

Universal Design Guidelines for Web Contents

Masahiro Watanabe[†], Aya Okano, and Yoko Asano

Abstract

This paper describes NTT's universal design guidelines for making Web contents accessible to everyone.

1. Introduction

It is becoming more and more important to make sure that products and information intended for public use can be used by everyone. A universal design policy is needed in the fields of not only architecture and traffic but also information technology (IT). Although IT has the significant advantage of inherent flexibility, this flexibility is seldom fully utilized. Universal design for IT implies ensuring that the hardware and/or software is user-friendly to everyone including the disabled and the elderly. By optimizing its presentation, we can make IT easy to use for disabled people. Because being able to access Web contents is becoming essential in our daily lives, the application of universal design to Web contents is becoming critical [1].

As shown in **Fig. 1**, various users including the disabled and elderly will access Web sites using many kinds of input/output and display devices. Blind people may use voice browsers to access text on a Web page. Those with weak sight may use greatly enlarged fonts. Physically disabled persons may use special input-devices to operate their personal computers (PCs). To support these various users and situations, IT with universal design is strongly needed.

The key goal of universal design is to ensure that all users, regardless of their capabilities, can get the same Web-based information. This makes it essential for Web content to be made device-independent. Some Web sites provide special Web pages for the

disabled. However, it is difficult and expensive to synchronize Web-content updates so that information is kept uniform. It is more efficient to use universal design so that everyone can access the same page and get the same information.

2. Universal design guidelines: international and domestic

The World Wide Web Consortium (W3C), which issues standards on Web techniques, released "Web Content Accessibility Guidelines 1.0 (WCAG 1.0)" in 1999 [2]. In the United States of America, the Rehabilitation Act, Section 508, which was amended in 2001, requires the Federal government to consider accessibility when procuring IT devices, software, and Web sites [3]. Here, "accessible" means accessible to a wide range of people .

In Japan, a Committee of the Ministry of Posts and Telecommunications (now the Ministry of Internal Affairs and Communications (MIC)) and the Ministry of Health and Welfare (now the Ministry of Health, Labour and Welfare) announced in 1999 a policy on Web accessibility [4] based on WCAG 1.0. This policy has since been adopted by many Japanese governments, municipal offices, and auxiliary organizations. Many private companies have created their own guidelines based on WCAG 1.0. In June 2004, the Japan Industrial Standard (JIS) X8341-3 [5] was released in advance of WCAG 1.0, and it has become the established set of guidelines in Japan. The guidelines mentioned above are summarized in **Fig. 2**.

[†] NTT Cyber Solutions Laboratories
Yokosuka-shi, 239-0847 Japan
E-mail: watanabe.masahiro@lab.ntt.co.jp

