2005 Accessibility Diagnosis on the Government Web Sites in Taiwan, R.O.C.

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ABSTRACT

Improvement in web technology and services alone with diversity development has caused a high demand of Internet usage. New web technologies and equipment have opened infinite possibilities for global communication, but these possibilities are limited by various factors such as setting the browser version too high, causing limitations to lower version holders, or making faster speed hard-drives producing delays in lower speed hard-drives. However, the most severe factor limiting web communication's performing at full potential is accessibility for the both physically and mentally disabled.

The Executive Yuan of the Taiwanese Government has recently pushed forward the idea of Web accessibility in Governments' websites. Assessment of 35 websites has shown to pass Priority 1 Level Validation (machine recognition/machine review), of which 28 reached the Conformance Level "A+." Apart from the checkpoint numbered 1.8 of machine recognition/machine review that had an increase in failed website percentage, the rest presented a decline in the number of failed websites, which suggested improvements in Web accessibility development in the year 2005. The most commonly seen checkpoint errors were similar in 2004 and 2005, and included checkpoint error numbered 5.5 (Provide summaries for tables), 10.6 (Do not use space to separate adjacent links), 4.3 (Identify the language of the text), 3.5 (Use relative sizing and positioning (% values) rather than absolute (pixels)), 3.3 (Use a public text identifier in a DOCTYPE statement), 1.1 (Provide a text equivalent for every image), and 9.3 (Make sure that event handlers do not require use of a mouse).

Comparison between Freego and Bobby validation tools using the 58 checkpoints listed in the Web Accessibility Regulations have shown six checkpoints need to be revised. Five checkpoints were different in Priority Level setup, and one checkpoint numbered 9.3 (Make sure that event handlers do not require use of a mouse) was different in the calculation of number of errors. Apart from that, the 90 checkpoints listed in the Web Accessibility Regulations in Freego, none can be compared with checkpoint number 13.1 (Create link phrases that make sense when read out of context) in Bobby. With these results, it was clear that the Freego Validation Tool needs to be improved, and that Web Accessibility Regulations needs to be discussed further.

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Keywords

Accessibility, Accessible Examination, Accessible Website, Accessible Checkpoint, Accessible Examining System

1. INTRODUCTION

1.1 Background

Due to the advancement of web technology, online users increase day by day. Global internet has not only stretched into diversity, it has also advanced to provide various services. As a result, web technology is something we cannot live without in this century.

Web technologies provided information communication with infinite possibilities; however, it is people that make web communication impossible to reach its full potential. For example, some Web pages indicate that their websites are best browsed by a resolution of 800 x 600, and are recommended to use at least an IE4.0 version of browser. Setting a certain speed of resolution or asking for a specific version of browser has limited Web accessibility for those who have lower grade hard drives or slower dial-up internet connections, not to mention Web accessibility for people who are physically or mentally disabled. The power to search for information and information comprehension ability determines a person's ability to survive in this "burst of technology" society. This over-advanced technology century will not benefit people with disabilities at all.

At the end of 2004, the Minister of the Interior obtained the number of 911,640 people in Taiwan who are registered as disabled, that is, 4% of the total population. Because technology information is so freely accessible, those who have abundant resources are far more advanced in their economic and information growth than those whose limited resources and access to friendly technology have caused an imbalance in this information society.

1.2 Web Accessibility

The definition of accessibility formulated by C. James Huang and Mei Chao [8] was to emphasize convenience and direct access for each one who may need different assistance in his/her life, such as

in transportation, learning, working, etc. The concept can be expanded to the Internet. Webmasters have to consider different users, especially people with disabilities, and how they can obtain the information through the Internet by relative equipment, techniques and resources. Paddison [15] defined accessibility as "barrier-free," which means that the information provider or service must be available to everyone, regardless of software, platform, environment, and user ability. For software, it includes accessing the Internet using desktop browser or voice browser; for platform, it includes using desktop, mobile phone or PDA (Personal Digital Assistant); for environment, it includes working in noisy or under-illuminated surroundings; and for user ability, it includes visual impairment or dyslexia. In addition, accessibility indicates that people with disabilities can surf the Internet through assistant technology to gain the complete information, and have full opportunities to interact with the Internet [12] [14].

In general, accessible websites are able to give everyone equal opportunities to access the complete Web content regardless of software, hardware and user ability.

Interested groups

With regard to Web accessibility, several domestic and foreign interested groups are introduced in the following subsections.

The World Wide Web Consortium: The World Wide Web Consortium (W3C) is a nonprofit group founded in 1994 to develop standards for the Web and also to play a major role in promoting Web accessibility. Three major long-term goals of W3C include universal access, semantic Web and Web of trust. Regarding the limitations of users in different cultures, languages, education, abilities, resources, technology for surfing the Web, the developed techniques should satisfy all limitations around the world. The development directions of W3C are: Architecture Domain, Interactive Domain, Technology and Society Domain, and Web Accessibility Initiative.

