Information and Communication Technologies

3 Issues Surrounding Standardization and Promotion of Web Accessibility

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If anyone can access a piece of information, we say that the information is "accessible." In the case of website information, this quality is referred to as "web accessibility." When the Great East Japan Earthquake occurred on March 11, 2011, some websites providing public information were not accessible, and there were many cases where web accessibility was not given sufficient consideration.

In order for various individuals to be able to use the web not only during a crisis but also for everyday life, the Japanese Industrial Standard (JIS) X 8341-3, "Guidelines for older persons and persons with disabilities - Information and communications equipment, software and services - Part 3: Web Content" was published to establish unified technical specifications. The JIS has three characteristics: 1) a grading system was adopted to establish three conformance levels, and so, for example, level A conformance must conform to 25 success criteria; 2) the success criteria are, in principle, testable, and 3) the success criteria are described without referring to specific technology.

In recent years, countries around the world have been active in promoting web accessibility. In Japan, the Web Accessibility Infrastructure Committee (WAIC) has published "Accessibility Supported User Agent Information," "Test Guidelines," and other related documents. A "Public Site Management Model" was also provided to the central, prefectural, and municipal governments to encourage them to improve web accessibility in a systematic and continuous manner. In addition, the Japan Web Accessibility Consortium was established in April 2010 and it began working to improve the accessibility of both public and private websites.

In the United Kingdom, "Web Accessibility - Code of Practice" was published to bring together matters that needed to be managed systematically, and the Accessibility Maturity Model was also proposed. Organizations can use the model to self-assess the accessibility performance of their information and communications systems, products, and services.

Website providers need to further heighten their awareness of accessibility on a regular basis.

(Original Japanese version: published in May 2011)

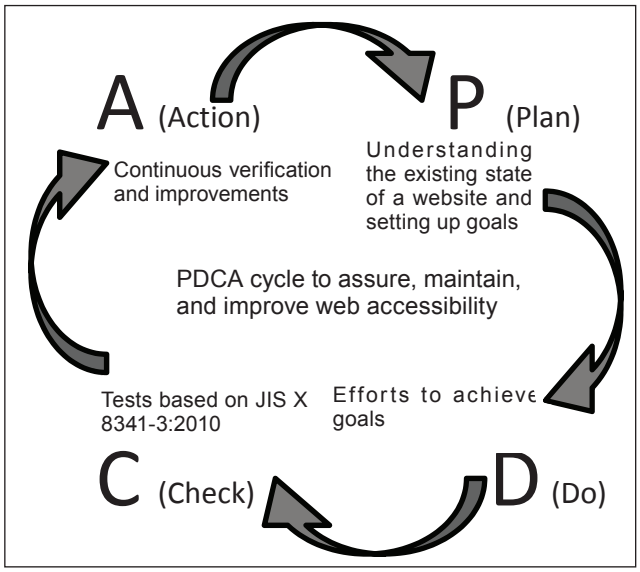

Figure : PDCA cycle recommended by the Public Site Management Model
Taken from the Public Site Management Model

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Issues Surrounding Standardization and Promotion of Web Accessibility

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1 Introduction

With the advancement of an information society, there has been an increasing need for people to be able to access information. If anyone can access a piece of information, we say that the information is "accessible." In the case of website information, this quality is referred to as "web accessibility."

Web accessibility is typically targeted at elderly and disabled. However, it is not limited to these people. Smart phones are popular, but the small screens make them hard to use, even for young people without disabilities. In some cases, images on information terminals are not comprehensible without captions. Market evaluation of eBook readers is affected by the adjustability of text size on the screen. These examples suggest that web accessibility is not only for the elderly and the disabled, but that it is a factor in whether web technology-based equipment and services will be accepted in the market.

Countless organizations and individuals provide web technology-based content (hereinafter referred to as web content). There are also many kinds of web browsers to access web content. In addition, there are people who cannot see web content for various reasons and who use screen reader software to understand the content. Browsers and screen reader software are collectively called user agents.

If web content providers and user agent providers were to start using different technical specifications to respond to web accessibility, many users, including elderly and disabled users, would only be confused. Therefore, it would be desirable to establish a standard for web accessibility. In other words, the first step to promote web accessibility is to determine this standard.

This article introduces trends in standardization and activities to promote web accessibility.

2 The Great East Japan Earthquake and Web Accessibility

The Great East Japan Earthquake occurred on March 11, 2011, and part of the Tohoku and Kanto regions were considerably affected. Public transportation was immediately disrupted, and since many power plants stopped working, planned power outages were conducted in many areas throughout the Kanto region.

Television and radio stations continued to provide special programs on the earthquake for more than a week. However, there was so much news to report that, in many cases, newscasters just announced that viewers and listeners should visit each company's website for detailed information, such as updates on public transportation and planned power outages.

Were people then able to access detailed information on each company's website? Could the browsers be used to expand text on the screens of those who had difficulty reading small characters? Was screen reader software working for those who were not able to acquire visual information? Were captions available for people who were not able to acquire audio information? The following section introduces some actual cases where problems were seen.

2-1 Case 1: Non-adjustable Text Sizes

On March 23, 2011, two weeks after the earthquake, I looked at how companies were providing earthquake-related information on their websites. In many cases, web accessibility was not given sufficient consideration. Figure 1 illustrates one such case.