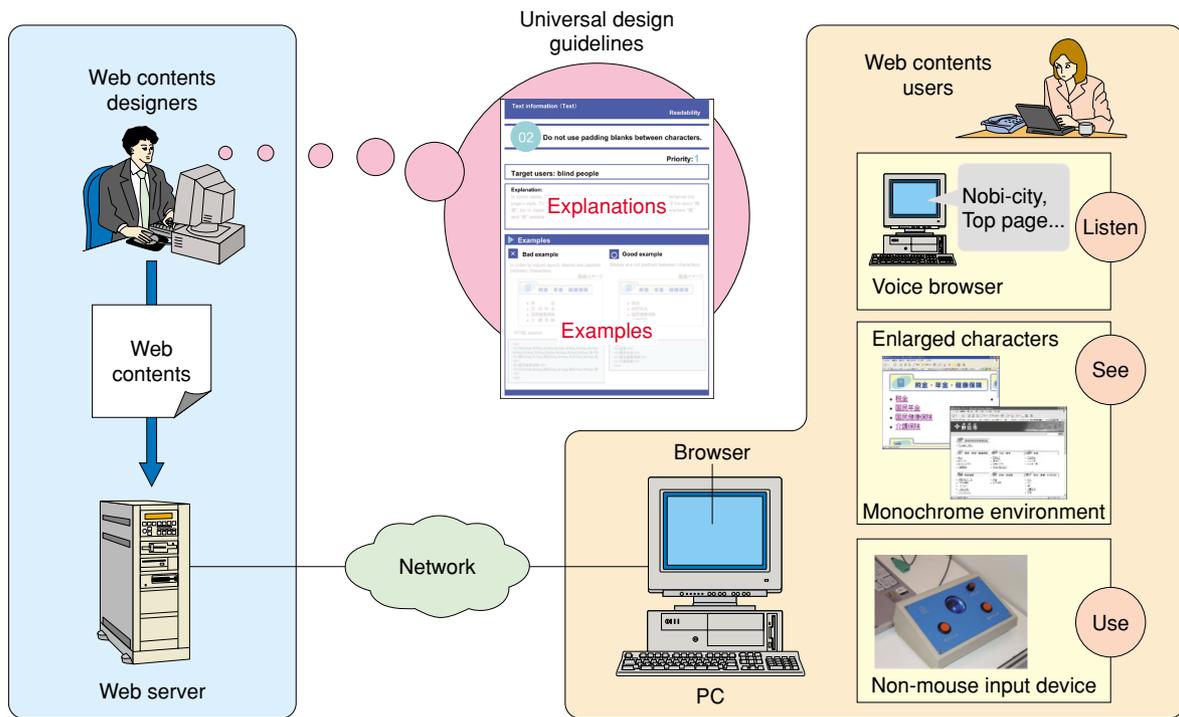


Fig. 1. Web contents based on universal design.

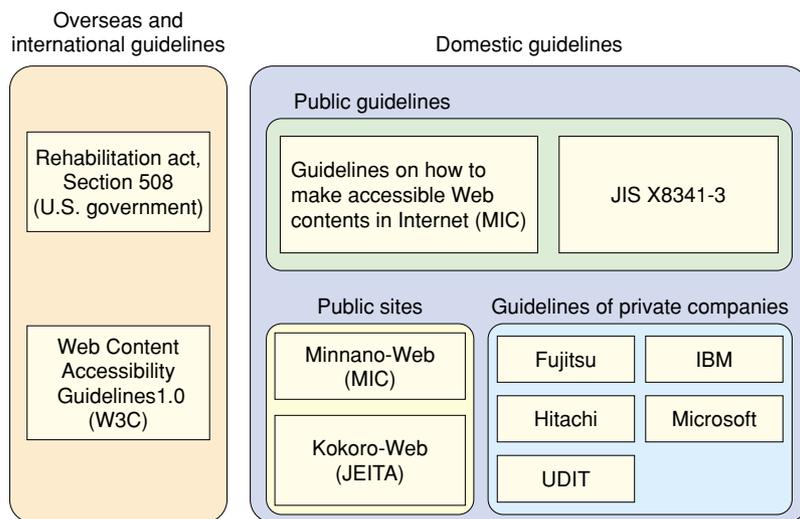


Fig. 2. Various guidelines from many public institutions and private companies.

3. Situation in NTT Group companies

The NTT Group set the “NTT Official Website guidelines” to ensure the same basic appearance and usability. One problem is that they make insufficient use of universal design. Thus, very few Web sites of the NTT Group adequately consider universal design, which is regrettable. This is a serious problem

because accessibility will be a key feature of Web sites created by the NTT Group for outside customers. In particular, for public Web pages for local governments, municipal offices, and so on, a universal design policy is essential. Although the demand for universal design in Web contents is rapidly increasing year by year, Web producers and designers have no clear idea of what good designs are or how to

evaluate them.