Web Accessibility Initiative (WAI) provides Web Content Accessibility Guidelines 1.0 (WCAG1.0) [5] [21], Authoring Tool Accessibility Guidelines 1.0 (ATAG 1.0) [23], and User Agent Accessibility Guidelines 1.0 (UAAG 1.0) [22] for different aspects to contribute to Web accessibility. WCAG 1.0 makes the Web content directly usable for individuals with disability. Many checkpoints following these guidelines are being developed for practical validation. All checkpoints are classified into three levels: Priority1, Priority 2 and Priority 3. Priority 1 indicates the Web content MUST satisfy its checkpoints. Priority 2 indicates the Web content SHOULD satisfy its checkpoints, including those in Priority 1. Priority 3 indicates the Web content MAY satisfy its checkpoints, including those both in Priority 1 and Priority 2. All checkpoints of these levels provide specific and detailed explanation to webmasters [13]. Most software tools providing Web accessible validation capability are compliant with the guidelines developed by WAI.

The Center for Applied Special Technology: The Center for Applied Special Technology (CAST) is also a nonprofit group founded in October 1984 to address the problems of expanding learning opportunities for individuals with disabilities by providing or developing assistive technology. However, CAST has recognized that the more focus on individuals the more burdens and cost of adaptation, and has not conquered all barriers that individuals with disabilities encounter. Therefore, over the past several years, CAST has undergone a major shift in its approach, now starting that: "We now believe that the most effective strategy for expanding opportunities for individuals with disabilities is through 'Universal Design for Learning'." The slogan "Universal Design for Learning" refers to the contribution of software tools and learning models that are feasible for use by everyone, regardless of age or whether they are typical learners, or have special needs. A Web accessible desktop validation tool, Bobby, helps to expose barriers to accessibility and encourages compliance with existing accessible web guidelines, including Section 508 of the US Rehabilitation Act and the Web Content Accessibility Guidelines (WCAG) of W3C [1]. In 2002, Bobby was adopted as part of Watchfire Corporation to provide two types of services. One service was free validation for single pages and was renamed WEBXACT (http://webxact.watchfire.com/) in 2005, and the other was paid validation. So far, Bobby can examine two types of Web accessibility designs (WAI WCAG 1.0 and section 508 standards of United States), and when websites pass validation, the standards and conditions are posted on the Web as evidence.

The RDEC, Executive Yuan, Taiwan: Taiwan is actively pushing the policy of filling in digital gaps and developing a computerized society. The Research, Development and Evaluation Commission (RDEC) of the Executive Yuan is the governmental department in charge of making the regulations and supervising the websites of all governmental agencies to stratify Web accessibility in Taiwan. In fact, providing accessibility service has been a major policy of the Taiwanese Government for some time now. In 2002, The RDEC has established "the guidelines of accessible websites." In 2003, The RDEC has provided "on-line validation service," and has delivered "the claim of conformances" to webmasters with perfect validation results. In 2004, the RDEC released the stand-alone validation tool called "Freego," and has supplied more convenient and efficient validation services in order to improve Web accessibility.

The global trend shows that governments make many efforts to compensate for digital gaps and to provide individuals with disability with fairness and equal access to information. Although, some researchers have found that designer's perspectives are substantial and long-term matters [7] [18], policies, laws and guidelines play the most important roles.

1.3 Current Status

When e-government is being promoted world-wide, the rights of those with disabilities are something that cannot be ignored, and that is why Web accessibility to those with disabilities is being emphasized today. The United States of America, Great Britain, Canada, Portugal, and Australia have noticed the problem and have started resolving the issue by making websites accessible to people with disabilities. In 1998, America re-wrote section 508 of the Rehabilitation Act of 1973, asking all states to ensure that access to websites is available to people with disabilities. The Global E-Government (table 1-1-1, 1-1-2) issued by Brown University of America and the Global E-Government Indices provided by the United Nations will include government websites as one of the assessments for Web accessibility for the disabled. In year 2000, Japan clearly stated in their Information and Communications Technology Booklet (ICT) that Web accessibility must be provided for the disabled, and in the E-Japan2002 proposal issued in 2001 also emphasized Web accessibility for the minority and the elderly populations. A ubiquitous oriented society proposed by u-Japan was granted in year 2004, that wishes to construct a web environment be

leveraged by anytime, anywhere, any device, anyone, by the year 2010.

