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**A Best Practice Framework for Web Accessibility in
South Africa**

by

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DISSERTATION

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Writing style

This thesis uses the writing style of the “editorial we”. This style was chosen to improve readability of the piece, personalize the writing style and create a common understanding between the reader and the author. When the word “we” is used, it refers to the author of the thesis.



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Chapter 1: Introduction

1.1 Introduction

South Africa is experiencing phenomenal e-commerce growth and people are adopting digital channels to perform different daily tasks. Everyone is becoming more reliant on some kind of interaction with the Internet to connect with people, fill in forms, apply for finance etc.

It has therefore become more important than ever to ensure that everyone has access to technology and is not discriminated against.

Nineteen per cent of all people living in South Africa (Parliamentary Monitoring Group, 2013) are living with a disability – one out of every five. This includes physical and mental disabilities. By not catering for the needs of this population group, companies, Government and Non-Profit Organisations are potentially excluding 10 million people in South Africa.

Not only do we have a large portion of the population with disabilities but also section nine of the Constitution of South Africa states and emphasises the legal responsibility to create equal access:

“Everyone is equal before the law and has the right to equal protection and benefit of the law.” (Republic of South Africa, 1996)

It is also the first right in the South African Bill of Rights, Chapter 2 of the Constitution of South Africa and is arguably one of the key fundamentals that a post 1994 democratic South Africa was built on. Every citizen shall be treated equally and have equal access – able-bodied or not. It is therefore imperative that equal access is provided.

But creating equal access is no easy feat. People with disabilities have a range of functions that they cannot perform and creating websites that promote equal access need to be tailored to each disability.

To create these tailored websites in South Africa the logical step is to endeavour to adhere to International standards frameworks. The problem arises in that the level of compliance and awareness in people that create websites in countries like South Africa is still extremely low as demonstrated by a study conducted in 2012 on the Government of Bangladesh (Bhuiyan, Baowaly, & Hossain, 2012). They concluded that governments across many developing countries have not grasped the importance of creating equal access websites, do not have the skills required and recommended that governments create their own set of guidelines for their context.

It is currently expected South Africa adhere to International frameworks of standards developed by experts familiar with developed and technologically mature environments.

The problem with International frameworks of standards is that they assume a level of knowledge and resources not available to developing countries like South Africa.

A framework that has been developed specifically for South Africa with its unique environment and challenges and that can be made into local policy does not currently exist. There is a need for a local framework of standards that has been compiled by selecting the biggest impacting and most applicable best practice from International frameworks.

In addition, a recent survey conducted by the University of Pretoria indicated that 83% of companies in South Africa regarded web accessibility as important but less than 25% of them thought about addressing the issue due to lack of skills. (EOH Coastal, 2017)

Furthermore, a study conducted in 2016 on web accessibility challenges in developing countries found the following as the main challenges when trying to make websites accessible: (Abuaddous, Jali, & Basir, 2016)

- Lack of skilled professionals
- Lack of resources
- Lack of accessibility awareness
- Lack of prescribing accessibility manuals

The study further indicated that popular International frameworks of standards need to be made easy to understand and easier to adopt.

In a study of government websites in Saudi Arabia and Oman, an email survey was sent to webmasters of all government websites. Sixty five per cent of the respondents indicated that inaccessible websites are caused by a lack of local policy. (Abanumy, Al-Badi, & Mayhew, 2005)

Our goal in this thesis is therefore to develop a local framework of standards that prescribes exactly what should and should not be included in a website, in an easy to follow and comprehensible way.

1.2 Problem Statement

South Africa is aware of the challenges faced by people with disabilities but do not have a framework of standards that has been specifically developed for them. There is a need for a framework of standards that is flexible and easy to follow and that can be promoted locally.

1.3 Hypothesis

It is possible to develop a framework of standards for South Africa for equal access to websites by selecting the most applicable best practice from International frameworks of standards.

1.4 Objective

The objective of this thesis is to develop a framework or artifact for equal web access for South Africa. The framework will be called the South African Web Accessibility (SAWA) framework.

The artifact being developed in this thesis does not try to develop new standards but is more a selection of applicable best practice from International frameworks of standards – simplified and made relevant to the South African context.

1.5 Approach

The approach to this thesis is based on two components:

- Section 1.5.1: Literature study
- Section 1.5.2: The Development of SAWA

The above-mentioned approach is an accepted research methodology for Informatics.

Such an approach relates to some extent to the accepted approach of Design Science.

1.5.1 Literature study

The goal of the literature study is to identify the root cause of low adherence to Web accessibility in South Africa as well as the building blocks that will form the basis of our SAWA framework (artifact).

We will develop an artifact addressing an identified problem based on a thorough literature study.

1.5.2 Development of our SAWA framework

The development of our SAWA framework will consist primarily of the analysis performed as part of our literature study i.e. which areas to focus on based on the unique challenges presented by South Africa and determining which standards to include from International frameworks of standards.

We will further validate the inclusion/exclusion of standards by looking at the main challenges designers and developers struggle with when creating accessible websites. If we include standards that address the main challenges, we maximize the impact that the framework of standards will have.

1.6 Evaluation of our SAWA framework

Once our SAWA framework of standards have been developed, we will evaluate a well-known South African Telecommunications website – Vodacom. The author has specifically chosen a narrow evaluation of one website and not a wide evaluation of multiple websites.

The reason for the selection is due to the results of one website being similar to the evaluation of multiple websites as well as ethical reasons. Vodacom currently employs the author and it would not be ethical to display the shortcomings of competitive websites.

1.7 Overview of dissertation

Chapter 2 provides an overview of what the term Accessibility is as well as a definition for Web Accessibility. We also look at the following aspects of Web Accessibility:

- Section 2.5: Different types of disabilities and assistive technologies
- Section 2.6: External factors influencing Accessibility
- Section 2.7: Why make the Web accessible?

The goal of chapter 2 is also to show the uniqueness of each type of disability and why it is important to have a unique framework that can be followed to ensure each need is catered for.

In chapter 3 we will evaluate the presence of legislation in both developing and developed countries. Legislation ensures compliance and adherence and if we measure the presence of legislation in developing countries we get an impression of how serious the governments in those countries take accessibility. The goal of the chapter is to show the difference between developing and developed countries in terms of their awareness and commitment to creating equal access.

We will be looking in more detail at the following:

- Section 3.3: Legislation in South Africa?
- Section 3.4: Legislation in Developed versus Developing Countries
- Section 3.5: Examples of court cases

We will also introduce the reader to the two most widely adopted frameworks in the world: The WCAG 2.0 framework (created by the World Wide Web Consortium or W3C) and Section 508 framework (created by Section 508, a US Government department). These two frameworks are predominantly used in developed countries and will form the basis of the SAWA framework we will develop.

In Chapter 4 we narrow the focus to look at the two organisations that govern the two frameworks, WCAG 2.0 and Section 508, introduced in Chapter 3.

Looking at these international organisations and their frameworks is instrumental in getting a better understanding of the structure and governance of frameworks.

- Section 4.3: Two international organisations that create frameworks with standards
- Section 4.4: Frameworks by the W3C and section508

In Chapter 5 we proceed to dissect the two frameworks, looking at the standards that are included in each framework and which to include in the SAWA framework. We also look at the top 10 Web accessibility challenges as we try to narrow our focus on.

- Section 5.3: The WCAG 2.0 Framework

- Section 5.4: Section 508
- Section 5.5: Top 10 Web accessibility challenges

We want to identify the common categories that each framework addresses as well as the key categories that are problematic for developers. Once we have identified the categories, we will then use them as the categories for our SAWA framework.

The key focus in chapter 6 is to show the culmination of this literature study (Chapters 1 to 5) and to showcase our SAWA Framework

- Section 6.4: The SAWA Framework
- Section 6.5: The SAWA Framework quick checklist (Section 6.5)

In chapter 7 we will be looking at ways of evaluating if an existing website is accessible by using the WCAG 2.0 and section508 frameworks. It is imperative that one gets an understanding of evaluating against frameworks if we are to evaluate websites built according to the SAWA framework.

We will also look at why it is important to review websites and the extent to which an evaluation needs to take place.

The chapter includes:

- Section 7.3: Why review websites for Accessibility?
- Section 7.4: Review against Standards
- Section 7.5: Heuristic reviews
- Section 7.6: Design Walkthroughs or Prototypes
- Section 7.7: Screening Techniques
- Section 7.8: Usability testing

Chapter 8 is a practical application chapter whereby we apply the SAWA framework to a well-known South African website to evaluate its level of accessibility as measured against the SAWA framework.

Chapter 9 is the concluding chapter. In this chapter we look at further applications of the SAWA framework as well as next steps. We look at options to digitize the solution as well as lobbying Government to adopt a standardized approach to website access.

Chapter 2: Accessibility and Web Accessibility

2.1 Introduction

Chapter 2 explains what Accessibility and Web Accessibility is. It also provides an understanding on how people with disabilities use websites and the technologies they use to help them access key information. It will outline key difficulties each disability struggle with to ensure that our *SAWA* framework successfully addresses each need.

The next section (2.2) explains the outline of Chapter 2 and what items we should understand upon completing the reading thereof.

2.2 In this chapter

As mentioned in the Chapter 1, Section 1.1, it is important to understand certain key concepts before moving onto describing the need for the *SAWA Framework* and ultimately the steps we followed to create the *SAWA Framework*.

In the chapter we will discuss the following key concepts:



Accessibility

- Section 2.3: What is Accessibility?
- Section 2.4: Different types of disabilities and assistive technologies
- Section 2.5: External factors influencing Accessibility
- Section 2.6: The benefits of accessible websites
- Section 2.7: How the *SAWA Framework* can help

We will now briefly discuss each of the sections listed in the diagram above.

In the next section (2.3), we are going to define ‘Accessibility’ in every-day life and more specifically, we are going to explain what ‘Web Accessibility’ is.

We will then look at the different types of disabilities in Section 2.4 and focus on how these users interact with the Web. We will also look at the different assistive technologies people with disabilities use to navigate websites, apps etc. It is important to know *how* these people interact with websites etc. to ensure that the SAWA Framework will cater for their needs.

Section 2.5 looks at how Web content need to take into account local culture, beliefs, religion and linguistics to ensure understandable and non-offensive experiences are created. This is again very important to understand to ensure that the SAWA Framework takes into account the differences between countries and ultimately people.

Sections 2.6 discuss why we need to make the Web accessible.

Section 2.7 provides a summary of chapter 2 and sets the scene for chapter 3 where we will be reviewing Web Accessibility in South Africa and other developing countries.

We will start with the definition of “Accessibility” as well as “Web Accessibility” in section 2.3.

2.3 What is Accessibility and Web Accessibility?

Accessibility should not be confused with the usefulness of a product but instead is the *degree* to which a person has access to a product, service, environment or device. (W3C, 2017) In simple terms it asks the question if a person with a disability can have the same or similar experience as an able-bodied person through an alternative access medium when using a product or service.

The simplest example of creating universal access or equal access to a person with a disability could be argued to be the elevator. Some people might take the stairs to

the first floor for granted and see it merely as an effortless task to get from A to B. This would be a near impossible feat for a paralysed person in a wheelchair to achieve and therefore the alternative access medium in the form of an elevator is offered.

Braille is another good example of how an alternative access medium was developed to enable people with sighted disabilities to read books in a similar fashion or understanding as sighted users.