4. Features of our guidelines

To solve the problems described above, we developed “NTT Web Contents Universal Design Guidelines” based on WCAG 1.0. Our 61 guidelines enable Web developers to develop Web contents easily and evaluate them. They have the following features:

1. They deal with the problems specific to the Japanese language: These are caused by the use of both 1- and 2-byte codes for Japanese words and also by the different readings possible for the same Chinese character.
2. They deal with the problems and requests of disabled or elderly users: The results of interviews with such people and those of other experiments are reflected in the Web page structure, writing style, text size, and so on.
3. They deal with the problems and requests of Web developers: The guidelines have the structure demanded by Web developers and have indexes such as target objects and influenced elements, which are described in more detail later.
4. They provide practical examples: Some good and bad illustrations are provided so that Web designers can easily understand the guidelines.

Some examples also include the corresponding HTML source code.

5. Version 2.0 and later versions are fully compliant with JIS: Our guidelines embrace JIS X8341-3, which describes 39 guidelines.

5. Contents of the guidelines

To facilitate easy comprehension, the guidelines include some common items, such as a statement, explanation, and practical examples, and each guideline is presented on a single page, as shown in **Fig. 3**. Each guideline includes:

- Guideline number
- Statement of the guideline’s purpose
- Target objects
- Influenced elements
- Priority of the guideline (one of three levels)
- Target users and situations
- Explanation that includes why this guideline is necessary, what kind of problems would be caused if it were not applied, and how to design a Web site that applies it
- Practical examples (good and bad illustrations), some including HTML source code).

Each guideline has four elements to help Web developers understand its features or importance as described below. First of all, one of the nine target

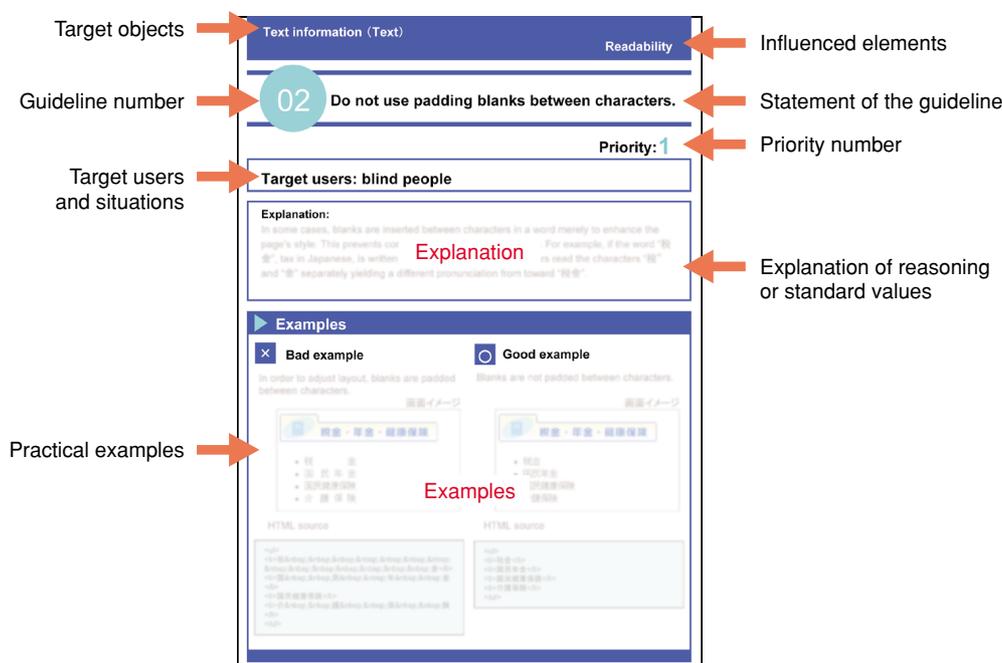


Fig. 3. Page layout of the guidelines.

objects is displayed in the top-left corner of each page as shown in Fig. 3. Target objects include:

- Text information (text)
- Styles and layouts
- Navigation (links)
- Image maps (buttons)
- Lists and tables
- Images and multimedia
- Frames
- Scripts
- Input forms.