Table 1-1- 1 Table of article of 2004 Global E-Government

2004	Taiwan	Singapore	United States	Canada	Monaco
Rankings/ Ratings	1	2	3	4	5
	44.3	43.8	41.9	40.3	39.0
Online Service	46	87	77	29	50
Publican	100	100	100	97	100
Data bases	100	63	95	87	100
Privacy Policy	50	97	82	90	50
Security Policy	54	93	67	23	0
W3C Disability Accessibility	0	3	42	81	0

Global E-Government, 2004

Table 1-1- 2 Table of article of 2005 Global E-Government

2005	Taiwan	Singa-pore	Unite d States	Hong Kong	China	Canada
Rankings/ Ratings	1	2	3	4	5	6
	57.2	54.5	50.5	46.2	44.3	43.3
Online Service	77	77	75	65	70	27
Publication	100	100	100	100	100	93
Data bases	100	100	95	100	100	60
Privacy Policy	77	100	82	85	78	100
Security Policy	85	100	64	65	61	100
W3C Disability Accessibility	92	13	44	15	0	70

Global E-Government, 2005

According to the Global E-Government 2004 and Global E-Government 2005, out of the first five countries developing Web accessibility for the disabled, only Canada has achieved the desired level, while the other four have shown improvement. What is noteworthy is that, in 2004, Taiwan accumulated a total of 92 points in the rating indices, and is the fastest growing country of all in the area of developing Web accessibility for the disabled. Taiwan has reduced the imbalance of information growth within its society, and has pushed for Web accessibility for the disabled as one of the primary goals that need to be actualized by E-Government. Facing the rapid development of Internet technologies, obstacles encountered by the disabled are increasing; therefore, it is crucial to resolve each problem as it arises.

The current review adopted the Freego Stand-Alone Validation Tool, developed by the Research, Development, and Evaluation Commission (RDEC), Executive Yuan, R.O.C. The aim in so doing was to stratify Web accessibility for the disabled in Taiwan, and to propose future developments for better services.

2. DEVELOPMENT FOR GOVERNMENT WEB ACCESSIBILITY

2.1 Web Accessibility Inspection and Implement Target

The Executive Yuan, in its Web Accessibility Regulations, clearly states the direction of movement including central governments, associated organizations, local governments, social welfare, and academia. By June 2004, the RDEC has achieved four levels of accessibility: Conformance Level "A," Conformance Level "A+," Conformance Level "double-A," and Conformance Level "triple-A" (see Figure 2-1-1).

Figure 2-1- 1 Levels of Conformance

The purpose for the RDEC to start working on Web accessibility within government systems is to provide a guideline for other organizations to follow. Therefore, this research is targeted at government websites. By using automated accessibility tools, it is possible to examine the effectiveness of the guidelines and the level of conformity to them in society. A total of 117 websites were examined in this research.

2.2 Web Accessibility Inspection and Instruction for Implementation

Web Accessibility Services provided by the RDEC, and the On-Line Validation Service and the Stand-Alone Validation Tool provided by Freego have offered Single-page Diagnosis (specific for Web page Diagnosis) and Website Diagnosis (specific for all the links related to the website). The difference between On-Line Validation Service and the Stand-Alone Validation Tool lies in the ability to inspect individual website separately, allowing high efficiency by the latter.

The passing standard for Web accessibility is usually set at Website Diagnosis; therefore, most overseas research selects the homepage or various levels of websites for their assessments. The present review conducted Website Diagnosis on 117 governments by using 24 accessible checkpoints (machine recognition/machine review) (see figure 2-2-1) listed in the Accessible Web Development Guidelines (AWDG).

Table 2-2- 1 Guideline and 24 accessible checkpoints (machine recognition/machine review)

Guideline number / Checkpoint code		Priority level / Description	
1	H101000 (1.1)	1	Provide a text equivalent for every image.
	H101001 (1.2)	1	Provide a text equivalent for every applet.
	H101002 (1.3)	1	Provide a text equivalent for every object.
	H101003 (1.4)	1	Provide alternative text for all image-type buttons in forms.
	H101004 (1.5)	1	Provide alternative text for all image map hot-spots (AREAs).
	H101007 (1.8)	1	Provide other descriptive links (e.g. D link) to describe the content of LONGDESC.
	H301015 (1.16)	3	Contain a link client-side image map not presented elsewhere on the page.
3	H203002 (3.3)	2	Use a public text identifier in a DOCTYPE statement.
	H203004 (3.5)	2	Use relative sizing and positioning (% values) rather than absolute (pixels).
	H203005 (3.6)	2	Nest headings properly.
4	H304202 (4.3)	3	Identify the language of the text.
5	H305004 (5.5)	3	Provide summaries for tables.
6	H106001 (6.2)	1	Refer a HTML file to each FRAME source.
	H206005 (6.6)	2	Provide a NOFRAMES section when using FRAMEs.
7	H207001 (7.2)	2	Avoid blinking text created by the BLINK element.
	H207002 (7.3)	2	Avoid scrolling text created by the MARQUEE element.
	H207004 (7.5)	2	Do not cause a page to refresh automatically.
	H207005 (7.6)	2	Do not cause a page to redirect to a new URL.
9	H109000 (9.1)	1	If possible, use a client-side image map instead of a server-side image map.
	H209002 (9.3)	2	Make sure that event handlers do not require use of a mouse.
10	H310004 (10.5)	3	Provide a default in the text area.
	H310005 (10.6)	3	Do not use space to separate adjacent links.
12	H112000 (12.1)	1	Give each frame a title.
13	H213004 (13.5)	2	Give each page a title.