Accessibility planning or conformance has far reaching implications and affects most industries. Transportation in most forms is greatly impacted and can be seen in examples such as wheelchair seats in airplanes, bus and train ramps, specially adapted cars and more. Spatial planning in housing, commercial buildings and public areas are more important than ever to ensure equal access to all.

Web accessibility forms part of accessibility but specifically relates to the methods by which people with disabilities access the Web. It also includes the way service providers provide ease of access or alternative access mediums to these users to ensure they enjoy a similar experience.

A good example of this would be the synchronised captions on a video that is hosted on a website. It provides deaf users with the ability to watch the video and understand the content through the captions.

To summarise: When a website relies on a specific sense or ability that other people might not have to perform a task, it is excluding those people who do not have that ability.

Now that we know what Accessibility and Web Accessibilities are, we are going to look at the different types of disabilities and how these disabilities affect people's experience on a computer, tablet or similar device.

2.4 Different types of disability

According to the World Wide Web Consortium (W3C), an international community where member organizations, staff, and the public work together to develop Web standards, there are 6 main types of disability: (W3C, 2012)

In this section we are going to discuss these 6 types of disability to ensure that when we create the SAWA Framework in chapter 9, we cater for all types of disability.

- Section 2.4.1: Auditory
- Section 2.4.2: Visual
- Section 2.4.3: Cognitive and neurological
- Section 2.4.4: Physical
- Section 2.4.5: Speech
- Section 2.4.6: Age

The sixth disability is a perceived disability. Whilst age in the general sense is not a disability, it is considered a Web disability as we witness how some elderly people struggle with the use of computers and laptops or are reluctant to use new technologies.

We will now describe in more detail the 6 types of disability. With every type we will also refer to relevant assistive technologies that help people with each disability overcome their disadvantage.

2.4.1 Auditory

Users with hearing disabilities are our first type of disability. These users are also commonly referred to as deaf people. The level of impairment can range from complete deafness in both ears, deafness in one ear to varying degrees of loss of hearing. (W3C, 2012) People that make use of hearing aids are therefore also included in this group.

Deaf people or people with an auditory disability are primarily affected when it comes to audio and video media on the Web. Videos, audio-clips, voice-response or sound-based interactions present the most challenges. If the person is not presented with tools like a visible volume control, captions, transcripts and alternative mechanisms, the user will not be able to have a similar experience.

In section 2.4.1.1 we look at some of the assistive technologies that people with auditory disabilities use to access and navigate the Web.

2.4.1.1 Assistive technologies to assist users with auditory disabilities

There are unfortunately only a handful of assistive technologies in the digital world for deaf users.

Hearing amplifiers, as seen in Figure 2.1, are commonly known to increase the volume/clarity of existing audio.

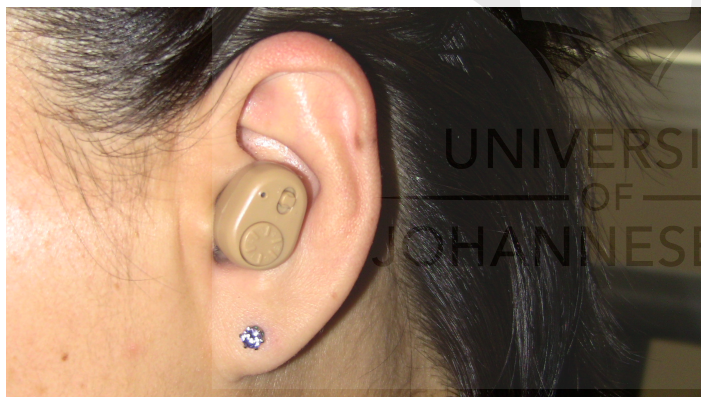


Figure 2.1. An in-ear hearing aid or hearing amplifier (Excelife, 2014)

But, new communication technologies for deaf users are however being advanced.

The image in figure 2.2 shows how an interface could potentially interpret sign language when a user is equipped with a glove that has built in sensors. The interface maps the interactions, interprets the signals and converts them into commands.

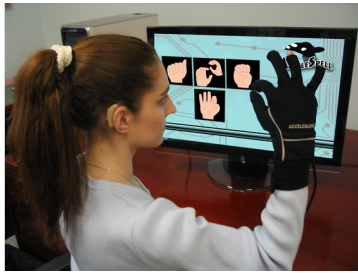


Figure 2.2. A sign language reader that has sensors built into the glove that are then interpreted by the software (IDRT, 2014)

Why this is important?

- Multi-media events such as video and clips that rely on sound should be complemented with text-only versions

In Section 2.4.2 we move to our second type of disability and we look at how people with sighted disabilities use the web as well as technologies used to aid them.

2.4.2 Visual

Our second type of disability relates to sight and includes blind people, partially sighted, colour-blind people or people that make use of visual aids etc.

Luckily there are a number of technologies that can aid users with a visual disability. We will look at these technologies in section 2.4.2.1.

2.4.2.1 Assistive technologies and software for users with visual disabilities

The key to succeeding in creating equal access for people with a visual impairment is to ensure that there is no reliance on visual cues and that the tools to enhance the experience is readily available. The guidelines and technologies include: (Action for blind people, 2014)

- Windows Explorer's magnifying glass and zoom functionality on Smartphones and tablets.

Why this is important:

- Content that rely on visuals should be adequately coded in a way that screen-readers can read out the content
- Audio alternatives should be made available where possible for visual content

...s that creates
...nters that can

print in Braille.

- Alternative input mechanisms e.g. Keyboards with large letters printed on them
- Audio books, audio alternatives that describes what is happening onscreen, transcripts that can be read by a screen-reader
- Specific HTML mark-up and best practices e.g. alternative text on images that describe
- Large monitors



We will now look at the third type of disability in section 2.4.3 and the technologies used to assist users with cognitive and neurological disabilities.

2.4.3 Cognitive and neurological

Cognitive, neurological or mental disabilities are potentially the most expansive set of disabilities to cater for and is also our third type that we will discuss.

It is unfortunately also the most difficult category for which to define guidelines for and therefore often overlooked. This is very well stated by Hudson, Weakley & Firminger (2005), *"those with cognitive disabilities and learning difficulties, appear to have slipped through the cracks to a large extent when it comes to Website Accessibility."*

As most cognitive disabilities rely on different interaction models and variations thereof, the number of categories for cognitive disabilities is virtually endless. For the purpose of this study we will mention the following:

- Users with learning disabilities e.g. Attention Deficit Disorder (ADD)
- Memory impairments e.g. Alzheimer's and brain injuries
- Linguistic and reading e.g. Dyslexia, verbal comprehension (WebAIM, 2013)
- Problem solving and calculations (Pouncey, 2010)

One of the key considerations we will be looking at in more detail in later chapters, which is also a critical usability requirement, is to keep the Web experiences consistent. The aim is to reduce confusion, using familiarity, learnability and ease of use rather than lengthy explanations or recalling previous events or content.

Section 2.4.3.1 outlines the assistive technologies available to people with Cognitive and Neurological disabilities.

2.4.3.1 Assistive technologies and software for users with Cognitive and Neurological disabilities

In the World Wide Web, assistive technology for Cognitive and Neurological disabilities, usually take on the form of visual design guidelines. The guidelines and warnings include:

- Limit blinking graphics, because it can cause epilepsy
- Include navigation cues to help people keep track of where they are in a process
- Use Plain English methods of writing
- Don't design for recall or expect a user to remember something from the previous screen

There are some technologies available for assisting those with cognitive disabilities, but they are limited: (Ed, 2007)

Simplify the experience and cognitive load as much as possible through

- Intelligent error handling on entry fields
- Plain English writing
- Multiple formats of the same information
- Logical flow of navigation and presentation
- Do not rely on memory recall when following sequential processes

WebAIM. 2013)

In section 2.4.4 we will look at our fourth type of disability: physical or motor disabilities.

2.4.4 Physical or motor disabilities

Professor Stephen Hawking, as seen in Figure 2.3, was the longest living person in the UK with Motor Neurone Disease (MND) (Christopherson, 2013) and just one of the many millions of people in the world that relies on technology to communicate with the world and the digital space.

For many years Professor Stephen Hawking relied on a switch that he could operate with his finger but deterioration in his condition has forced him to communicate through the blinking of his eyes.



Figure 2.3. Professor Stephen Hawking (The Telegraph, 2008)

Similarly, Christopher Reeves, the Superman actor who was tragically paralysed after being thrown from his horse in 1995 (WebAim, 2014) was a paraplegic who relied on his voice to navigate the Internet. He commented that the Internet is a lifeline for many disabled users. Disabled users are often left dependent on others to do a lot of things we take for granted, like taking a bath, and the Internet is a way to regain some independence. They can interact with the world, transact, read, research and more.

Spinal cord injuries, loss of limbs, congenital conditions and diseases are the main causes of physical impairment.

We can categorise specific challenges that people with physical disabilities face, into the following: (WebAim, 2014)

- People who cannot use or can only partially use the keyboard or mouse.
- People who use speech/voice.
- People that use eye movement.
- People who use a sip and puff or similar oral device.

As with the other disability types, we will now look at the aids available for people with motor disabilities.

2.4.4.1 Assistive Technologies for users with physical or motor disabilities

Assistive technologies for people with physical or motor disabilities take the form of input devices. It allows the user to still interact with the web or digital media. The following are examples of alternative input devices:

- Joysticks
- Touch screens
- Trackballs – like a mouse but with the ball on top of the device
- Custom keyboards
- Head-wand (Figure 2.4)

Alternative input devices, such as the switch controller in Figure 2.5, allow people with physical disabilities to navigate the web using easy to use large buttons where the smaller controls of a mouse prove to be too challenging.

Similarly, for many people that no longer have access to their arms or legs or both, the advent of input devices that make use of other senses or body parts are proving to be a lifesaver for many. New technology can track movement and perform certain actions based on certain gestures (Figure 2.6) or interfaces that can be controlled by using only your mouth (Figure 2.7).



Figure 2.4 A head-wand is controlled by your head and can be used on an input device (WebAim, 2014)



Why this is important?

- Allow for larger clickable areas
- Reduce the number of input actions
- Allow for sufficient time in time-based applications

Buttons are the
movement.

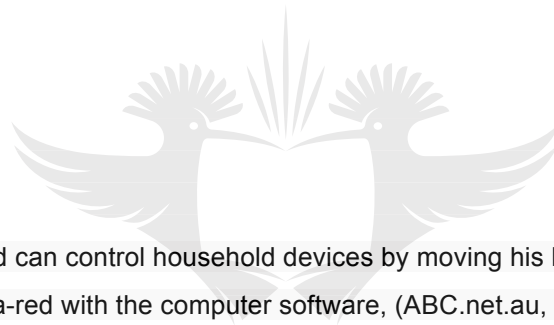


Figure 2.6. Sean Fitzgerald can control household devices by moving his head; the silver dot on his forehead connects via infra-red with the computer software, (ABC.net.au, 2014)



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Figure 2.7. The Jouse 3, a sensitive joystick that is controlled through the mouth (Compusult, 2014)

- Allow alternative input mechanisms such as text input for applications that rely speech-only input

available to people with speech impairments. e technologies

2.4.5 Speech

Speech impairments have been traditionally seen as a minor obstacle to digital accessibility but should not be overlooked as we head into an era where biometric authentication and voice interaction becomes the norm.