Using Internet Explorer 7, I maximized and minimized the text setting on the website in Figure 1, but the size did not change at all. This is a typical scenario, where consideration is not given to web accessibility for those who have difficulty using small screens or reading small characters, including elderly users.

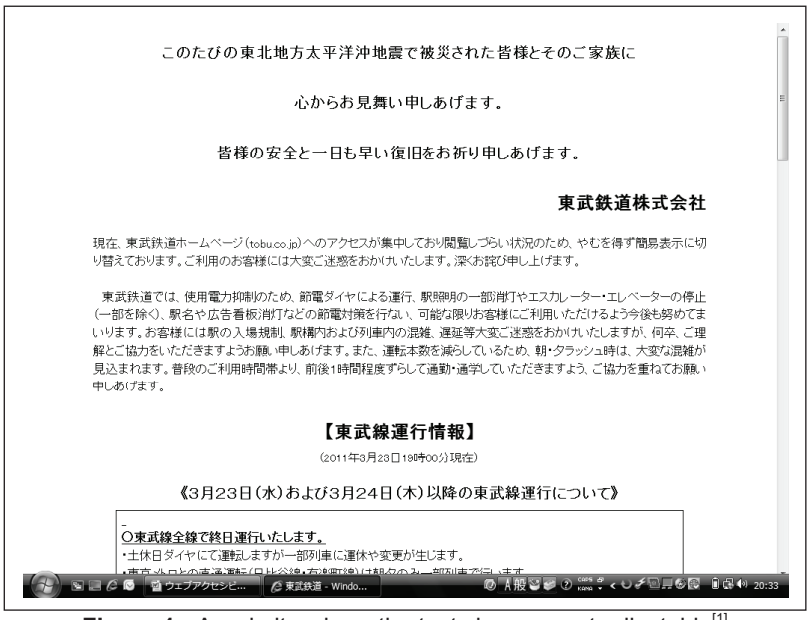

Figure 1: A website where the text size was not adjustable[1]

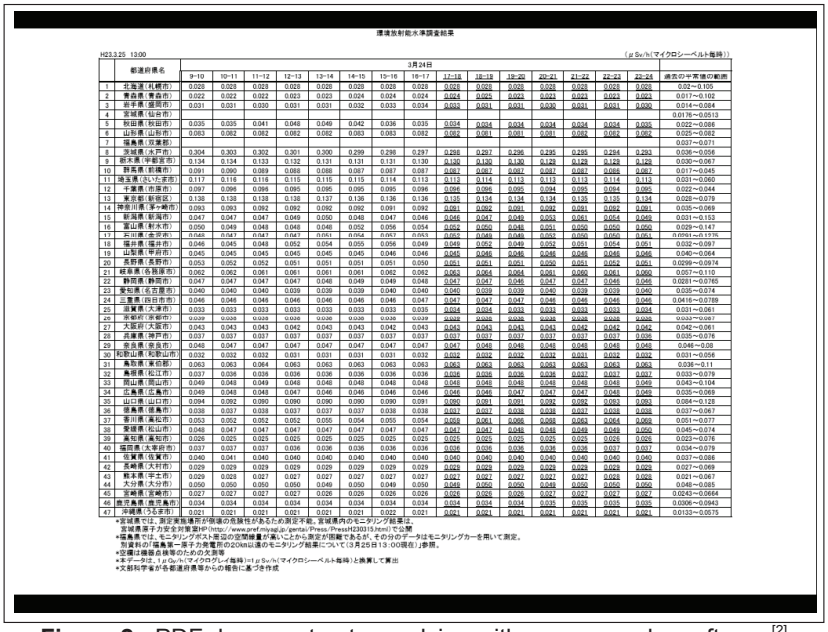

Figure 2: PDF document not complying with screen reader software[2]

2-2 Case 2: Website Not Responding to Screen Reader Software

Documents on websites often employ Portable Document Format (PDF). However, if a PDF is just a scanned paper document, it does not contain text information and thus screen reading is not possible. However, as illustrated in the example below, there were cases where screen reader software did not work even though PDF documents contained text information.

The great earthquake caused accidents at a nuclear power plant in Fukushima prefecture, and many people were interested in learning about radioactivity. As such, the Ministry of Education, Culture, Sports, Science and Technology began releasing daily readings of environmental radioactivity levels by prefecture. Figure 2 illustrates the PDF document for readings. PC Talker Vista Ver.1.24 (screen reader software) read the beginning of the document as follows.

"Reading of environmental radioactivity level by prefecture, micro sievert per hour, nine, minus, ten, ten, minus, eleven, eleven, minus, twelve, twelve, …… usual value, one, 0.028, 0.028, 0.028, 0.028 ……"

"Nine, minus, ten" actually meant nine to ten o'clock. However, it was not explained that the readings were hourly results, and there was no text information for "o'clock," and so only numbers and minuses were

repeated audibly but incomprehensibly.

In addition, the "one" read after "usual value" meant the first observation site, located in Sapporo city in Hokkaido. The text "Sapporo city in Hokkaido" was on the PDF file, but the screen reader software skipped it for some reason. Therefore, for someone who could only listen to the information, it was not clear which observation site the document was referring to.

Next, the software read hourly readings, but it just kept reading numbers like "0.028." So it was difficult to understand important information, such as when the readings increased or decreased.