2.3 Accessible Validation Procedure

Having accessed 117 websites using the Freego Validation Tool during July and August of 2005, the accumulated results were categorized into three main Priority groups (see Table 2-3-1).

Table 2-3- 1 Distribution of the Three Priority Levels Checkpoint Error

Number of websites / Mistake checkpoint	Priority level 1	Priority level 2	Priority level 3
0	35	13	4
1	25	10	3
2	17	12	7
3	11	20	19
4	14	21	39
5	7	16	45
6	7	9	-
7	1	6	-
8	0	4	-
9	0	4	-
10	-	2	-
Total	117	117	117

From Table 2-3-1, the validation for Priority Level 1 (machine recognition/machine review) was shown to certain thirty-five websites (29.91%) with the Conformance Level "A." Of all the 35 websites, 28 also passed validation for Priority Level 2 (ensuring that event handlers do not require use of a mouse) thus reaching to Conformance Level "A+." A total of 13 websites (11.11%) had passed the Priority Level 2 (machine recognition/machine review) as well as Priority Level 1 (machine recognition/machine review), reaching to Conformance Level of "double-A." Of those four websites (3.42%) that passed Priority Level 3 (machine recognition/machine review), only 3 had also passed Priority Level 1 & 2 (machine recognition/machine review), reaching to Conformance Level "triple-A." These three websites are http://www.cpa.gov.tw/, http://www.moea.gov.tw/, and http://w2kdmz1.moea.gov.tw/index.asp.

2.4 Comparison of the Accessible Validation Procedure between year 2004 and 2005

The developmental trend for the three Priority Level Validations can be obtained by comparing results found in 2004 and 2005 assessments (see Table 2-4-1, 2-4-2, and 2-4-3).

Table 2-4- 1 Priority Level 1 Validation Comparison between 2004 and 2005

Website / Number of Checkpoint Errors	2004		2005	
	Number	%	Number	%
0	3	**4.05**	35	**29.91**
1	11	**14.86**	21	**21.37**
2	10	**13.51**	17	**14.53**
3	12	**16.22**	11	**9.40**
4	16	**21.62**	14	**11.97**
5	10	**13.51**	7	**5.98**
6	10	**13.51**	7	**5.98**
7	2	**2.70**	1	**0.85**
8	0	**0**	0	**0**
9	0	**0**	0	**0**
Total	74	**100**	117	**100**
Average number of Checkpoint Errors	3.45		1.98	

From both Table 2-4-1, comparing the data between 2004 and 2005, it was evident that website percentage was higher when checkpoint errors were between 0~2 for year 2005. However, a decrement of website percentage was seen when checkpoint errors were between 3~7. The change of trend was further supported by the decrease in average checkpoint error from 3.45 in 2004 to 1.98 in 2005. In addition, the distribution of checkpoint errors presented for 2005 was evidently more consistent than the distribution for 2004.

Table 2-4- 2 Priority Level 2 Validation Comparison between 2004 and 2005

Website / Number of Checkpoint Errors	2004		2005	
	Number	%	Number	%
0	2	**2.70**	13	**11.11**
1	1	**1.35**	10	**8.55**
2	5	**6.76**	12	**10.26**
3	10	**13.51**	20	**17.09**
4	13	**17.57**	21	**17.95**
5	14	**18.92**	16	**13.68**
6	13	**17.57**	9	**7.69**
7	4	**5.41**	6	**5.13**
8	6	**8.11**	4	**3.42**
9	3	**4.05**	4	**3.42**
10	3	**4.05**	2	**1.71**
Total	74	**100**	117	**100**
Average number of Checkpoint Errors	5.05		3.78	

From both Table 2-4-2, it is apparent that in 2005 website percentage increased from zero checkpoint error to four checkpoint errors. However, it decreased dramatically after five checkpoint errors. A decrease in averaged checkpoint errors from 5.05 in 2004 to 3.78 in 2005 further supported the trend. Furthermore, the overall distribution trend in Priority Level 2 Validation did not fluctuate as much as in Priority Level 1 Validation.