Users with a voice disability such as: (W3C, 2012)

- Muteness
- Stuttering
- Apraxia Of Speech (AOS) – “inconsistent articulation and production of speech sounds, and errors producing sounds in the correct order so that spoken words or phrases become difficult to understand” (World Wide Web Consortium (W3C), 2012)
- Ccuttering (increased speaking rate)

Speech impairments are especially detrimental where websites only have phone numbers to contact as well as Interactive Voice Response (IVR) systems.

2.4.5.1 Assistive technologies for people with speech disabilities

There are only two technologies that offer significant aid to users with speech impairments:

- Speech synthesizers can convert text to speech
- Alternative keyboard or keypad entry instead of voice commands

We conclude our different types of disability with our last and sixth type of disability in the next section: age.

2.4.6 Age

Our sixth and last type of disability is age. Whilst age is definitely not an impairment or disability, it is very important to note that websites and technology are perceived differently by different age groups. The level of comfort, understanding and interaction vary greatly.

Technophobia and Cyberphobia (Wikipedia, 2013) are two conditions that refer to aversion to technology and computers. The first instance of Technophobia dates back to 1675 when a group of weavers destroyed machines that replaced their jobs. The Luddites in 1811 (Wikipedia, 2014) were a similar group that destroyed and plundered in response to technological advancement.

Cyberphobia is a more specific condition that relates to the fear of computers and is seen in many of the elderly.

2.4.6 Summary

We have now looked at all six categories of disabilities and the technologies designed specifically for them. These technologies focused primarily on input mechanisms when interacting with another device or monitor. We will use these different types as key deciding factors when constructing the *SAWA* Framework in later chapters.

In section 2.5 we will look at how some external factors can have an impact on a website's accessibility in addition to it not being accessible to people with disabilities.

2.5 External factors that have an impact on Web

Accessibility

Now that we understand what digital accessibility is, how it impacts different disabilities and how technology can assist them, it is also important to look at some of the external factors that can have an impact on a website or an application's accessibility.

At the end of 2002 it was estimated that 32% of Internet users were English-speaking people (Culture and Website Localization, 2013). At the end of May 2011 the number had dropped to 27%. It is clear that many developing nations are entering the digital world but more importantly they are doing it in their own language.

The result of the growth in non-English speaking websites is that many such websites are being translated into various other languages to make them accessible to the English, Spanish or Chinese markets. The biggest challenge is that each country, nation or culture is different and words, images, symbols, reading and navigation patterns etc. have different meanings for different cultures.

To ensure this content is accessible it is therefore very important to consider the differences in interpretation. Key factors to consider are: (Culture and Website Localization, 2013)

- **Navigation:** Westerners read from left to right, Chinese and Japanese people from top to bottom and Arabic users from right to left.
- **Colour:** White in Japanese culture is considered the colour of mourning whilst red represent 'auspicious' for the Chinese.
- **Symbols and pictures:** Pictures of certain animals are offensive to certain cultures whilst others are sacred. Iconography differs from country to country as well and the 'Home' icon might be represented differently in another country.

- **Language:** A prime example would be the transference of metaphors from one language to the other. One should be very careful when translating websites to ensure the content is still understandable and accessible for the audience.

In section 2.6 we will look at the benefits of making websites accessible.

2.6 The benefits of accessible websites?

We have established that there is a huge audience in the world that has some sort of disability. Whilst it is widely accepted that it is the right thing to do to enable everyone equal access to our websites and applications, there are some key benefits to creating accessible websites. They are: (Kiss, 2014)

- It helps improve the lives of people with disabilities
- Inclusion creates innovation: By creating an inclusive environment an organisation involves those with disabilities to help evolve the technologies that assist millions.
- From a business point of view it makes sense to create accessible websites to enable more customers to interact with your site.
- From a cost perspective it is a lot cheaper to develop standards-based websites than to retrofit your current non-accessible website.
- Many countries have legislation in place that websites have to abide by.

In section 2.7 we are going to see how we can get the above-mentioned benefits realized.

2.7 How our SAWA framework can help

We have learned what Accessibility is as well as what Web Accessibility is. From the previous paragraphs it is clear that we need to ensure equal access to the entire population, regardless of disability. We have also encountered the different types of disabilities and their associated assistive technologies. Lastly, we looked at external factors that have an impact on the way people use the Web.

To create a consistent experience amidst all of the above-mentioned factors, it is very important to have one localised framework that can be applied consistently across industries.

As mentioned in Chapter 1, the purpose of this research project is to create a framework that will provide guidelines and checkpoints to create websites that will allow maximum access for all users.

2.8 Conclusion

We have concluded that a significant portion of South Africa's population are affected by a disability and that it is more so in developing countries where disabilities are often not treated, not acknowledged and compounded by the environment. These people often live with a variety of disabilities such as hearing, seeing, motor or movement, cognitive or mental and lastly age and speech.

There are however various methods and technologies that exist that can be deployed to assist people with disabilities to use the digital channel of their choice. It is this fact that each disability requires unique intervention on the part of web developers that further validates the need for a tailored framework.

But to ensure that a tailored framework can be adopted into internal law or legislation, it is important to determine what laws currently exist and if there is scope for improvement.

In the next chapter we are going to look at legislation and awareness in South Africa regarding Web accessibility.

Chapter 3: Web Accessibility legislation and frameworks in South Africa

3.1 Introduction

In chapter 2 we confirmed that a significant portion of South Africa's population (1 out of 5 people) suffer from some kind of disability. It re-affirmed the importance of creating accessible websites for all users and to provide accessible alternatives or experiences.

We then looked at the different types of disability:

- Auditory
- Visual
- Cognitive or Neurological
- Physical
- Speech
- Age



Each disability has different assistive technologies and accessibility principles that apply to ensure a simple and consistent experience across digital platforms.

Chapter 2 has essentially highlighted the different disabilities that we need to consider when creating our SAWA framework as well as the technologies and external factors that have an impact on how the website is designed.

In chapter 3 we will look at the correlation between the presence of legislation and internal law and the maturity of accessibility. We will do so by looking at countries in the European Union versus developing countries like South Africa.

3.2 In this chapter



Web Accessibility legislation and frameworks in South Africa

- Section 3.3: Legislation in South Africa?
- Section 3.4: Legislation in Developed versus Developing countries
- Section 3.5: Examples of court cases
- Section 3.6: How the *SAWA Framework* can help

We will now briefly discuss each of the sections listed in the diagram above.

Section 3.3 will specifically look at current provisioning in the South African regulatory environment for equal access to Web content.

Section 3.4 will expand on section 3.3 as we widen the search for Web accessibility frameworks and legislation in other developing countries versus developed countries.

We also look at examples of court cases where certain companies or entities have been sued for not complying with accessibility legislation in section 3.6.

Lastly, in section 3.6 we look at how our *SAWA* framework can assist in establishing the foundation for legislation by creating a consistent set of standards to adhere to.

3.3 Legislation in South Africa

Whilst South Africa has no shortage of legislation related to the electronic and communications fields, such as the ECA (Electronic Communications ACT) of 2006 and subsequent amendments, no specific law or legislation could be found at the

time of this study that prescribes web accessibility standards or binds public or private enterprises to them. (Ellipsis regulatory services, 2012)

The closest regulatory document that can be found is the South African constitution and The Promulgation of Information Act that states that "*South Africa's Constitution gives every person the right of access to information, held by a public or private body, that is required for the exercise or protection of any right.*" (Central Applications Office, 2016)

South Africa was one of the first countries to ratify the 'UN Conventions on the Rights of Persons with Disabilities' on 30 March 2007. (United Nations enable, 2015). The convention places responsibility on state entities to encourage both public and private organisations to provide "access for persons with disabilities to new information and communications technologies and systems, including the Internet." (World Wide Web Consortium (W3C), 2010) (SouthAfrica.info, 2015). The South African Government therefore has an obligation through the signing of the treaty but unfortunately there has been very little sign of movement in terms of standardizing web protocols.

One existing guide (Policy Guidelines for South African Government Websites, October 2012) does advise on basic accessibility and usability principles for HTML, content, layout, structure and creative but is generic and vague. Whilst many consider it a step in the right direction, it does lack the detailed guidelines and implementation checkpoints global standards offer. (Directorate: Electronic Information Resources , 2012)

The document lacks the weight, comprehensiveness and clarity that International frameworks offer.

In section 3.4 we are going to look at other developing countries to establish if this scenario of where there is a clear lack internal laws and guidance, is replicated elsewhere.

3.4 Legislation in Developed versus Developing countries

We have concluded in this study that South Africa does not have enforceable legislation in place to ensure equal access to the Web. (Loftus, 2018)

We have further established that very few existing documents exist (known at the time of writing this document) that prescribes general best practices. Those that do exist are based on global best practices and standards and have not considered local limitations. This further strengthens the need for a local framework of guidelines for developing countries as envisaged by our SAWA Framework.

In this section we are going to look at developing countries like South Africa versus developed countries. We are going to look two aspects to determine if countries that have stronger internal laws or legislation have more accessible websites. We will do so by looking at:

1. The presence of any local legislation or laws aimed specifically at making the web more accessible to people with disabilities.
2. The level of accessibility maturity of government websites as measured against the WCAG 1.0 framework of standards.

The international WCAG 1.0 framework of standards has three levels of compliance: A, AA and AAA. Each level implies higher degree of accessibility. WCAG 1.0 framework will be discussed in detail in Chapter 4.

In the table 3.1 and table 3.2 we illustrate the results from a study conducted by Kuzma, Yen and Oestreicher whereby they evaluated 6 government websites from a series of developed countries in the European Union versus developing countries like South Africa against the WCAG 1.0 framework of standards. They also looked at the presence of internal laws governing web accessibility in these countries: (Kuzma, Yen, & Oestreicher, 2008):

- Column 1: The country name

- Column 2: Indication if the country signed the UN Conventions on the Rights of Persons with Disabilities'
- Column 3: The presence or strength of internal laws or legislation regarding web accessibility
- Column 4: The number of websites that passed the lowest level of compliance (A level)
- Columns 5-10: Number of warnings and errors per level of compliance as measured against the WCAG 1.0 framework of standards. The more errors and warnings per level (A, AA or AAA), the more inaccessible your website is.

1 2 3 4 5 6 7 8 9 10

Country	UN Treaty	Internal Law	Min level	A error	A warn	AA error	AA warn	AAA error	AAA warn
UK	Yes	Strong	6	0	294	98	445	25	134
France	Yes	Strong	4	33	724	323	569	64	211
Germany	Yes	Strong	6	0	518	88	482	6	118
Switzerland	No	Strong	1	7	332	69	311	8	92
Total				40	1868	578	1807	103	555

Table 3.1: An illustration of the results of testing 6 government websites in developed countries

1 2 3 4 5 6 7 8 9 10

Country	UN Treaty	Internal Law	Min level	A error	A warn	AA error	AA warn	AAA error	AAA warn
South Africa	Yes	Weak	0	203	948	1299	1084	168	376
Liberia	Yes	Weak	1	138	346	110	584	14	115
Kenya	Yes	Weak	1	77	623	812	919	175	329
Namibia	Yes	Weak	0	66	319	219	284	17	70
Total				484	2236	2440	2871	374	890

Table 3.2: An illustration of the results of testing 6 government websites in developing countries.