To solve these issues, it is necessary to read information in a manner that relates the heading (nine to ten o'clock) and the numbers like 0.028. As such, the reading of environmental radioactivity level by prefecture was hardly compliant with screen reader software.

2-3 Case 3: Partial Consideration of Web Accessibility

Almost every day, the Chief Cabinet Secretary had two press conferences per day to explain the government's response to the great earthquake. Videos of the press conferences have been stored on the Office of the Prime Minister's website, and anybody can watch the videos.

Figure 3 illustrates an image from the videos. A sign language interpreter can be seen on the left of the Secretary, and so the Secretary's speech can be understood in sign language. In addition, captions were added under the video screen.

It seems that the video gives full consideration to those who cannot acquire audio information. However, the question and answer session after the Secretary's initial speech is not captioned. Media reporters do not have microphones close by, so it is extremely difficult to hear their questions even for people without disabilities. There is also text information for the conferences, but it is limited to the Secretary's initial speech and does not include the questions and answers.

Except for those who are able to see and understand the sign language interpretation during the question and answer session, it is hard for viewers to fully understand the press conference.

In this case, it was necessary to provide captions during the question and answer session for both persons with hearing disabilities and those without. This case clearly exemplifies that web accessibility is not only for the elderly and the disabled.

At times like this great earthquake, in particular, websites providing public information play an important role, but web accessibility has not yet been given appropriate consideration.

In addition to the aforementioned cases, there were also many cases where only visual information was provided.

Figure 3: Insufficient captions[3]

3 History of Web Accessibility Standardization in Japan

What needs to be done so that web accessibility is given consideration not only at times of crisis but also on a daily basis?

In Japan, the Japanese Industrial Standard (JIS) X 8341-3, "Guidelines for older persons and persons with disabilities - Information and communications equipment, software and services - Part 3: Web Content[4]" was published and has been used to this end.

3-1 JIS 2004 Version

JIS X 8341-3 was first published in 2004.

Those who plan and design web content should expect to have a wide variety of users with different needs, making the website accessible for different types of individuals, including elderly and disabled people. JIS X 8341-3 was published to provide a desirable technical standard for web content.

W3C (World Wide Web Consortium) plays a key role in the international standardization of web content. W3C includes WAI (Web Accessibility Initiative).[5] WAI released Web Content Accessibility Guidelines (WCAG) 1.0 in 1999. During the process of making JIS X 8341-3, the basic principle was to use WCAG1.0 as a baseline document. Additional technical specifications were also included to deal with unique situations in Japan. JIS X 8341-3 also conformed to JIS X 8341-1, "Guideline for older persons and persons with disabilities - Information and communications equipment, software and services - Part1: Common Guidelines," which was drawn up at the same time.[6] Accordingly, JIS X 8341-3 was finalized.

Incidentally, JIS X 8341-1 specifies accessibility technical specifications applicable to all information and communications equipment, software, and services. JIS X 8341-1 is, so to speak, the parent standard. Based on JIS X 8341-1, offshoot accessibility standards were created (8341-2: Information Processing Equipment; 8341-4: Telecommunications Equipment; 8341-5: Office Equipment).

JIS X 8341-3 was created as part 3 of the JIS X 8341 series.

3-2 Japan's Contribution to International Standardization

After completing WCAG1.0 as the international standard, WAI at W3C began revising it to reflect rapidly advancing web technology. In response, Japanese experts began participating in WAI's work in around 2004.

One example of the technical specifications proposed by the Japanese experts was related to a technical specification surrounding a particularly prominent issue in Japan. Table 1 illustrates the case.

In Japanese, the same combination of kanji characters can mean different things depending on the pronunciation. For example, "今 日" means "today" when pronounced as kyô, but the same characters mean "nowadays" when pronounced as konnichi. Similarly, "三 田" can refer to either "Mita" city in Tokyo or "Sanda" city in Hyogo. In these cases, if pronunciations are not added in web content, it is possible that screen reader software will not pronounce the words correctly. It is not a big issue if the pronunciations are not visible to users reading visual text, but if screen reader software mispronounces these words, the words can have totally different meanings. Thus, JIS X 8341-3 proposes a technical specification: "… the pronunciation must be specified at the first appearance of the word." In fact, there are similar cases in other languages, too. For example, the English word "read" is pronounced differently depending on whether it is the present or past tense. As such, Japan's proposal was accepted, and WCAG2.0 added a technical specification: "a mechanism should be available for identifying the specific pronunciation of words…"

The discussion over WCAG2.0 faced difficulty, but it was finalized and officially released as the international standard in 2008.[7]

Table 1: Technical specification proposed by Japan for the international standard WCAG2.0

JIS X 8341-3 (2004)	Extensible use of words that may be difficult for the intended user to read (such as proper nouns) should be avoided. When such words are used, the pronunciation must be specified at the first appearance of the word.
WCAG2.0	A mechanism is available for identifying specific pronunciation of words where meaning of the words, in context, is ambiguous without knowing the pronunciation.

Taken from JIS X 8341-3

3-3 Revision of JIS X 8341-3

JIS standards are supposed to be revised every five years. So JIS X 8341-3 (published in 2004) needed to be revised in 2009. Accordingly, the revision work began.