Table 2-4- 3 Priority Level 3 Validation Comparison between 2004 and 2005

Website / Number of Checkpoint Errors	2004		2005	
	Number	%	Number	%
0	2	**2.70**	4	**3.42**
1	1	**1.35**	3	**2.56**
2	1	**1.35**	7	**5.98**
3	7	**9.46**	19	**16.24**
4	21	**28.38**	39	**33.33**
5	42	**56.76**	45	**38.46**
Total	74	**100**	117	**100**
Average number of Checkpoint Errors	4.30		3.89	

From both Table 2-4-3, the website percentage in 2005 increased from zero checkpoint error to four checkpoint errors, but decreased slightly at five checkpoint errors. The decreased average checkpoint error (4.30 in 2004 to 3.89 in 2005) also supported the claim. Moreover, the overall website percentage distribution trend in Priority Level 3 Validation assessment appeared in an opposite direction to that of Priority Level 1 Validation.

Synthesizing the above comparisons for year 2005, the overall website percentage that passed the three validations was raised, with more evidence shown in Priority Level 1 Validation. The number of websites passing the validations as checkpoint errors increased was on the decrease. The average checkpoint error increased from Priority Level 1 Validation (1.98) to Priority Level 3 Validation (3.89).

2.5 Comparison of Failed Website Percentage between 2004 and 2005

The percentage of failed websites was calculated by dividing the number of failed websites by the total websites. There are 24 checkpoints assessing websites, and these are categorized into three Priority Levels. The first Priority Level consisted of 9

accessible checkpoints (see Table 2-5-1), the second Priority Level consisted of 10 accessible checkpoints (see Table 2-5-2), and the last Priority Level consisted of 5 accessible checkpoints (see Table 2-5-3).

Table 2-5- 1 Priority 1 Level Failed Website Percentage comparisons between 2004 and 2005

Item		The Number of Failed Websites		Website Mistake Percentage (%)		Average Decline Percentage (%)
Year		2004	2005	2004	2005	38.33
Sample		74	117	74	117	
Priority 1 level	1.1	67	79	90.54	67.52	25.43
	1.2	13	11	17.57	9.4	46.50
	1.3	53	38	71.62	32.48	54.65
	1.4	15	18	20.27	15.38	24.12
	1.5	47	39	63.51	33.33	47.52
	1.8	1	2	***1.35***	***1.71***	***-26.67***
	6.2	11	1	14.86	0.85	94.28
	9.1	1	1	1.35	0.85	37.04
	12.1	47	43	63.51	36.75	42.14

Table 2-5-1 clearly stated the difference in website error percentage for each of the nine accessible checkpoints. Eight of the 9 checkpoints have a decline rate of 42.90% to 24.57% in their website mistake percentage from 2004 to 2005. Only the checkpoint numbered 1.8, which stated it provides other descriptive links (e.g. D link) to describe the content of LONGDESC, showed an increase in the number of failed websites from 1 in 2004 to 2 in 2005, while the other checkpoints showed a decrease in the number of failed websites. The averaged percentage decline of website error was 38.33%.

Table 2-5- 2 Priority 2 Level Failed Website Percentage comparisons between 2004 and 2005

Item		The number of failed websites		Website Mistake Percentage (%)		Average Decline Percentage (%)
Year		2004	2005	2004	2005	27.52
Sample		74	117	74	117	
Priority 2 level	3.3	68	90	91.89	76.92	16.29
	3.5	68	101	91.89	86.32	6.06
	3.6	15	21	20.27	17.95	11.45
	6.6	18	16	24.32	13.68	43.75
	7.2	21	15	28.38	12.82	54.83
	7.3	37	26	50	22.22	55.56
	7.5	14	21	18.92	17.95	5.13
	7.6	14	16	18.92	13.68	27.70
	9.3	64	74	86.49	63.25	26.87
	13.5	55	63	74.32	53.85	27.54

Table 2-5- 3 Priority 3 Level Failed Website Percentage comparisons between 2004 and 2005

Item		The number of failed websites		Website Mistake Percentage (%)		Average Decline Percentage (%)
Year		2004	2005	2004	2005	11.73
Sample		74	117	74	117	
Priority 3 level	1.16	51	57	68.92	48.72	29.31
	4.3	68	104	91.89	88.89	3.26
	5.5	70	108	94.59	92.31	2.41
	10.5	59	76	79.73	64.96	18.53
	10.6	70	105	94.59	89.74	5.13

Table 2-5-2 presented the Priority Level 2 Validation with a decrease in the number of failed websites in all ten checkpoints in 2005, with an average decline percentage of 27.52%. Likewise, Priority Level 3 Validation showed a similar trend of 11.73% decline in the five checkpoints (see Table 2-5-3). In addition, by comparing the most often seen checkpoint errors, a similarity in percentage rate was evident in both 2004 and 2005 assessments (see Table 2-5-4)