Conclusion: Countries that have stronger internal laws regarding accessibility have far fewer errors and warnings when compared to countries that have weak internal accessibility legislation.

To further illustrate the discord between developed and developing countries we will be looking at examples of court cases where these regulations have been challenged. (No web accessibility court-cases could be found for the developing countries mentioned in Section 3.4)

3.5 Examples of court cases

In the USA, under Section 504, Section 508 and the American Disability Act (ADA) there have been numerous court cases against the likes of AOL, American Airlines, Barnes and Noble and Claire Stores. (Groves, List of Web Accessibility-Related Litigation and Settlements, 2011)

One of the more renowned cases involved the National Association of the Deaf when they sued Netflix (a media streaming service in the US) in an attempt to obligate Netflix to add captions to all of their streaming media. Netflix argued that their service is not a “place of public accommodation” i.e. they do not need to conform as they are a website and not a publicly accessible business. A Massachusetts court ruled in favour of the National Association of the Deaf and ordered them to add captions within a 2 year time period. (Launey, 2016)

Similarly, the National Federation of the Blind (NFB), sued Target, (AccessibleTech, 2013) a popular retail chain in the US in September 2006 arguing that their website is inaccessible to people with a visual impairment. The judge found their claim to be valid.

Another example outside of the United States (US) is the case of Donna Jodhan vs The Attorney General of Canada, in 2011 (Lowman, 2014). Jodhan argued that the Canadian Federal Government sites are not accessible to visually impaired people. The judge ruled that all 106 Government sites needed to be made accessible.

We have looked at three examples of successful cases whereby the plaintiffs were granted equal access. There has, on the other hand, been numerous unsuccessful cases but the evidence of these judiciary outcomes illustrate the robustness of applied legislation within developed countries.

No record could be found for any African case of digital web accessibility discrimination.

The awareness levels in South Africa regarding digital web accessibility are surprisingly low. This factor, combined with a lack of education and knowledge on the subject matter, seems to be additional attributes that lead to the creation of inaccessible websites. Our *SAWA* framework aims to address this lack of education and provide clear guidelines on how to create accessible websites.

3.6 How our *SAWA* framework can help

In Chapter 2 we looked at various types of disabilities and now in Chapter 3 we sought to find out if any laws exist or frameworks govern websites in developing countries versus developed countries.

South Africa does indeed have weak legislation in place to enforce web accessibility and as indicated in section 3.4, no local policy frameworks. Our *SAWA* framework steps in to provide this consistent set of standards that can be applied to developing countries. Once our framework of standards is in place, then existing laws can be applied to ensure adherence to the framework.

3.7 Conclusion

In chapter 3 we observed that compliance and maturity levels in developing countries like South Africa are low. If we were to develop a framework of standards to help increase these maturity levels, then we would need to learn from International frameworks of standards brought to us by International organisations.

In Chapter 4 we will be looking specifically at these international frameworks of standards. The aim of the chapter is to extract best practice elements (standards) that will be applicable in a localized framework of standards such as our *SAWA* Framework.



Chapter 4: Global organisations and their frameworks for creating accessible websites

4.1 Introduction

In chapter 2 we looked at the different types of disability and the assistive technologies available to them and it clearly highlighted the areas to focus on when creating our SAWA framework.

In Chapter 3 we established that legislation South Africa is non-existent and is also clear that if local frameworks are present and enforced as observed in developed countries, then higher levels of accessibility is observed.

In Chapter 4 we diverge our thinking to look at two organisations that govern the two most popular international frameworks of standards, WCAG 2.0 and Section 508, used to develop accessible websites.

4.2 In this chapter

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Global organisations and their frameworks

- Section 4.3: Two international organisations that create frameworks with standards
- Section 4.4: Frameworks by the W3C and section508
- Section 4.5: How the *SAWA Framework* can help

We will now look at each of these components individually to get a better understanding of who is responsible for creating frameworks of standards. We will introduce the W3C as well as section508.gov in section 4.3.

Once we get to know both the W3C and section508.gov, we can then delve deeper into their respective frameworks of standards in section 4.4.

4.3 Two International organisations that create frameworks of standards used to create accessible websites

In sections 4.3 we will be looking at the two organisations that create frameworks with globally accepted standards for Web Accessibility.

These organisations are groups of people that have published, validated and promoted a framework of standards whereby a person or machine can validate if a website is accessible to a person with a disability.

From our literature study we have found two main frameworks developed by two main organisations as seen in Figure 4.1.

The two organisations are:

- Section 4.3.1: The World Wide Consortium (W3C) (W3C, 2017)
- Section 4.3.2: Section 508.gov (Section 508, 2017)

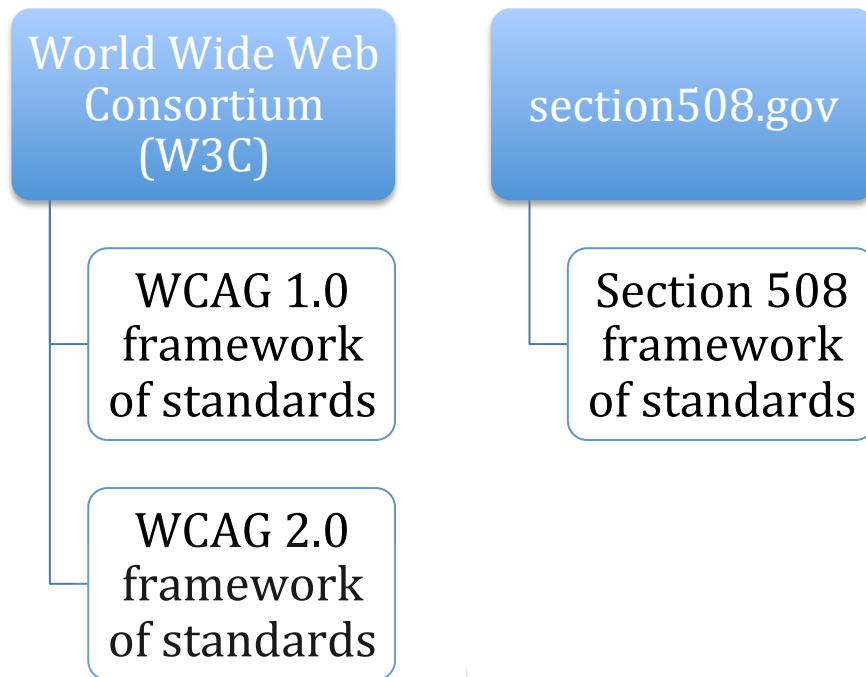


Figure 4.1. Frameworks with standards created by international organisations

In sections 4.3.1 and 4.3.2 we will be looking at these two organisations in more detail.

4.3.1 The World Wide Web Consortium (W3C)

The first organization we will be looking at is the W3C. The W3C is an international community of full-time W3C staff, member organisations and the public that work together in an effort to develop global standards in effort to create accessible websites.

The W3C is responsible for creating the WCAG 1.0 and WCAG 2.0 frameworks of standards.

The W3C's vision and mission is centered on creating a Web that facilitates the following values: (World Wide Web Consortium (W3C), 2015)

- Trust
- Knowledge sharing through data and services
- Participation for all

- Rich interaction on a Web for everything

In addition to the vision and mission statements of the W3C, the WCAG 1.0 and 2.0 frameworks of standards are also built upon a core set of Accessibility Principles.

These include: (World Wide Web Consortium (W3C), 2012)

- Accessibility principle 1: Perceivable information
- Accessibility principle 2: Operable user interface and navigation
- Accessibility principle 3: Understandable information and user interface
- Accessibility principle 4: Robust content and reliable interpretation

In section 4.3.2 we will be looking at the other organization that has a framework of standards that is adhered to by mainly US websites.

4.3.2 Section508.gov

Our second organization that has a framework with standards is section508.gov. Section508.gov created the primary American set of standards for people with disabilities wanting to access electronic and information technology. It is a requirement by law that Federal agencies abide by these standards.

(Section508.gov, 2015)

Section508.gov is responsible for creating the Section508 framework of standards.

4.4 Frameworks of standards set by the W3C and section508.gov

In section 4.2 we looked at two organisations namely the W3C and section508.gov and from our literature study identified them as the two main organisations that have frameworks of standards to develop websites by.

In section 4.4.1 we will look at an overview of the WCAG 1.0 and WCAG 2.0 frameworks with standards produced by the W3C. These are the two frameworks of

standards produced by the W3C. In section 4.4.2 we will look at the other main framework with standards called Section 508, developed by section508.gov.

Looking at these two frameworks of standards will be critical in the formulation of our SAWA framework.

4.4.1 The Web Content Accessible Guidelines (WCAG) 1.0 and WCAG 2.0

As mentioned in section 4.2.1.1, the W3C is responsible for creating the WCAG (both version 1.0 and version 2.0) frameworks with standards. Their goal is to develop a single consistent standard for web content.

The first framework with standards, WCAG 1.0, was developed in 1999 and was followed up by the final version of WCAG 2.0 on 11 December 2008. (World Wide Web Consortium, 2014) The key difference between the two frameworks is that WCAG 1.0 focused mainly on checkpoints and specific technical guidelines as opposed to WCAG 2.0's approach that is more concentrated on the principles as mentioned in 4.3.1. The reason for the change was the rapid pace at which new technologies are being introduced. The emphasis is more on the presentation and interaction than on the technology used. For the purpose of the study, we will only focus on the newer WCAG 2.0 standards.

By choosing to use and follow the WCAG 2.0 framework, the following benefits can be obtained: (World Wide Web Consortium (W3C), 2010)

- Accessible websites
- Flexibility – only the technology needs to change, not the methodology
- Universal, standard interfaces
- Large community of web professionals and documents as support base
- Easily testable and clear criteria

In the next section (4.4.1.1) we will look at how WCAG 2.0 is constructed and look at the various layers that make up WCAG 2.0.

4.4.1.1 WCAG 2.0 Layers of guidance

As illustrated in Figure 4.2, WCAG 2.0 consists of 4 layers of guidance, namely:

1. **Layer 1: Accessibility Principles** - total of 4 principles exist (see Section 4.3.1):
 - a. Accessibility Principle 1: Perceivable information
 - b. Accessibility Principle 2: Operable user interface and navigation
 - c. Accessibility Principle 3: Understandable information and user interface
 - d. Accessibility Principle 4: Robust content and reliable interpretation
2. **Layer 2: Guidelines** – Under each of the 4 principles there is a set of guidelines.
3. **Layer 3: Success Criteria** – For each guideline you are able to test if it has been met or not.
4. **Layer 4: Sufficient and Advisory techniques** – for each success criterion there are two categories of techniques: Sufficient and Advisory. Sufficient techniques will enable websites to meet the success criterion. Advisory techniques go beyond what is required to greater enhance the experience.
(World Wide Web Consortium (W3C), 2008)

Figure 4.2 below illustrates how the 4 layers of guidance interact with one another:

Each Accessibility Principle has a series of guidelines that in turn has a success criterion for each guideline. To ensure the success criterion is met, we include a technique that satisfies the criterion (Sufficient technique) as well as a technique that will go beyond satisfying the criterion (Advisory technique).