The principle for the revision was to first conform to WCAG2.0. Web content can transcend national borders, and therefore, it is beneficial to have standards that are consistent with each other.

After it was published in 2004, JIS X8341-1 was proposed to ISO (International Organization for Standardization). Taking into consideration the opinions of experts from around the world, ISO 9241-20 "Ergonomics of human-system interaction - Part 20: Accessibility guidelines for information/ communications technology (ICT) equipment and services" was published in 2008.[8] JIS X 8341-1 was revised to completely conform to ISO 9241-20 and to add test methods in an appendix. The second policy for revising JIS X 8341-3 was to reflect revisions of JIS X 8341-1.

In the revised version, individual success criteria are consistent with WCAG2.0. In addition, the revised version lists matters that need to be considered at each step: planning, designing, making, developing, verifying, maintaining, and managing. Test methods are also itemized in the main text.

After it was publicly reviewed, the revised version was published in August 2010.

4 Characteristics of 2010 Web Accessibility Standards

The 2010 version of JIS X 8341-3 has three major characteristics, and these characteristics affect the promotion of JIS X 8341-3. Each of the three major characteristics is described below.

4-1 Conformance Levels

JIS X 8341-3 divides 61 proposed technical specifications into three groups. These technical specifications are called success criteria in JIS X 8341-3. In this report, the technical specifications in the 2010 JIS X 8341-3 are called "success criteria," and in other cases, the term "technical specifications" is used. In addition the term "standard" means a document that is authorized by a standardization organization.

Table 2 illustrates the outline of the relationship between success criteria and conformance levels.

For example, to be recognized as level A, web content needs to conform to 25 success criteria. The success criterion for non-text content illustrated for this category is: "all non-text content that is presented to the user has a text alternative that serves the equivalent purpose…" The success criterion for the use of color is: "color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element." These success criteria are for those who have difficulty acquiring visual information.

To be regarded as level AA, web content needs to conform to 38 success criteria. Thus, it is more difficult than being regarded as level A. For example, the criterion for images of text is: "if the technologies being used can achieve the visual presentation, text is used to convey information rather than images of text…"

To be regarded as level AAA, web content needs to conform to all 61 success criteria. In reality, however, it may be difficult to conform to every criterion. The success criterion for audio-only (Live) is: "an alternative for time-based media that presents equivalent information for live audio-only content is provided." This criterion is for those who have difficulty acquiring audio information.

Generally speaking, as already discussed, it is more difficult to be regarded as AA than A, and AAA is more difficult than AA.

The success criteria are categorized based not only on the levels of technical difficulty but also on the significance that affects accessibility. In other words, if web content lacks any of the success criteria to be regarded as level A, it seriously undermines accessibility.

Incidentally, the 2004 version did not have conformance levels. As such, there were cases where some web content claimed that they complied by selecting some technical specifications and conforming only to these self-selected specifications. The 2010 version does not allow this kind of picking of convenient criteria. Therefore, web content providers need to do their best to at least conform to the level A criteria.

4-2 Testability

The conformance levels do not work if one cannot verify the conformance of web content with the success criteria. In principle, the success criteria for

Table 2: Achievement criteria and conformance levels

Categories	No. of criteria	Example criteria
Achievement criteria for being regarded as level A, AA, or AAA	25	Non-text content
		Use of color
Achievement criteria for being regarded as level AA or AAA in addition to the 25 criteria above	13	Captions (Live)
		Images of text
Achievement criteria for being regarded as level AAA in addition to the 38 criteria above	23	Sign language (Prerecorded):
		Audio-only (Live)

Prepared based on JIS X 8341-3

the 2010 version of JIS X 8341-3 are testable. The following paragraphs illustrate some examples.

Flickering lights may trigger photosensitive epilepsy in some people. To avoid the triggering of photosensitive epilepsy, the 2004 version merely stated, "web content must avoid flickering on the screen at a high frequency." In contrast, the 2010 version clearly specifies the limit of frequency, stating, "web pages do not contain anything that flashes more than three times in any one second period…" This is a criterion for level A.

Elderly people with advanced cataracts have difficulty acquiring information on low-contrast screens. The 2004 version included the technical specification, "ensure that foreground and background color combinations provide sufficient contrast." The 2010 version specifies numbers for the success criterion for level AA, stating, "the visual presentation of text and images of text has a contrast ratio of at least 4.5:1…"

In addition, the 2010 version includes a testable success criterion for sounds (level A): "If any audio on a web page plays automatically for more than 3 seconds, either a mechanism is available to pause or stop the audio, or a mechanism is available to control audio volume independently from the overall system volume level."

The 2010 version did its best to eliminate ambiguous statements in the other success criteria and to pursue testability.

4-3 Technology Independence

Why did JIS X 8341-3 and WCAG need to be revised often? It is because web technology advances very rapidly and old technical specifications continue to become obsolete one after another. This is inevitable in the information and communications field.

To avoid frequent revisions, it is best not to mention specific technology in standard. Technology independence is an idea to draw up technical specifications without mentioning specific technology.

The creators of the revised JIS X8341-1 and ISO 9241-20 (which was the base for JIS X8341-1) were conscious of technology independence. The same idea was adopted in WCAG2.0 and the 2010 version of JIS X 8341-3 as well.