Table 2-5- 4 The most often seen checkpoint errors

rank	Checkpoints	Priority level	2004	2005
1	5.5 Provide summaries for tables.	3	94.59 %	92.31 %
2	10.6 Do not use space to separate adjacent links.	3	94.59 %	89.74 %
3	4.3 Identify the language of the text.	3	91.89 %	88.89 %
4	3.5 Use relative sizing and positioning (% values) rather than absolute (pixels).	3	91.89 %	86.32 %
5	3.3 Use a public text identifier in a DOCTYPE statement.	2	91.89 %	76.92 %
6	1.1 Provide a text equivalent for every image.	1	90.54 %	67.52 %
7	9.3 Make sure that event handlers do not require use of a mouse.	2	86.49 %	63.25 %

The proposal was made by the Executive Yuan at the end of 2005 promoting government websites' achievement of Conformance Level "A+." Its results can be seen in Table 2-5-4. The checkpoint errors numbered 3.3, 1.1, and 9.3 were significantly decreased in their website mistake percentage, and all of them belonged to the Priority 1 and 2 Levels. The checkpoint error number 9.3 in particular had achieved Conformance Level "A+," suggesting the positive result came from the influence of promoting Conformance Level "A+."

2.6 Comparison of average number of checkpoint errors between 2004 and 2005

The average number of checkpoint errors was calculated by dividing the total number of checkpoint errors by the total sample of websites. There are 24 checkpoints assessing websites, and they are categorized into three Priority Levels. The first Priority Level consisted of the average number of checkpoint errors of 9 accessible checkpoints (see Table 2-6-1), the second Priority Level consisted of the average number of checkpoint errors of 10 accessible checkpoints (see Table 2-6-2), and the last Priority Level consisted the average number of checkpoint errors of 5 accessible checkpoints (see Table 2-6-3).

Table 2-6- 1 Comparison of Priority 1 Level Validation of the averaged number of checkpoint errors between 2004 and 2005

Year	2004	2005
Samples	74	117
1.1	5051.14	2109.00
1.2	1.07	0.32
1.3	23.81	7.32
1.4	***10.91***	***51.62***
1.5	699.24	533.20
1.8	0.26	0.26
6.2	0.65	0.00
9.1	0.01	0.00
12.1	34.38	5.05

Table 2-6- 2 Comparison of Priority 2 Level Validation of the averaged number of checkpoint errors between 2004 and 2005

Year	2004	2005
Samples	74	117
3.3	428.47	131.44
3.5	20878.39	4686.53
3.6	1.18	0.06
6.6	2.31	0.07
7.2	0.64	0.07
7.3	***5.27***	***48.65***
7.5	0.64	0.58
7.6	***0.58***	***0.91***
9.3	2880.35	788.97
13.5	35.28	5.33

Table 2-6- 3 Comparison of Priority 3 Level Validation of the averaged number of checkpoint errors between 2004 and 2005

Year	2004	2005
Samples	74	117
1.16	***373.32***	***430.79***
4.3	485.61	235.88
5.5	5990.22	3970.44
10.5	116.53	93.86
10.6	1276.82	241.02

In Table 2-6-1, eight of the 9 checkpoints showed a decrease in average number of errors in 2005, with only the checkpoint numbered 1.4, which stated that it provides alternative text for all image-type buttons in forms, showing an increase in checkpoint error (an average of 10.91in 2004 to 51.62 in 2005).

In Table 2-6-2, eight of the 10 checkpoints in Priority 2 Level Validation showed a decrease in average number of errors. Two checkpoints numbered 7.3 (Avoid scrolling text created by the MARQUEE element) and 7.6 (Do not cause a page to redirect to a new URL) showed an increase in their average number of checkpoint errors. Likewise in Table 2-6-3, four of the 5 checkpoints in Priority 3 Level Validation showed a decrease in average number of errors. The checkpoint numbered 1.16, which stated that it contains a link to a client-side image map not presented elsewhere on the page, showed an increase in its average number of checkpoint errors.

3. COMPARISON OF WEB ACCESSIBILITY EQUIPMENT (FREEGO VERSUS BOBBY)

3.1 Comparison of Web Accessibility Design Inspection Regulation

WAI WCAG 1.0, proposed by W3C, is one of the relatively completed Web Accessibility Regulations there is. It contained the requirements/necessities by the Web Content Accessibility Guideline (Nielsen, 2000). Bobby, from Watchfire Corporation, adopted WAI WCAG 1.0 as its standard for providing Web accessibility diagnosis services. In the same way, the Executive Yuan of Taiwan, R.O.C., adopted the regulations of WAI WCAG 1.0 and proposed the "Web Accessibility Regulations" which also consisted of 14 regulations and 3 Priority Levels. This Web Accessibility Regulations was the regulation guide when developing the Freego Web accessibility equipment. When comparing Web Accessibility Regulations and WAI WCAG 1.0, it is apparent the checkpoints in each of the 14 regulations are somehow different. In the Web Accessibility Regulations, a total of 90 checkpoints were found to be different, and in the WAI WCAG 1.0, sixty-five checkpoints were found to be different (see Table 3-1-1).