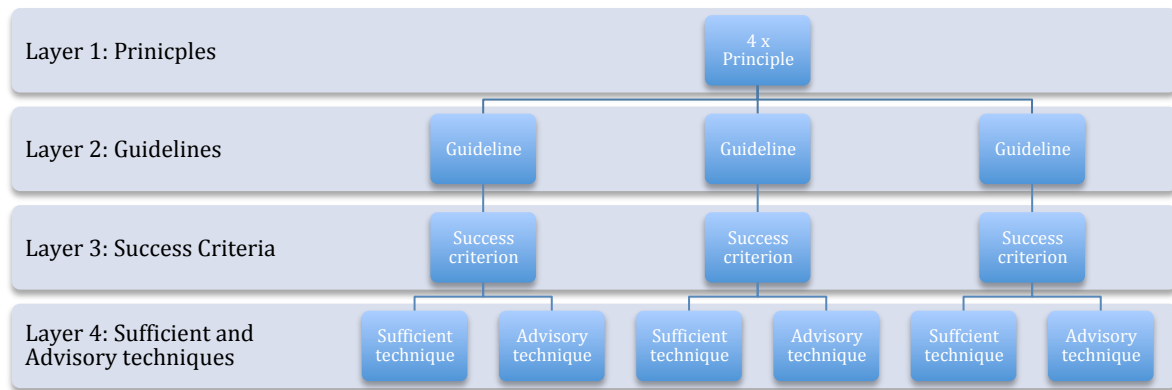


Figure 4.2 WCAG 2.0 – 4 Layers of guidance structure as created by author

The 4 layers of guidance work together to create an accessible experience on a website that can be tested, validated and classified. Classifications consist of A, AA and AAA – each classification consists of a set of criteria and the more criteria a website satisfies, the higher the classification.

We now move on the second framework called Section 508 as developed by section508.gov.

4.4.2 Section 508

The Section 508 framework with standards are a set of less detailed guidelines or standards when compared to WCAG 2.0 but nevertheless very comprehensive.

The framework of standards is part of the United States' IT and Accessibility Workforce (ITAW) solutions to eliminate barriers for people with disabilities to any electronic or information technology. (United States Access Board, 2015)

There are a number of reasons why Section 508 is so important to the US: (WebAim, 2013)

- Section 508 is the first ever US Federal accessibility standard for the Internet.
- Section 508 is a giant step in promoting digital web accessibility.
- Section 508 is a statutory obligation for Federal agencies and can be monitored from a distance.

- Businesses must also be Section 508 compliant when supplying electronic information or technology goods to the Government.

Section 508 became effective on 21 June 2001 and consists of 4 main categories with sub-categories of standards. (Section508.gov, 2015)

1. Main Category 1: Technical standards

- a. Sub-category: Software applications and operating systems
- b. Sub-category: Web-based intranet and internet information and systems*
- c. Sub-category: Telecommunications products
- d. Sub-category: Video and multimedia products
- e. Sub-category: Self contained, closed products
- f. Sub-category: Desktop and portable computers

2. Main Category 2: General standards

3. Main Category 3: Functional Performance Criteria

4. Main Category 4: Information, Documentation, and Support

Each category has a series of sub-categories and each sub-category has a number of success criteria or standards. A website is evaluated against the success criteria or standards of each of these sub-categories.

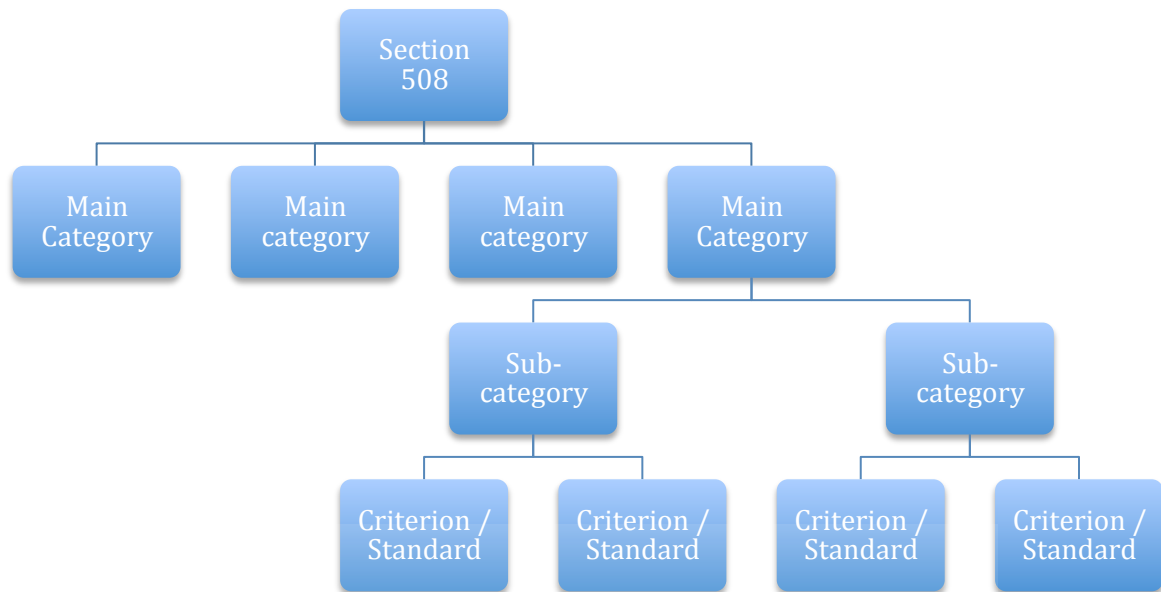


Figure 4.3 Section508 structure as created by the author

For the purpose of this research project we will focus on the first two Technical sub-categories:

1. **Technical sub-category 1: Software applications and operating systems** (12 criteria / standards) (1a above)
2. **Technical sub-category 2: Web-based intranet and internet information and systems** (16 criteria / standards) (1b above)

In chapter 5 we will look at these two Technical sub-categories in more detail. We will also look at the WCAG 2.0 framework and dissect the standards with a view to identify which standards to include in our SAWA framework.

4.5 How our SAWA framework can help

Our SAWA framework has the unique opportunity to draw on the best practice (standards) from both the WCAG 2.0 and Section 508 frameworks. By combining the best of both and adapting the frameworks for South Africa, we have the opportunity to create a framework of standards (SAWA) that is built on a solid foundation.

4.5 Conclusion

Chapter 4 served as an introduction to the two main frameworks of standards that are widely considered the norm and which carries the most weight in terms of compliance and classification of websites based on their adherence to WCAG 2.0 and Section 508 frameworks of standards.

We have further learned that to ensure consistent experiences across different platforms, cultures and languages, we need a framework of standards such as WCAG 2.0 and Section 508.

In Chapter 5 we will look at the WCAG 2.0 and Section 508 frameworks in more detail to establish which standards from these frameworks will be applicable to use in our *SAWA* framework. We also determine the top 10 Web accessibility challenges in order to help us narrow our themes that we will focus on in our *SAWA* framework.



Chapter 5: An analysis of the WCAG 2.0 and Section 508 frameworks

5.1 Introduction

In Chapters 1 to 4 we looked at what web accessibility is, if laws and policies are available in countries like South Africa, designed to promote and enforce accessibility frameworks, and we looked at some of the organisations and frameworks of standards already available.

We introduced the World Wide Web Consortium's (W3C)'s Web Content Authoring Guidelines (WCAG) 2.0 and the section508.gov - Section 508 framework.

In Chapter 5 we are going to look at:

- Section 5.2: WCAG 2.0 framework of standards
- Section 5.3: Section 508 framework of standards
- Top 10 Web accessibility challenges

We will look at how these two frameworks address the various accessibility requirements by analyzing the different criterion or standards within each set, with the goal of designing our *SAWA* framework for South Africa.

We will also look at the top 10 Web accessibility issues in conjunction with the existing international standards to ensure we focus on the highest impacting areas for accessibility.

5.2 In this chapter



An analysis of the WCAG 2.0 and Section 508 frameworks of standards

- Section 5.3: The WCAG 2.0 Framework of standards
- Section 5.4: Section 508 Framework of standards
- Section 5.5: Top 10 Web Accessibility challenges
- Section 5.6: Identifying the key focus areas or themes for our SAWA framework
- Section 5.7: Which standards to include
- Section 5.8: How the *SAWA Framework* can help

We will now discuss each of the two frameworks in detail as well as evaluate which standards to include in our *SAWA* framework in Section 5.6. Lastly we will look at how our *SAWA* framework can help in Section 5.7.

5.3 The WCAG 2.0 Framework of standards

In Chapter 4.4.1 we introduced the WCAG 2.0 framework of standards developed by the W3C. We established that the WCAG 2.0 framework of standards consists of 4 layers, namely: (World Wide Web Consortium (W3C), 2008)

1. **Layer 1: Accessibility Principles** (Refer to section 4.2.1.1) - total of 4 principles exist.
2. **Layer 2: Guidelines or standards** – Under each of the 4 principles there is a set of guidelines or standards.
3. **Layer 3: Success Criteria** – For each guideline there are testable criteria.
4. **Layer 4: Sufficient and Advisory techniques** – for each success criterion there are two categories of techniques on how to solve the issue: Sufficient and Advisory. Sufficient techniques will enable websites to meet the success

criterion. Advisory techniques go beyond what is required to greater enhance the experience.

Figure 5.1 (a repeat of figure 4.2) illustrates the structure.

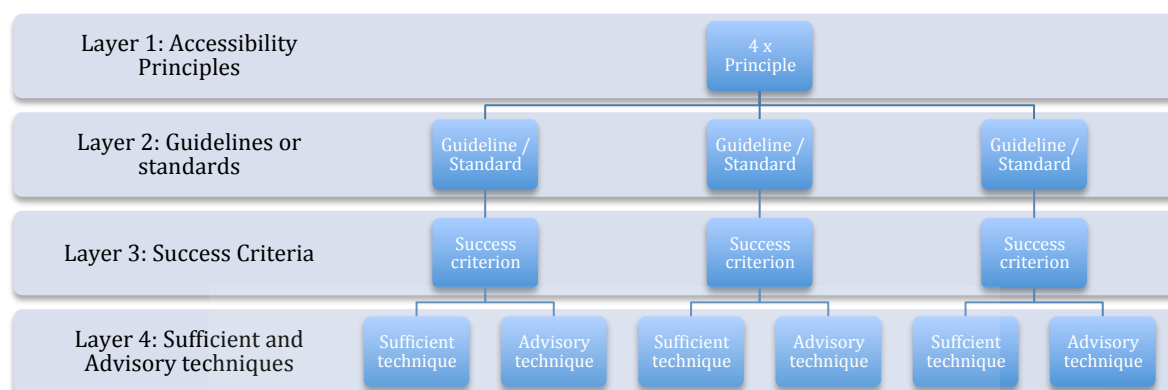


Figure 5.1 WCAG 2.0 – 4 Layers of guidance structure, created by the author to illustrate the structure

In the next section we will look at the Accessibility Principles, of which there are 4:

- 5.3.1 Layer1, Accessibility Principle 1: The website must be Perceivable
- 5.3.2 Layer1, Accessibility Principle 2: The website must be Operable
- 5.3.3 Layer1, Accessibility Principle 3: The website must be Understandable
- 5.3.4 Layer1, Accessibility Principle 4: The website must be Robust

We will now look at each of these 4 Accessibility Principles and their guidelines or standards.