In fact, the 2004 version of JIS X 8341-3 did not mention specific technical specifications in the main text. However, the version included many examples of how to respond to specific technology, and so the readers tended to feel that they were being encouraged to take specific measures.

For example, the 2004 version had a technical specification that stated, "provide equivalent alternatives to auditory and visual content." The standard was followed by the example, "… in HTML (Hyper Text Markup Language), use 'alt' for the IMG…" However, the example took on a life of its own, and adding the "alt" attribute for images was often considered a technical specification itself.

In contrast, as quoted in section 4-1, the 2010 version only states that "all non-text content that is presented to the user has a text alternative that serves the equivalent purpose…" Therefore, if new web technology allows mainstream methods other than the "alt" attribute to provide alternative information for images, it will not be necessary to revise the standard. For example, non-HTML technology such as Flash and PDF can be covered by the same success criterion.

5 Providing Technological Documents to Promote Web Accessibility

The 2010 version of JIS X 8341-3 is technology-independent, and so there may be those who do not know what kind of technology to implement to improve web accessibility. To help the needs of those who use the JIS standard, related technical documents and guidelines are now provided.

Table 3: Publicized documents related to the 2010 version of JIS X 8341-3

Documents related to JIS X 8341-3:2010
-Understanding JIS X 8341-3:2010 -Accessibility Supported (AS) User Agent Information -Test files required to create AS User Agent Information -JIS X 8341-3:2010 Test Guidelines -Compliance Performance Announcement Guidelines for JIS X 8341-3:2010
Translated documents related to WCAG2.0
-Web Content Accessibility Guidelines (WCAG) 20. -Understanding WCAG2.0 -Techniques for WCAG2.0

Source: Web Accessibility Infrastructure Committee of the Info-communication Access Council

The Info-communication Access Council established the Web Accessibility Infrastructure Committee (WAIC), and experts involved in the revision of the JIS standard gathered to work in the committee. Documents listed in Table 3 were finalized and publicized free of charge in August 2010.[9]

5-1 Accessibility Supported

Even if web content was created using technology that conforms to JIS X 8341-3, users cannot access the content if user agents such as the browser or the screen reader software do not respond to such technology.

Even if alternative text is provided for an image being used as a link to navigate to a topic, if a user agent cannot find the alternative text and show it to a user, the user will not see the image and will not be able to navigate to the topic. In other words, alternative text must be provided in a way that is understandable and usable for the user agent. Each user agent may require different technology to provide alternative text, and so it is essential to outline which technology complies with each user agent.

Access Supported (AS) User Agent Information provides a list to show which technology different user agents comply with.

5-2 Testing and Conformance Levels

Conformance levels illustrate to what degrees web content complies with accessibility. As discussed in 4-1, conformance levels are determined by whether web content conforms to each success criterion. How can one test whether web content conforms to the criteria?

As discussed in 3-3, JIS X 8341-3 has an article about test methods. Based on the article for test methods, JIS X 8341-3:2010 Test Guidelines illustrates detailed guidelines and examples on how to conduct a test.

There are tests both for a web page and a group of web pages. The test for the latter can be used for up to around 100 pages, but it takes substantial time and cost to test more pages. Based on the website's nature and web accessibility policy, it is necessary to examine and determine if it is reasonable to spend the time and cost to test all of the pages. For randomly selecting and testing pages to save time and cost, the appropriate number of pages required to determine whether the website passes or fails is 25 to 39, and checking 40 or more pages is definitely sufficient to determine whether the site passes or fails.

As such, JIS X 8341-3:2010 Test Guidelines illustrates detailed descriptions about how to conduct a test.

Compliance Performance Announcement Guidelines describes what kinds of tests are required to be able to announce that the website conforms to the standard. According to the guidelines, one can say that web content "conforms" to the standard if it is tested and found to meet all of the success criteria and, in addition, a self-conformance announcement is made based on the JIS Q 1000 "Conformity assessment - Guidelines for supplier's declaration of conformity with product standards." One can say that web content "mostly conforms" to the standard if it was tested and found to meet all of the success criteria. One can say that web content "partially conforms" if it was found to conform to part of the success criteria. One can say that web content was "tested taking consideration of the standard" if it was tested regardless of the results. One can say that web content "takes the standard into consideration" if the importance of web accessibility is taken into account, best efforts have been made to conform to the standard, but the content has not been tested.

It will be more convenient for users by referring to these conformance announcements.

6 Public Site Management Model Aims to Promote Web Accessibility Among Public Organizations

Among a great number of websites, public websites managed by the central, prefectural, and municipal governments, in particular, should be as easily accessible as possible by a great number of people. In particular, prefectural and municipal government websites contain necessary information for everyday life, and so it is critical to ensure their accessibility.

What kinds of principles should the heads of these governments propose regarding public websites? What should a website manager look for when placing an order with vendors? What should the manager be careful about when managing the website on a daily basis?

The Public Site Management Model (2005) answers these questions, and the revision work for the model began in September 2010 in response to the revised JIS X 8341-3 published in August 2010. The revision work for the model took account of opinions of prefectural and municipal governments, and the revised version was published in April 2011.[10]

The new management model advises that public entities, particularly prefectural and municipal government bodies, draw up web accessibility policies. The model also recommends that public bodies make their web accessibility policies available to the public on their websites and elsewhere. These web accessibility policies must specify concrete targets such as "Currently available websites must conform to conformance level A by the end of fiscal 2013, and conformance level AA by the end of fiscal 2014."