Second, one of four kinds of influenced elements is displayed in the top-right corner of each page, as shown in Fig. 3. Influenced elements include:

- Readability: support for voice browsers
- Navigation: ability to reach desirable information effectively
- Expression: good visual representation like color and correct Japanese readings
- Operation: support for operation by all kinds of users.

Third, one of the three priorities is clearly displayed. A Web designer can easily refer to them separately in order to adjust the characteristics of the Web site.

Finally, the target persons and situation of each guideline are shown so that the Web designer can choose the really important guidelines and decide the order of managing them, especially when they improve a Web page.

6. Three examples of Web pages without universal design

This section discusses three examples of poor design commonly found in many Web sites.

First of all, there are problems with the alternative explanations provided for images. It is quite common for these explanations to be omitted. A voice browser will read aloud the text entry indicated by the alt attribute of the IMG element. Many Web designers fail to see the need to include any text beyond just a simple title. A more complex problem is that some IMG elements are used only to assist page layout and so are not intended to be processed by voice browsers. Some Web designers omit the alt attribute itself from the IMG element, but some voice browsers handle this by saying “Image without alt-text”. Users with visual disabilities cannot understand this response. Moreover, if the layout image has a link, its destination address is read out. In both cases, it is very hard for voice browser users to understand the infor-

mation. The solution is ensure that the alt attribute is used, but that the entry is null or a space (e.g., alt = “” or “ ”).

The second example is a problem peculiar to Japanese words. Most Chinese characters used in Japanese have several readings. In Japanese, the reading is determined by character order. Unfortunately, character sequences are often broken to achieve “better” text layout by adding blanks. This can confuse voice browsers and lead to incorrect readings. For example, the Japanese word *nen-kin*, which means pension, is written with two Chinese characters; it is often seen in public sites. If a blank is inserted between the two characters, some voice browsers read it incorrectly such as *toshi-kane*, where *toshi* and *kane* are alternate readings of the Chinese characters *nen* and *kin*, respectively. This indicates that padding spaces should be avoided and instead style sheets should be used to achieve the layout desired.

The third example is the problem of color. Care should be taken to ensure that text and graphics are understandable when viewed without color information. Some simulations for various users and situations are shown in Fig. 4. The left figure shows an original image full of color. The middle image simulates what is seen by a person with deuteranopia (the inability to recognize green). Obviously, some of the information provided by the color is missing. The right image is the gray scale equivalent. It suggests that a document printed on a monochrome printer will lack a considerable amount of the original information. For example, the table in Fig. 4 indicates the garbage collection times in several areas. There are two collection periods: daytime and nighttime. Areas with daytime collection are shown in red. In this case, one of the worst designs would be to use only the phrase “Areas shown in red have daytime garbage collection.” Instead, it is better to use the phrase “Areas indicated by “D” have daytime garbage collection”. Note that we do not suggest that Web contents should omit the use color. In this example, it is definitely effective to enhance the text by showing it in red. However, it is important to provide the same information in other ways as well. Then, even if all the color is lost, as in a monochrome printout, the user can still acquire the information by finding the areas identified by “D”.

Some problems described in our guidelines are due to immature voice browser technologies. W3C has issued guidelines for Web browsers [6] and authoring tools [7]. We should find out how to make good Web contents that can avoid the problems of current voice