5.3.1 Layer 1, Principle 1: A website must be Perceivable

Information and elements on a webpage must be presented in such a manner that users can perceive the content. (How to Meet WCAG 2.0, 2014)

Layer 2: The guidelines or standards include:

- a) Text Alternatives: Provide text alternatives for any non-text content

- b) Time-based Media: Provide alternatives for time-based media
- c) Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure
- d) Distinguishable: Make it easier for users to see and hear content including separating foreground from background

5.3.2 Layer 1, Principle 2: A website must be Operable

Information and elements should be accessible using the keyboard only. (How to Meet WCAG 2.0, 2014)

Layer 2, the guidelines or standards include:

- a) Keyboard Accessible: Make all functionality available from a keyboard
- b) Enough Time: Provide users enough time to read and use content
- c) Seizures: Do not design content in a way that is known to cause seizures
- d) Navigable: Provide ways to help users navigate, find content, and determine where they are

5.3.3 Layer 1, Principle 3: A website must be Understandable

Content should be easy to follow and understand. Users should not be left to feel lost or do not know how to perform a task. (How to Meet WCAG 2.0, 2014)

Layer 2, the guidelines or standards include:

- a) Readable: Make text content readable and understandable
- b) Predictable: Make web pages appear and operate in predictable ways
- c) Input Assistance: Help users avoid and correct mistakes

5.3.4 Layer 1, Principle 4: A website must be Robust

Ensure a website is compatible with as many web-browsers and technologies (including assistive technologies). (How to Meet WCAG 2.0, 2014)

Layer 2, the guidelines or standards include:

- a) Compatible: Maximize compatibility with current and future web-browsers, including assistive technologies

Now that we've looked at the WCAG 2.0 framework of standards it is important to look at the similarities between WCAG 2.0 and the other main framework of standards, Section 508. These frameworks provide a comprehensive checklist to creating accessible websites and form the foundation of our SAWA Framework.

5.4 Section 508 framework of standards

Section 508 framework of standards are the standards that form part of the United States' IT and Accessibility Workforce (ITAW) solutions to eliminate barriers for people with disabilities to any electronic or information technology. (United States Access Board, 2015)

In chapter 4.4.2 we indicated that we would be focusing on the first two Technical sub-categories, as they are the only standards applicable to the design and development of websites:

1. Category 1: Technical standards

- a. Software applications and operating systems
- b. Web-based intranet and internet information and systems
- c. Telecommunications products
- d. Video and multimedia products
- e. Self contained, closed products
- f. Desktop and portable computers

2. Category 2: General standards

3. Category 3: Functional Performance Criteria

4. Category 4: Information, Documentation, and Support

We will now look at the first two sub-categories within Technical standards, namely:

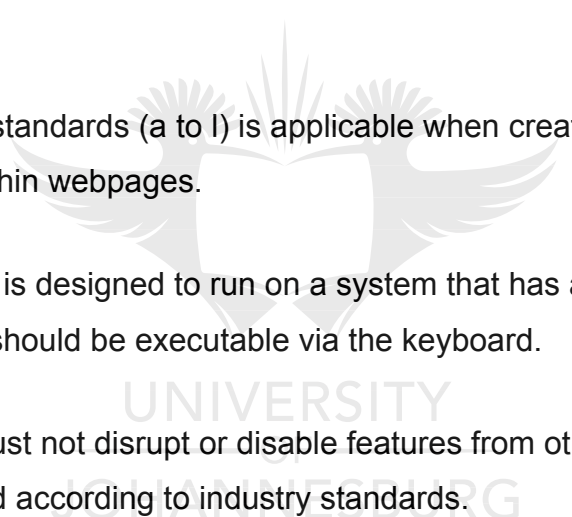
1a Software applications and operating systems

1b Web-based intranet and internet information and systems

In the next section we are going to discuss these two sub-categories and their criteria or standards in detail.

5.4.1 Technical standard 1a: Software applications and Operating Systems

A set of 12 criteria or standards (a to l) is applicable when creating forms, scripts, media and Plugins within webpages.

- 
- a) When software is designed to run on a system that has a keyboard then all commands should be executable via the keyboard.
 - b) Applications must not disrupt or disable features from other products that were developed according to industry standards.
 - c) It should be clear where the current focus is on a form or applet and it should be clear to assistive technologies.
 - d) Information about a user interface such as the identity, operation and state of the element must be available to assistive technology.
 - e) When bitmap images are used to display status indicators or other programmatic elements then these images must be used consistently and all appropriate associative cues and alternatives must be used (i.e. alt text)

- f) Textual information shall be provided through operating system functions for displaying text. The minimum information that shall be made available is text content, text input caret location, and text attributes
- g) Applications must not override colour and contrast preferences that were set by the user.
- h) When animation is used then the animation must be displayed in a different format that is not animation
- i) Colour coding must not be used as a sole way of conveying a message or action.
- j) When a product allows the changing of colour or contrast then a wide variety of colours and contrast must be provided
- k) Do not use flashing or blinking objects that may cause seizures or similar reactions.
- l) Forms should be equally accessible to assistive technologies including all direction and cues

Will now look at the next sub-category: Web-based intranet and internet information and systems.

5.4.2 Technical standard 1b: Web-based intranet and Internet information and systems

The following are the 16 (a to p) criteria or standards on which Section 508 is built and applies to building webpages:

- a) Provide a text alternative for each non-text element
- b) For a multi-media presentation the text alternative should be synchronized with the presentation

- c) All information conveyed through colour should also be available without colour
- d) Webpages should be logical and readable even if the stylesheets are turned off.
- e) Provide text links for each area of an image-map.
- f) Provide client-side image maps instead of server-side image maps.
- g) Use column and row headers for data tables
- h) HTML markup should be used to associate data cells with table headers where there are two or more levels of columns or rows
- i) All frames should have an unique identification name
- j) Pages should not cause screen flicker and therefore have a frequency greater than 2 Hz and lower than 55 Hz.
- k) Text only pages should be provided for pages where it is not possible to make the dynamic page fully accessible
- l) Pages that make use of a scripting language should have text alternatives or functionality to make them fully accessible for screenreaders.
- m) When a page makes use of an applet, an appropriate text link must be provided to the applet for download
- n) When electronic forms are used the forms must be fully accessible and all direction and cues must be readable and accessible
- o) Provide skip-links in order to skip navigation
- p) When a time limit is present the user must be given enough time to complete the action as well as be provided with cues and alerts as to the time remaining and the limit in place.

We have now been introduced to and looked in detail at both the WCAG 2.0 and Section 508 frameworks of standards. Each framework offers standards that can be applied universally across the world.

When looking at the above standards, the following main themes are common in both frameworks and summarised as the following:

- Theme 1: Web page aesthetics and construct
- Theme 2: Web page forms
- Theme 3: Web page navigation
- Theme 4: Media

Thus, each standard discussed, impacts one of these themes in one way or another.

When building our SAWA framework of standards, we will use the 4 themes identified above as our 4 main themes under which we will group our best practice standards.

But before select the standards from the two frameworks of standards discussed in Chapter 4 and the beginning of Chapter 5, we need to ensure that we address the main areas of concern or challenges when building accessible websites.

We will now look at the top 10 Web accessibility challenges to ensure that we select and amend standards that focus on the key areas of concern for web accessibility.

5.5 Top 10 Web accessibility challenges

A series of common challenges arise when using evaluation techniques and we will discuss the top 10 challenges that are commonly encountered when evaluating against the WCAG 2.0 and Section 508 frameworks of standards. The purpose of this section is to ensure that we have looked at all possible criteria that should be included in our SAWA framework.

We are therefore going to look at some of the most common challenges found when evaluating websites against WCAG 2.0 and Section 508. This will form the basis of our SAWA framework for developing countries, as it will point out areas to focus on when developing websites.

These challenges are (Grech, 2011); (Hudson, 2010): (Boudreaux, 2013)

5.5.1 Accessibility challenge 1: Images without alt-text

5.5.2 Accessibility challenge 2: Colour contrast

- 5.5.3 Accessibility challenge 3: Keyboard navigable content
- 5.5.4 Accessibility challenge 4: Forms without labels
- 5.5.5 Accessibility challenge 5: No clear semantic mark-up or heading structure
- 5.5.6 Accessibility challenge 6: No Skip links
- 5.5.7 Accessibility challenge 7: 'Click-here' and other link bad practices
- 5.5.8 Accessibility challenge 8: Ineffective use of Javascript and CSS
- 5.5.9 Accessibility challenge 9: Use of CAPTCHA
- 5.5.10 Accessibility challenge 10: Table structure

We will now look at each of these 10 Web Accessibility challenges in detail.

5.5.1 Accessibility challenge 1: Images without alt-text

Alt-text provides a text alternative to a non-text element. It is used to convey the content and function of images and other non-text elements. Alt-text is the first and most important element of creating accessible websites for the following reasons: (2015 WebAIM, 2013)

- Alt-text is the element that is read out by screen-readers such as JAWS when users with sight disabilities navigate a website
- Alt-text is displayed in browsers when the image or non-text element is not loaded
- Alt-text provides context to an image for search-engines and assists with Search Engine Optimisation (SEO)

Solution

Alt-text can be provided in a number of ways:

- 1) As the alt-attribute inside the HTML tag (It is worth mentioning that an should always have an alt-attribute populated as it is an HTML standard.)
- 2) Using the longdesc-attribute inside an HTML tag.

3) As text within the page providing context.

4) HTML uses the <figcaption> attribute inside the <figure> tag

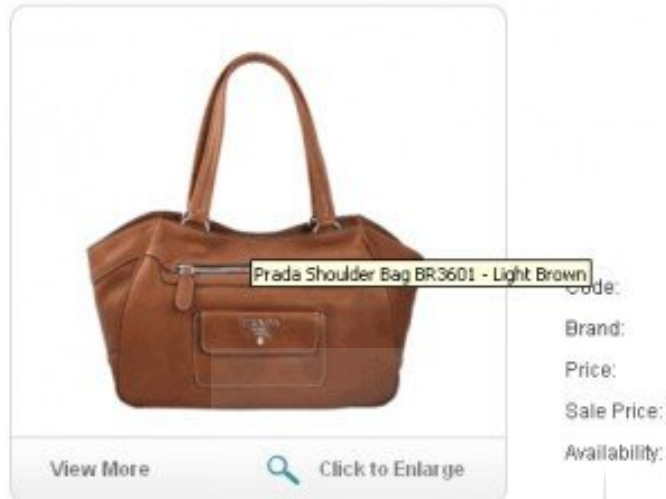


Figure 5.1: Example of alt-text available on an image when a user hovers over the image (Steinbrueck, 2012)

5.5.2 Accessibility challenge 2: Colour contrast

The aim of creating effective contrast is to ensure there is sufficient difference or contrast between text and background colour so that people with low vision can read the text without too much difficulty. (World Wide Consortium (W3C), 2015)

Solution

Black and white has the best colour contrast but can be too strong for certain users. The W3C and the WCAG 2.0 guidelines have a recommended contrast ratio and colour analyzers that designers can use to determine if selected colours have sufficient contrast. See Figure 5.2.