6-1 Systematic Efforts toward Web Accessibility

The Public Site Management Model recommends prefectural and municipal governments to systematically work on web accessibility.

Heads of public entities need to understand the significance of and the necessity for systematic efforts toward improving web accessibility, to establish and promote such efforts, and to take the lead in securing funding. Under the leadership of the head of a public entity, the department in charge of managing public websites works on accessibility. It is essential to secure a sufficient number of personnel and man-hours to manage the website as well as to provide the personnel with adequate training opportunities to understand the significance of and how to improve web accessibility. Public entities need to ensure that successors to these positions are appropriately briefed by predecessors as well as to educate the personnel to be experts in website management.

If several departments are in charge of updating web pages, it is essential to provide adequate training opportunities to all personnel involved. If a public body outsources the creation of a website or the development of a system, it is essential to hire a contractor who is knowledgeable about JIS X 8341-3 and to communicate intentions. It is important for the public body to take responsibility for setting goals and promoting the necessary steps to achieve the public body's goals rather than fully depending on the contractor.

To ensure, maintain, and improve web accessibility while taking into consideration users' opinions, it would be effective to ask for cooperation from local organizations of elderly and disabled to identify problems or to verify updated web content.

6-2 PDCA Cycle

The PDCA (Plan, Do, Check, and Action) cycle is critical for compliance with web accessibility policy. Figure 4 illustrates the PDCA cycle in the Public Site Management Model.

During the P (Plan) phase, the existing state of the site is determined and goals are established. To understand the existing state, accessibility assessment tools can be used, and experts who are knowledgeable about JIS X 8341-3 or actual users (including older persons and persons with disabilities) can assess the site. The current state of web management, including technology to create a site and methods to manage the site, is also recognized. Finally, a web accessibility policy is made and publicized.

At the D (Do) phase, efforts are made to achieve goals when creating and updating web pages on a daily basis. Additionally, these efforts are examined every fiscal year, and necessary personnel and budget are secured. For daily updates of a web page, the model suggests several ways to check accessibility: 1) the page creator can go through a list to identify any problems, 2) accessibility assessment tools or a CMS (Content Management System) can be used to identify any problems, and 3) web management personnel

who are knowledgeable about accessibility verify and publicize the page.

It is also important to include contact information on the website in order to actively collect users' opinions and to respond, on a daily basis, to any problems that can be dealt with swiftly. If there are problems that cannot be dealt with immediately, they can be examined and addressed the next time the site is updated in order to comply with accessibility.

At the C (Check) phase, test is conducted as discussed in section 5-2 (Testing and Conformance Levels), and conformance levels are publicized.

At the A (Action) phase, continuous action is taken to improve the web content quality by updating guidelines, providing training to personnel, periodically verifying web accessibility, and examining users' assessments. Based on the achievements made, more success criteria can be added, higher conformance levels can be set, or other revisions can be made in the web accessibility policy. Testing should be conducted based on JIS X 8341-3 at least once a year.

The Public Site Management Model is characteristic in that it advises public entities to repeatedly rotate the PDCA cycle. New information is updated on a website on a day-to-day basis, and so if the website is not managed continuously, web accessibility issues may occur without knowing. To avoid such issues, the model emphasizes continuity.

The Ministry of Internal Affairs and Communications published an accessibility assessment tool called "miChecker" at the same time that the model was published. To check accessibility, there are tests that can be done mechanically and tests that have to be done manually. The "miChecker" conducts tests that can be done mechanically as well as helps determine results manually.

7 Web Accessibility Code of Practice in the United Kingdom

To continuously improve web accessibility, BSI (British Standard Institute) has been working on a national standard called BS 8878 "Web Accessibility - Code of Practice." To maintain and improve web accessibility, matters to be systematically managed are covered in the standard in the form of a code of practice.[11] It is the same idea as the Public Web Management Model in Japan.

BS 8878 introduces three main reasons below that organizations should take action to improve web product accessibility and make it easier to use the products. Firstly for regal reasons: "if an organization's web product is not accessible to a disabled person, that person might have grounds for making a claim against the organization under the Equality Act 2010 or the Disability Discrimination Act 1995." Secondly, for commercial reasons: "the numbers of people who could benefit from more accessible web product … are significant. There are more than 11 million