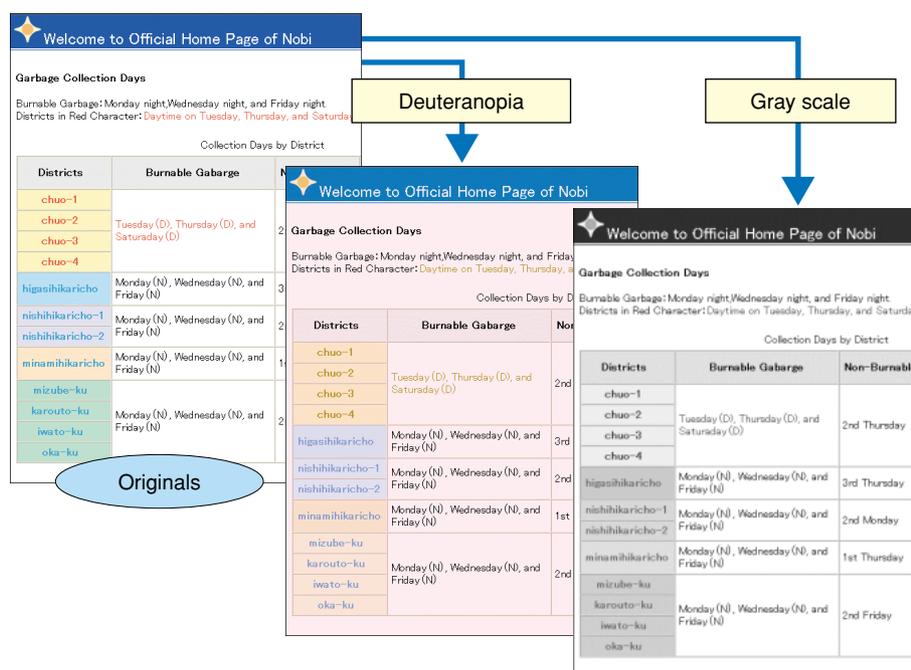


Fig. 4. Results of color simulation: Web page appearance.

browsers. The guidelines for universal design will change along with further development of Web technologies such as voice browsers.

7. Tools related to universal design

It is effective to use tools related to universal design to check the accessibility of Web contents automatically. Many organizations and private companies provide various tools for checking Web pages by comparing them with their own guidelines [8]. Some companies offer simulators for color disability, as shown in Fig. 4, and ones for voice browsing. We are also developing a tool to check Web pages by comparing them with our guidelines. This tool will enable Web developers who have little knowledge about universal design to make a Web site that complies with universal design.

8. Conclusion

This paper described the weaknesses of current Web contents and the use of universal design to eliminate them. We would like to enlarge the universal design policy to support all NTT Group companies

and their Web pages. For this purpose, we plan to hold seminars similar to the “Universal IT Design Symposium” that was held in May 2005 in Tokyo. Moreover, we must plan to ask NTT Group companies that have know-how about Web solutions to evaluate the guidelines and provide a support framework for all NTT Group companies.

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Masahiro Watanabe

Research Engineer, Human Interaction Project, NTT Cyber Solutions Laboratories.

He received the B.E. and M.E. degrees in mechanical engineering in 1991 and 1993, respectively, and the Dr.E. degree in electronics, information, and communication engineering in 2003 from Waseda University, Tokyo. He joined NTT Basic Research Laboratories in 1993 and studied the human auditory system. He moved to NTT Cyber Solutions Laboratories in 1999. Since then, he has been studying human interfaces. He is a member of the Human Interface Society and the Acoustical Society of Japan.



Yoko Asano

Senior Research Engineer, Human Interaction Project, NTT Cyber Solutions Laboratories.

She received the B.E. degree in administration engineering from Keio University, Yokohama, Kanagawa in 1988 and joined NTT Human Interface Laboratories the same year. She moved to NTT Cyber Solutions Laboratories in 1999. Since then, she has been conducting research on human interfaces. She is a member of the Human Interface Society, the Japan Ergonomics Society, and the Information Processing Society of Japan.



Aya Okano

Research Engineer, Human Interaction Project, NTT Cyber Solutions Laboratories.

She received the B.E. degree in information science from the University of Tsukuba, Tsukuba, Ibaraki in 1998 and joined NTT Kanto Corporate Business Department the same year. She moved to NTT East Leased Circuit Service Center in 1999 and to NTT Cyber Solutions Laboratories in 2002. She is currently researching universal design.