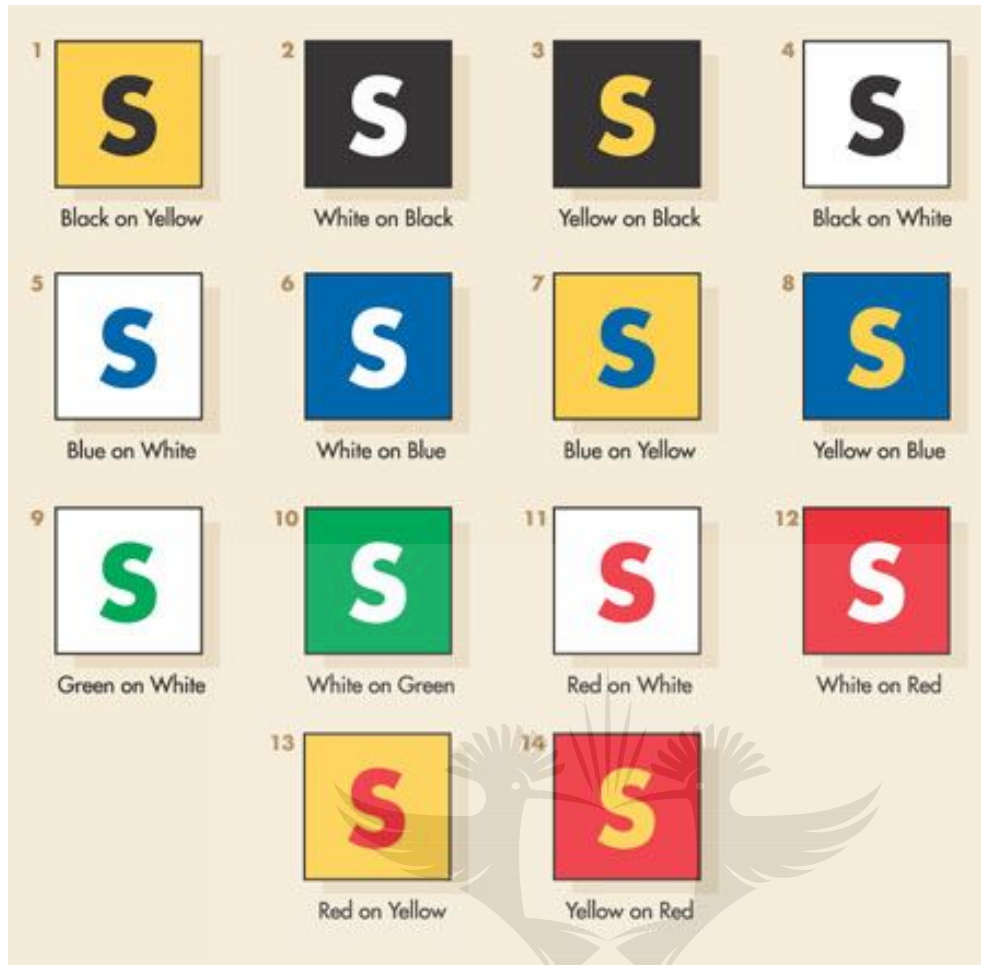


Figure 5.2: Top 14 best colour combinations (Decals and Stickers, 2015)

5.5.3 Accessibility challenge 3: Keyboard navigable content (Keyboard accessibility)

The aim here is to create webpages that can be navigated using the keyboard only and not using the mouse. This is often a requirement by users that have motor-disabilities or sight-disabilities and cannot use the mouse.

A webpage can be tested for keyboard accessibility by navigating through the page using 'Tab', 'Shift-tab' and the 'Enter' keys.

Solution

(WebAIM, 2013)

- Focus indicators – providing a visual indicator of where the user currently is on the page
- Navigation order – the order must be logical and intuitive i.e. must flow in the same way as the visual layout of the page
- Scripted elements and widgets – complex menu's and navigation methods must be scripted so that they can be navigated using a keyboard
- Lengthy navigation – avoid pages that are too long and incorporate the 'Skip' link

5.5.4 Accessibility challenge 4: Forms without labels

When a form or input fields do not have a label it makes it difficult for screen-readers to identify what should be entered into those fields. It also is not as easy to click into those fields for people with motor-disabilities.

Solution

Each input field or form control should have its own unique label. This not only helps identify the form control visually and auditory but creates an additional accessibility protocol in that a label can be made clickable to enlarge the clickable area of the form control for user with motor-disabilities.

5.5.5 Accessibility challenge 5: No clear semantic mark-up or heading structure

Screen-readers use headings and other HTML mark-up to jump from one section to another. If this is not present, the information is not logically structured and makes it very difficult for people with sight-disabilities to make sense of the content.

Solution

Pages should have a clear semantic heading structure (H1 to H6) both visually and in HTML.

The same applies to list structure and the correct HTML mark-up should be applied to the type of list being used e.g. ordered lists, numbered lists etc.

5.5.6 Accessibility challenge 6: No skip-links

The body or main content of a page is not usually at the top of the page and it is often hard for users with motor-disabilities and users with sight disabilities to get to the main content. (WebAIM, 2013). See Figure 5.3.

Solution

The idea of a skip-link is to add a hidden or visible link at the top of the page so that users can skip items such as the consistent navigation or secondary navigation.

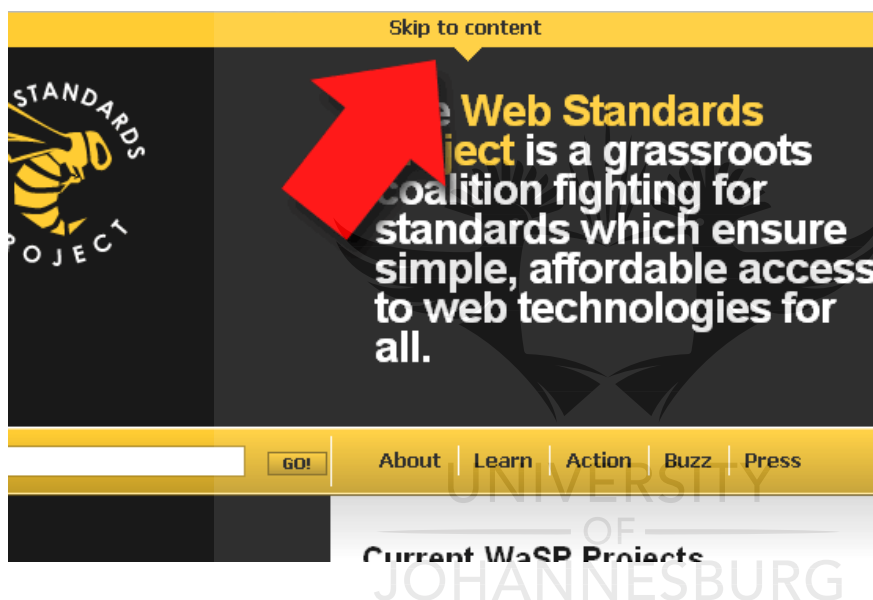


Figure 5.3: An example of a skip link (25 Ways To Make Your Website Accessible, 2011)

5.5.7 Accessibility challenge 7: 'Click here' and other link bad practices

Users are frustrated or challenged by link practices such as:

- 'Click here' instead of a descriptive link. A person using a screen-reader will have no idea of the destination of this link.
- Images that are links
- Images that portray text links



Figure 5.4: An example of a button with 'Click here' text (Mountain Ammo, 2014)

Solution

Always use descriptive links that describe exactly where the link will take the user. Also, avoid using links with the same the description that take users to different locations.

5.5.8 Accessibility challenge 8: Ineffective use of Javascript and CSS

People with disabilities do use Javascript - in fact, 98,6% of disabled users have Javascript enabled. (WebAIM, 2013) The key to creating accessible websites is to create device independent functionality – that is, not to rely on the mouse or keyboard to trigger an event. It remains a massive task and Javascript accessibility needs to be evaluated and tweaked on case-by-case basis.

Solution

For those users that do switch off Javascript and Cascading Style Sheets (CSS) it is important that the content is still displayed in a logical flow, for example, content that was flowing from left to right should now be placed as text one below the other. This relies on correct HTML mark-up though.

5.5.9 Accessibility challenge 9: The use of CAPTCHA

The purpose of a CAPTCHA (Completely Automated Public Turing test to tell Computers and

Humans Apart) is to show a distorted image or phrase prompting the user to enter said phrase in order to prove they are not an automated bot or server trying to gain access.

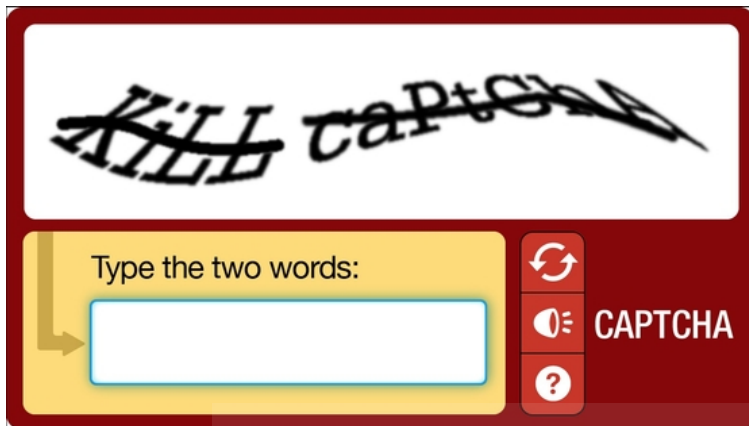


Figure 5.5: An example of CAPTCHA (<http://accan.org.au>, 2015)

CAPTCHA's unfortunately do pose a series of Accessibility problems:

- No alt-text so screen-readers can't read them (PennState, 2015)
- Audio CAPTCHAs interfere with the audio of a screen-reader
- By making the images more distorted in order to enhance CAPTCHA's efficiency, the accessibility decreases

Solution

Where possible, do not incorporate CAPTCHA tools and rather rely on other security mechanisms.

5.5.10 Accessibility challenge 10: Table structure

Tables are notoriously difficult to navigate for people with sighted disabilities. It requires them to read the top cells and the far left cells to understand in which column and row they are and then they have to navigate each cell – all the while trying to remember the top and left cells.

Solution

In order to create accessible data tables, it is important to include the following items to enable users (mainly users with sighted disabilities) to be able to navigate the table structure:

- The table summary attribute should be populated – provides a short summary an overview of the table and is read by a screenreader
- Include table headers for both rows and columns
- Use Unique IDs where possible

5.6 Identifying the key focus areas or themes for our SAWA framework

We want to leverage on these 10 challenges and see which of the main focus areas or themes identified on page 59 are impacted by these 10 challenges. This is important to know, as these will validate if we the 4 main themes that were identified are indeed the areas we need to focus on.

In the table (Table 5.1) we list the Web accessibility challenge in the first column and then in the second column we identify which theme of web development the challenge impacts.

Top Web Accessibility challenge	Theme (See page 59)
1. Images without alt-text	Web page aesthetics and construct
2. Colour contrast	Web page aesthetics and construct
3. Keyboard navigable content	Web page navigation
4. Forms without labels	Web page forms
5. No clear semantic mark-up or heading structure	Web page aesthetics and construct
6. No Skip links	Web page navigation
7. 'Click-here' and other link bad practices	Web page navigation
8. Ineffective use of Javascript and CSS	Web page aesthetics and construct
9. Use of CAPTCHA	Web page forms
10. Table structure	Web page aesthetics and construct

Table 5.1 Top Web accessibility challenges and which theme of web development it impacts

From Table 5.1, it is clear that the following themes are predominantly impacted:

- Theme 1: Web page aesthetics and construct
- Theme 2: Web page forms
- Theme 3: Web page navigation

One theme that was not impacted to a large extent but still have great importance is the presentation of media.