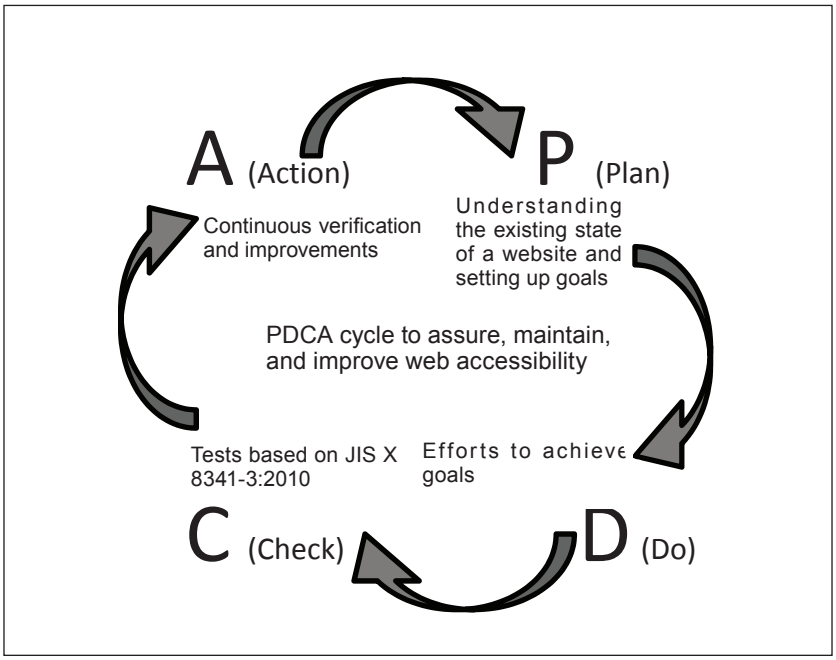

Figure 4: PDCA cycle recommended by the Public Site Management Model
Taken from the Public Site Management Model

disabled people in the UK, and there are nearly 12 million people of state pension age…" Thirdly, for ethical reasons: "Many organizations want to ensure that disabled and older persons are not excluded from (these) benefits and are able to use new technologies to increase their ability to live independently and to be fully engaged members of society."

BS 8878 uses the term "web products." Web products include any "website, web-service, web-based workplace applications which is delivered to users via Internet Protocol, through a web browser." The definition includes Rich Internet Applications, "Software as a Service" or Cloud computing services provided through a browser, computers, mobile phones, eBook readers, tablets and televisions. The definition suggests that web technology is widely used.

BS 8878 states that "as part of an organization's strategy for dealing with accessibility …, the organization should ensure that a department or specified role is responsible for the organization's compliance with BS 8878." BS 8878 applies to all types of organizations, including companies, non-profit organizations, government departments, local councils, public sector organizations, and academic institutions.

In contrast, the Public Site Management Model only targets public websites. To promote web accessibility, it will be essential for Japan to create documents that can apply to both public and private entities, including private companies and non-profit organizations.

In addition, BS 8878 specifies a series of procedures to be taken, starting with establishing web product purpose and analyzing the needs of target audiences. It continues to describe, in detail, how to assure accessibility throughout every process from web product designing, developing, and management. For example, BS 8878 describes user goals and tasks that the web product needs to provide, and the degree of user experience that the web product will aim to provide; inclusive design and user-personalized approaches to accessibility; delivery platforms to support; target browsers, operating systems and assistive technologies to support; the choice whether to create or procure the web product in-house or contract out externally; assuring the web product's accessibility through production; communication of the web product's accessibility decisions at launch; and assurance of accessibility in all post-launch updates to the product.

The Public Site Management Model explicitly emphasizes the PDCA cycle. BS 8878 does not refer to the PDCA cycle even though it also advises organizations to continuously improve web accessibility. The PDCA cycle was proposed by Walter Shewhart and Edwards Deming, who established a quality control method after World War II. The cycle is also referred to as the Deming wheel. The quality control method is well known in Japan, but it is not widely recognized in Europe. That is why BS 8878 does not directly refer to the PDCA.

BS 8878 is a kind of process standard in terms that it governs operating processes in an organization.

8 Accessibility Maturity Model

In the United Kingdom, the Employers' Forum on Disability organized the Business Taskforce on Accessible Technology and developed the Accessibility Maturity Model (AMM).[12] Using the AMM, organizations can self-assess and improve the accessibility of their information and communications-related systems, products, and services that they own or provide to society. The AMM also targets web content, as discussed in the following paragraphs.

Table 4 illustrates the self-assessment scorecard for the AMM.

An organization that has long been operating information and communications systems may be left with old systems (legacy systems). For example, if the accessibility in the legacy systems is low, the level is 1. If an improvement strategy is in place, the level is 2. If all legacy systems are made accessible, the level is 5. As such, organizations can conduct a self-assessment using the scorecard illustrated in Table 4.

Suppose that an organization self-assessed to level 2 under the "business drivers" and level 3 under the "standards and guidance" one year. Furthermore, when the organization has reassessed in the following year, the business drivers improve to level 3 and the standards and guidance remain at level 3. As such, progress is recognizable and further goals can be set. The strengths and weaknesses of an organization can also be identified.

The AMM can be used by an organization at various levels, including the Chief Information Officer, the Chief Technology Officer, the human resources department, and the IT program manager,