Table 3-1- 1 Accessibility Regulations and the WAIWCAG 1.0

WAI WCAG1.0 Number of Checkpoints		
Research, Development, and Evaluation Commission, Executive Yuan.（Web Accessibility Regulations） Number of Checkpoints		
Web Content Accessibility Guidelines		
1：provide equivalent alternatives to auditory and visual content.	16	5
2：Don't rely on color alone.	2	2
3：Use markup and style sheets and do so properly.	10	7
4：Clarify natural language usage	3	3
5：Create tables that transform gracefully.	7	6
6：Ensure that pages featuring new technologies transform gracefully.	6	5
7：Ensure user control of time-sensitive content changes.	6	5
8：Ensure direct accessibility of embedded user interfaces.	1	1
9：Design for device-independence.	6	5
10：Use interim solutions.	6	5
11：Use W3C technologies and guidelines.	4	4
12：Provide context and orientation information.	6	4
13：Provide clear navigation mechanisms.	14	10
14：Ensure that documents are clear and simple.	3	3
Total number of Checkpoints	**90**	**65**

Overseas research literature often uses Bobby for inspecting Web accessibility, whereas Taiwan always adopts Freego for inspection. Whether there are differences between the two tools, or how significant the differences imposed on the inspection are questions that need to be examined and compared in order to improve the quality of Freego and, hence, Web accessibility inspection.

3.2 Results from the administration of Freego versus Bobby

During the months of July and August 2005, one Web page was selected and underwent analysis using both Freego and Bobby equipment in order to find the conditions of the 58 checkpoints listed in the machine recognition/machine review and machine recognition/human review sections of the Development for Web Accessibility Regulations (originally there are 59 checkpoints, however the one numbered 3.2 H203001, which assures that Web page design documents can be used in HTML, was amended for human recognition). Table 3-2-1 below provides a detailed conclusion for the 58 checkpoint differences, and a suggestion for Freego is future development.

Table 3-2- 1 Freego future development opinions

Checkpoint	Revision Required	No Change Required	Further Discussion Required
1.1 H101000		✓	
1.2 H101001		✓	
1.3:H101002		✓	
1.4 H101003			✓
1.5 H101004		✓	
1.6:H101105		✓	
1.7 H101106		✓	
1.8 H101007		✓	
1.9 H101108		✓	
1.10 H101109		✓	
1.12 H101111		✓	
1.13 H101112		✓	
1.16 H301015		✓	
2.1 H102100		✓	
2.2 H202101		✓	
3.3:H203002	✓		
3.5:H203004	✓		
3.6 H203005		✓	
3.7 H203106		✓	
3.8 H203107		✓	
3.9 H203108	✓		
4.3 H304002		✓	
5.1 H105100		✓	
5.2 H105101		✓	
5.3 H205102		✓	
5.4 H205103		✓	
5.5 H305004		✓	
5.6 H305105			✓
5.7 H305106		✓	
6.1 H106100	✓		
6.2 H106001		✓	
6.3 H106102		✓	
6.4 H106103		✓	
6.5 H206104		✓	
6.6 H206005		✓	

7.2 H207001		✓	
7.3 H207002		✓	
7.4 H207103		✓	
7.5 H207004		✓	
7.6 H207005		✓	
8.1 H208100			✓
9.1 H109000			✓
9.3 H209002			✓
9.4 H309103		✓	
9.6 H309105		✓	
10.1 H210000		✓	
10.2 H210101		✓	
10.3 H210102		✓	
10.4 H310103		✓	
10.5 H310004	✓		
10.6 H310005	✓		
12.1 H112000		✓	
12.2 H212101		✓	
12.3 H212102		✓	
12.4 H212103		✓	
12.6 H212105			✓
13.2 H213101		✓	
13.5 H213004		✓	

Of a total of 58 checkpoints, between Freego and Bobby were compared, the two systems were found to have 49 checkpoints that are alike. As shown in the Table 3-2-1, 49 checkpoints were selected for "No Change Required," and have been tested, and been found to have 85% consistency. However, six checkpoints were selected for "Revision required," and they were:

3.3「Use a public text identifier in a DOCTYPE statement.」

3.5「Use relative sizing and positioning, rather than absolute」

3.9「Make sure BLOCKQUOTE is used only for quotations, not indentation」

6.1「If style sheets are ignored or unsupported; ensure that pages are still readable and usable. 」

10.5「Provide a default in the text area.」

10.6「Do not use space to separate adjacent links.」

Another five checkpoints (shown below) were different in Priority Level setup, and one checkpoint, numbered 9.3 (Make sure that event handlers do not require use of a mouse), was different in the calculation of number of errors.

