A descriptive, preliminary analysis of the survey data revealed the following. Of the 105 students in the course, approximately 80 attended this session, of whom 44 completed the questionnaire. In terms of the 6 questions of the AAT, students were asked to consider how helpful was the active approach of this technique in identifying the pertinent issues in this case study. Relating to question 1 "I was able to identify many of the facts in the case" 72.7% either agreed or definitely agreed. [For this and subsequent discussion, the facilitator listed responses by stakeholders and the audience on a whiteboard. Before moving on to the next question, he supplied his own list on an overhead projector screen.] Relating to question 2 "I was able to identify many of the people affected in the case" 68.2% either agreed or definitely agreed. Relating to question 3 "I was able to identify many of the accessibility issues in the case" 63.6% either agreed or definitely agreed. Relating to question 4 "I was able to identify many of the ethical issues in the case" 40.9% either agreed or definitely agreed. Also relating to question 4 "Having people act the stakeholder roles helped me identify the ethical implications" 61.4% either agreed or definitely agreed. The relatively low percentage for identifying ethical issues individually versus the role-play, appears to support the view that active scenario analysis benefits participants in thinking through the implications of the scenario.

4.4 Use-cases and role-playing

Use-cases are formal representations of requirements used in the software engineering process. The relationship between the use-cases that may be required by the developers of the course and the scenario that might be used by the actors is obvious. Full consideration of the circumstances in which the software and content may need to function is a step in the ideal process of development. It is not, however, one always taken by Web developers. This is probably because they do not know either the value of such an exercise, or the value of the use-case process.

In activities of the IMS Global Project [12], the W3C Authoring Tools Accessibility Working Group [13], and INCITS V2, Neville has been working extensively with the use-case approach. It provides a most effective process for teasing out the details that often make the difference between success and other results in the design of software. Extending the use-case activity to include role-playing helps the use-case specification process.

The difficulty for many working with use-cases is recognising the difference between the use-case as a product and the use-case process. Working through the use-case in detail as a process has been shown time and again to be more than worth the time it takes. Experience in these contexts has been a significant factor in the development of scenarios for raising awareness of the need for consideration of accessibility issues, as reported in this paper.

The similarity between use-case modelling and the scenario role-playing reported in this paper is such that a collection of good use-cases can provide a good supply of scenarios. Use-cases tend to start with scenarios and increasingly these are being shared in the Web standards world. This is similar to what happens to business scenarios in the Asian-Context business world [10] model. Indeed, the author has found that despite differences in the aspects of accessibility of interest to the three groups in which she is engaged (authoring tools, educational management systems and persistent computing and accessible devices), descriptions of users are interchangeable and welcomed and used by all equally.

The difference between use-case modelling and the Acting Accessibility Technique reported here is that the participants in the process are different. It is possible to think of the use-case modelling process being extended to the general context, as it is used in the Acting Accessibility context, for use with all sorts of people, not just for technical specifications.

5 CONCLUSIONS

The study of ethics can be described as the study of relationships. In the end, the practices adopted for improving the accessibility of Web content depend upon the relationships between the actors in the real situation. It seems inadequate then to have a technique for doing ethics that does not give sufficient attention to the interplay between actors in a given situation.

When confronted with a dilemma, an individual is well served by the Doing Ethics Technique. But when the situation involves multiple people, as in a training situation, the passivity of the technique may be a pedagogical drawback, especially when the possibly conflicting viewpoints of multiple stakeholders are not taken into account. From a pedagogical viewpoint, audience learning follows a constructivist paradigm. The actor participating in the role-play and the

audience tend to construct different solutions, and there can be lively sessions when all present arguments and have to choose the one that best fits the situation.

As with ANT, scenario analysis as described here involves the use of real life problems to illustrate ways to solve dilemma one can be confronted with. Often there is no single 'right' solution. There are approaches to resolving issues however, which are likely to yield good solutions. The Doing Ethics Technique is one such approach. The extensions advocated in this paper refine that technique, enhancing its potential for even better solutions.

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