Table 4: Scorecard to assess organizations' IT accessibility maturity

Focus Areas	Level 1 Informal	Level 2 Defined	Level 3 Repeatable	Level 4 Managed	Level 5 Optimized
Business Drivers	No senior buy-in	Strategy in place	Top down commitment / involvement	Active strategy management	Pioneers and leaders
Standards and Guidance	Minimal or unclear	Basic standards documented / used ad-hoc	Standards in regular use / actively promoted	High standards / continuous improvement	Influencer / early adopter of new standards
Government & Risk Management Process	Not defined	Process defined / minimal actual governance	Active governance	Continuous improvement / strategic view	Suppliers influenced
Resources and Cost Impact	Not allocated or controlled	Some budget provided / clear responsibilities	Investment strategy / support services in place	Effective budget / benefit management	Specific funding for innovation / user empowerment
Delivery (design, build, test, implement)	Minimal inclusion in development lifecycle	Lifecycle stages requirements documented / applied ad-hoc	Fully integrated including Usability / Accessibility testing by staff and customers	Proven standards compliance / metrics collected	Innovation and design excellence
Procurement and Supplier Contracts	Minimal inclusion in procurement processes	Processes documented and used ad-hoc	Regular use including non-compliance management	Proactive and supportive	Supplier partnerships
Legacy Systems	Low accessibility	Limited legacy accessibility / Strategy in place	Priority legacy systems made accessible	Systems mostly accessible	All legacy systems made accessible
Reasonable Adjustments Process	Minimal / Reactive	Basic process used ad-hoc	Integrated process promoted and in regular use	Active management within service levels	Innovation / sharing of best practice

Source: Accessibility Maturity Model

to self-assess, understand, plan, and improve the organization's accessibility performance.

The AMM was created based on typical policies and activities that are common for both public and private entities. It reflects not only the opinions of the task force but also outside opinions. It characteristically suggests an indicator and direction of a comparative assessment and supports an approach to be taken by each organization to proceed to the next step.

9 Efforts to Promote Web Accessibility

The Japan Web Accessibility Consortium (JWAC) was established in April 2010.[13] The Public Site Management Model only targets websites provided by public entities, but JWAC aims to improve accessibility on all websites.

JWAC conducts projects to maintain and improve web accessibility performance, to promote and provide education on web accessibility, and to conduct research activities for further improvements in web accessibility. Through JWAC activities, Japan is expected to establish a web accessibility code of practice and promote assessment measures equivalent to the Accessibility Maturity Model.

A private magazine company has been publishing website rankings for local public entities and private comapnies.[14] This can be an incentive and the announcement of the rankings is given a lot of attention. I hope that the rankings will reflect test results based on JIS X 8341-3.

The task force to promote administrative system reforms for disabled people (formed within the Cabinet Office) included ensuring information and communication access in its "Regarding basic direction" (published in June 2010).[15] The task force on ICT policy in the global era (formed within the Ministry of Internal Affairs and Communications) also proposes that public entities further improve accessibility of their websites.[16] As such, policies have been made to realize web accessibility. It is essential for both public and private website providers to heighten their awareness towards accessibility.

In the United States, public procurement has been based on Section 508 of the Rehabilitation Act since 2001. Section 508 requires the federal government to procure information and communications equipment and services that comply with accessibility technical specifications. To respond to rapid progress in information and communications technology, the revision work for the technical specifications in Section 508 began in 2006.[17] New technical specifications are expected to become effective in 2012, and the technical specifications for web content

are the same as WCAG2.0. In reality, therefore, web content provided by the federal government must conform to WCAG2.0. This is considered to help promote web accessibility in the United States.

This article explained the trends in the United Kingdom in detail, but some developed countries, including the United States, have begun to require web providers to respond to web accessibility.

10 Conclusion

In Chapter 2, this article introduced some cases where web accessibility was not given sufficient consideration. According to the 2010 version of JIS, the level AA success criterion for text size adjustability is that "… text can be resized without assistive technology up to 200 percent without loss of content or functionality." The level A success criterion for a PDF document reader is that "information, structure, and relationships conveyed through presentation can be programmatically determined…" The level A success criterion for captions for videos is that "captions are provided for all prerecorded audio content in synchronized media…" If the websites discussed in Chapter 2 had been created and provided based on JIS X 8341-3 and had conformed to the abovementioned success criteria, the problems discussed earlier would not have occurred.

Disasters and other emergency situations often serve to highlight problems that have been overlooked. The Great East Japan Earthquake also shed light on many problems concerning web accessibility. Website providers must prioritize and work to solve such problems. It is more desirable to initially create a website that complies with accessibility than to later pay to fix problems that have come to light at the wrong time.

Problems that occur at times of crisis suggest that it is critical for an organization to always be aware of web accessibility when receiving and providing information. It is very likely that problems will occur if an organization tries to suddenly respond to web accessibility during an emergency. As I discussed in this article, I hope that the idea of creating standard processes will be widely accepted in order to systematically and continuously improve web accessibility.

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[3] The image was taken from the Office of the Prime Minister's website on April 19, 2011. http://nettv.gov-online.go.jp/prg/prg4717.html

[4] JIS X 8341-3 can be accessed on the Japanese Industrial Standards Committee (JISC) website (http://www.jisc.go.jp/) and also can be purchased from Japanese Standards Association (JSA.)

[5] The WAI's website URL: http://www.w3.org/WAI/

[6] JIS X 8341-3 can be accessed on the Japanese Industrial Standards Committee (JISC) website (http://www.jisc.go.jp/) and also can be purchased from JSA.

[7] Information about WCAG2.0 is on: http://www.w3.org/WAI/intro/wcag

[8] Information about ISO 9241-20 is on: http://www.iso.org/iso/catalogue_detail?csnumber=40727

[9] The technical documents and guidelines in Table 3 can be obtained on the Web Accessibility Infrastructure Committee website. http://www.ciaj.or.jp/access/web/ *(in Japanese)*

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[11] BS 8878 can be purchased from BSI. The detailed information is on: http://www.bsigroup.com/

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Profile

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