1.4「Provide alternative text for all image-type buttons in forms.」

5.6「Provide a summary for tables」

8.1「Provide accessible alternatives to the information in scripts, applets, or objects.」

9.1「If possible, use a client-side image map instead of a server-side image map.」

9.3「Make sure that event handlers do not require use of a mouse.」

12.6「Explicitly associate form controls and their labels with the LABEL element」

In addition, none of the 90 checkpoints listed in the Web Accessibility Regulation in Freego can be compared with checkpoint number 13.1 (Create link phrases that make sense when read out of context) in Bobby. With these results, it is clear that the Freego Validation Tool needs to be improved, and that the Web Accessibility Regulations needs to be discussed further.

4. CONCLUSION AND DISCUSSION

Web accessibility Development has recently placed much emphasis on the Web Technology Industry. The current research has shed light onto the necessities for different organizations to unite and develop Web accessibility. The results of the research have gained International recognition.

The current research has found that, out of the 35 websites that passed the Priority 1 Level Validation (machine recognition/ machine review), 28 websites also passed the checkpoint numbered 9.3 (Make sure that event handlers do not require use of a mouse) Priority 2 Level Validation, reaching the Conformance Level "A+." Thirteen websites that passed Priority 2 Level Validation (machine recognition/machine review) had reached Conformance Level "double-A," and three of the four websites that passed Priority 3 Level Validation (machine recognition/machine review) had reached Conformance Level "triple-A."

Comparison of Website Priority Level Validation between 2004 and 2005 has shown an overall increase in websites passing all three Priority Levels, with more evidence shown in Priority 1 Level Validation. The number of websites passing the validations as checkpoint errors increase was on a decrease. The average checkpoint error increased from Priority Level 1 Validation (1.98) to Priority Level 2 Validation (3.78), and finally, again, to Priority 3 Level Validation (3.89).

Results from the failed website percentage assessed by the 24 checkpoint errors has shown a decrease in overall percentage, with the one exception of the checkpoint numbered 1.8 (Provide other descriptive links (e.g. D link) to describe the content of LONGDESC), which showed an increase of one failed website in 2004 to 2 failed websites in 2005. Further comparison of commonly seen checkpoint errors was found to be similar between 2004 and 2005, and they were as follows:

5.5「Provide summaries for tables.」

10.6「Do not use space to separate adjacent links.」

4.3「Identify the language of the text.」

3.5「Use relative sizing and positioning (% values) rather than absolute (pixels).」

3.3「Use a public text identifier in a DOCTYPE statement.」

1.1「Provide a text equivalent for every image.」

9.3「Make sure that event handlers do not require use of a mouse.」

The checkpoint errors numbered 3.3, 1.1, and 9.3 significantly decreased their website mistake percentage, and all of them belonged to the Priority 1 and 2 Levels. The checkpoint error number 9.3 in particular had achieved the Conformance Level "A+," suggesting that this positive result came from the influence of promoting Conformance Level "A+." In addition, twenty of the 24 checkpoints were shown to have decreased their average numbers of checkpoint errors, which was consistent with the increment of websites passing the Priority Level Validation percentages.

With the comparison of Freego and Bobby equipment, forty-nine of the 58 checkpoints listed in the Web Accessibility Regulations were shown to have 85% consistency. Of all the checkpoints, six of the Freego equipment checkpoints were suggested to be revised, and they were:

3.3「Use a public text identifier in a DOCTYPE statement.」

3.5「Use relative sizing and positioning (% values) rather than absolute (pixels).」

3.9「Make sure BLOCKQUOTE is used only for quotations, not indentation.」

6.1「If style sheets are ignored or unsupported, ensure that pages are still readable and usable.」

10.5「Provide a default in the text area.」

10.6「Do not use space to separate adjacent links.」

Another five checkpoints (shown below) were different in Priority Level setup, and one checkpoint, numbered 9.3 (Make sure that event handlers do not require use of a mouse), was different in the calculation of number of errors.

1.4「Provide alternative text for all image-type buttons in forms.」

5.6「Provide a summary for tables」

8.1「Provide accessible alternatives to the information in scripts, applets, or objects.」

9.1「If possible, use a client-side image map instead of a server-side image map.」

9.3「Make sure that event handlers do not require use of a mouse.」

12.6「Explicitly associate form controls and their labels with the LABEL element」

In addition, none of the 90 checkpoints listed in the Web Accessibility Regulation in Freego can be compared with checkpoint number 13.1 (Create link phrases that make sense when read out of context) in Bobby. With these results, it is clear that Freego Validation Tool needs to be improved, and that the Web Accessibility Regulations needs to be discussed further.

It is believed that after revision and discussion of the checkpoints, the Web Accessibility Regulation and the function of the Freego equipment will be more accurate in improving Web accessibility. It is also hoped that the results of this research can bring about more services to assist governments in pushing forward Web accessibility services.

5. ACKNOWLEDGMENTS

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