From the previous paragraphs it clear that the 4 main themes are very relevant and we will use them as our 4 main sections (themes) in our *SAWA* framework of standards.

In the next section we will look at existing international standards and select those applicable to include in the *SAWA* framework.

5.7 Which standards to include in our *SAWA* framework

In this section we are going to look at WCAG 2.0 as well as Section 508 to determine which of the standards identified in 5.3.1 – 5.3.4 and 5.4.1 – 5.4.2 will be included in our *SAWA* framework.

The criteria we will use to determine if they should be included will be based on:

- Cost to implement
- Impact
- Level of skill required to implement

We will also indicate to which theme (as identified on page 59) of web design the standard refers to:

- Theme 1: Web page aesthetics and construct
- Theme 2: Web page forms
- Theme 3: Web page navigation
- Theme 4: Media

These 4 themes will form the 4 main themes in our *SAWA* framework. We will add each standard that we choose to include into one of the above-mentioned themes.

We start by evaluating the WCAG 2.0 Standards:

WCAG 2.0 Standards (See page 51)	Included/ Excluded	Reason for inclusion / Exclusion	Theme
Text Alternatives: Provide text alternatives for any non-text content (Section 5.3.1 a)	Included	This is one of the basic accessibility requirements to provide alternative text for screen-readers.	Web page aesthetics and construct
Time-based Media: Provide alternatives for time-based media (Section 5.3.1 b)	Included	We will ensure text alternatives are available for all media types.	Media
Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure (Section 5.3.1 c)	Excluded	If you optimize your layout in the first instance, this requirement will not be required.	Web page aesthetics and construct
Distinguishable: Make it easier for users to see and hear content including separating foreground from background (Section 5.3.1 d)	Excluded	We will amend this requirement to ensure images are not used to convey text.	Media
Keyboard Accessible: Make all functionality available from a keyboard (Section 5.3.2 a)	Included	A lot of users navigate content using the keyboard only so this requirement is very important.	Web page navigation
Enough Time: Provide users enough time to read and use content (Section 5.3.2 b)	Included	We will include a clear warning if time-based media is used.	Media
Seizures: Do not design content in a way that is known to cause seizures (Section 5.3.2 c)	Included	We will discourage the use of flashing content to avoid seizures.	Media
Navigable: Provide ways to help users navigate, find content, and determine where they are (Section 5.3.2 d)	Included	We will ensure that skip-links are included to navigate content effectively.	Web page navigation
Readable: Make text content readable and understandable. (Section 5.3.3 a)	Included	We will ensure all abbreviations are explained and ensure content is written at a level that is easy to understand.	Web page aesthetics and construct

Predictable: Make web pages appear and operate in predictable ways (Section 5.3.3 b)	Included	We will ensure that pages are marked up correctly and consistently.	Web page aesthetics and construct
Input Assistance: Help users avoid and correct mistakes (Section 5.3.3 c)	Included	We will ensure error-messages are displayed on all forms.	Web page forms
Compatible: Maximize compatibility with current and future web-browsers, including assistive technologies (Section 5.3.4 a)	Excluded	We will not be focusing on enhanced compatibility and will ensure the basics are in place first.	Media

We will now take a look at the Section 508 standards, starting with **Technical standard 1a: Software applications and Operating Systems:**

Section 508 Standards: Technical standard 1a: Software applications and Operating Systems	Included/ Excluded	Reason for inclusion / Exclusion	Category
When software is designed to run on a system that has a keyboard then all commands should be executable via the keyboard. (Section 5.4.1 a)	Included	We will ensure all functionality is accessible via the keyboard.	Web page navigation
Applications must not disrupt or disable features from other products that were developed according to industry standards. (Section 5.4.1 b)	Excluded	The skill level required to obtain this standard is beyond basics and will not be included.	Media
It should be clear where the current focus is on a form or applet and it should be clear to assistive technologies. (Section 5.4.1 c)	Included	An indicator should be present and indicate clearly to a user where the focus is.	Web page forms
Information about a user interface such as the identity, operation and state of the element must be available to assistive technology. (Section 5.4.1 d)	Excluded	The skill level required to obtain this standard is beyond basics and will not be included.	Media
When bitmap images are used to display status	Included	Alternative text should be displayed	Web page

indicators or other programmatic elements then these images must be used consistently and all appropriate associative cues and alternatives must be used (i.e. alt text) (Section 5.4.1 e)		for all images.	aesthetics and construct
Textual information shall be provided through operating system functions for displaying text. The minimum information that shall be made available is text content, text input caret location, and text attributes (Section 5.4.1 f)	Excluded	The skill level required to obtain this standard is beyond basics and will not be included.	Web page aesthetics and construct
Applications must not override colour and contrast preferences that were set by the user. (Section 5.4.1 g)	Included	User preferences should always take preference.	Media
When animation is used then the animation must be displayed in a different format that is not animation (Section 5.4.1 h)	Included	Text alternatives should always be present for different kinds of media.	Media
Colour coding must not be used as a sole way of conveying a message or action. (Section 5.4.1 i)	Excluded	We do not encourage the use of colour to convey messages but will not be testing for it.	Web page aesthetics and construct
When a product allows the changing of colour or contrast then a wide variety of colours and contrast must be provided (Section 5.4.1 j)	Included	We will provide guidance on the best possible colour contrast to use.	Media
Do not use flashing or blinking objects that may cause seizures or similar reactions. (Section 5.4.1 k)	Included	We will discourage the use of flashing content to avoid seizures.	Media
Forms should be equally accessible to assistive technologies including all direction and cues (Section 5.4.1 l)	Included	We will have section dedicated to forms to allow efficient completion.	Web page forms

We now move over to **Technical standard 1b: Web-based intranet and internet information and systems:**

**Section 508 Standards:
Technical standard 1b:
Web-based intranet and
internet information and
systems**

Section 508 Standards: Technical standard 1b: Web-based intranet and internet information and systems	Included/ Excluded	Reason for inclusion / Exclusion	Category
Provide a text alternative for each non-text element. (Section 5.4.2 a)	Included	We will have a standard specifically aimed at providing text alternatives for media elements.	Web page aesthetics and construct
For a multi-media presentation the text alternative should be synchronized with the presentation. (Section 5.4.2 b)	Included	We will have a standard specifically aimed at providing text alternatives for media elements.	Media
All information conveyed through colour should also be available without colour. (Section 5.4.2 c)	Excluded	We will not encourage the use of colour to convey any kind of messages but will not be testing for it.	Media
Webpages should be logical and readable even if the stylesheets are turned off. (Section 5.4.2 d)	Included	We will have a standard that checks the logical flow of content once the stylesheets have been switched off.	Web page aesthetics and construct
Provide text links for each area of an image-map. (Section 5.4.2 e)	Excluded	Image maps are no longer very popular so we are excluding this requirement.	Web page aesthetics and construct
Provide client-side image maps instead of server-side image maps. (Section 5.4.2 f)	Excluded	Image maps are no longer very popular so we are excluding this requirement.	Web page aesthetics and construct
Use column and row headers for data tables. (Section 5.4.2 g)	Excluded	We will discourage the use of tables to convey critical messages	Web page aesthetics and construct
HTML markup should be used to associate data	Excluded	We will discourage the use of tables	Web page

cells with table headers where there are two or more levels of columns or rows. (Section 5.4.2 h)		to convey critical messages	aesthetics and construct
All frames should have a unique identification name. (Section 5.4.2 i)	Excluded	We will not encourage the use of frames but we do make a requirement that all HTML elements should be unique.	Web page aesthetics and construct
Pages should not cause screen flicker and therefore have a frequency greater than 2 Hz and lower than 55 Hz. (Section 5.4.2 j)	Included	We will discourage the use of flashing content to avoid seizures.	Media
Text only pages should be provided for pages where it is not possible to make the dynamic page fully accessible. (Section 5.4.2 k)	Excluded	We will only ensure that text alternatives are used for media elements.	Web page aesthetics and construct
Pages that make use of a scripting language should have text alternatives or functionality to make them fully accessible for screen-readers. (Section 5.4.2 l)	Included	When you switch Javascript off, the pages should still flow logically.	Web page aesthetics and construct
When a page makes use of an applet, an appropriate text link must be provided to the applet for download. (Section 5.4.2 m)	Included	It's important to include links to external applets or applications are used.	Media
When electronic forms are used the forms must be fully accessible and all direction and cues must be readable and accessible. (Section 5.4.2 n)	Excluded	This requirement is vague and we already have a section dedicated to making forms accessible.	Web page forms
Provide skip-links in order to skip navigation (Section 5.4.2 o)	Included	Skip links are essential for screen-readers to get to the body of the content	Web page navigation
When a time limit is present the user must be given enough time to complete the action as well as be provided with cues and alerts as to the time remaining and the limit in place. (Section 5.4.2 p)	Exclude	We do not encourage that time limits be used at all.	Media

We have evaluated both frameworks and have chosen specific standards to include the formulation of our *SAWA* framework.

5.7 How our *SAWA* framework can help

Our *SAWA* Framework will take the applicable standards from WCAG 2.0 and the technical standards from Section 508 as highlighted in Section 5.5 and construct a framework that is applicable specifically for South Africa.

5.8 Conclusion

In Chapter 5 we looked at the two main frameworks with standards used to evaluate the accessibility of a website. We have handpicked the applicable standards and criteria from within each framework as we continue to build our *SAWA Framework*.

In Chapter 6 we construct our *SAWA Framework* of standards using the insights obtained from our research in Chapters 1 to 5.



Chapter 6: The South Africa Web Accessibility (SAWA) framework

6.1 Introduction

This chapter is the culmination of this project and contains the final artifact (The *SAWA Framework*) set out as our objective in Chapter 1.

In Chapter 6 we will be using the best practice standards from the frameworks we analysed as well as the challenges we identified in Chapter 5 to create our *SAWA* framework for developing countries.

6.2 In this chapter



South African Web Accessibility framework

- Section 6.3: Putting the previous chapters into context as far as SAWA is concerned
- Section 6.4: The *SAWA Framework*
- Section 6.5: The *SAWA Framework* quick checklist
- Section 6.6: Applying the *SAWA Framework*

6.3 Putting the previous chapters into context as far as SAWA is concerned

In chapter 2 we learned that 20% of people suffer from some form of disability when using the Internet. It is important to note that a large part of the population is affected by inaccessible websites and that the situation is potentially worse in developing countries. We further learned that different disabilities use the Web in different ways

using assistive technologies. It is fundamental that we know how these technologies work in order for us to design a framework for them.

Why Chapter 2 is important for our *SAWA* framework:

- A large portion of the population is affected by inaccessible websites so there is a clear need to create a framework.
- It is important to design a framework that ensures accessibility across a range of assistive technologies.

Chapter 3 shifts the focus to legislation in South Africa, developing countries as well as developed countries. We've learned that most countries do promote equal access to services in general but that in developing countries there is very little legal consequence for not allowing equal access to the Web specifically. We saw that very few documents or frameworks exist in developing countries to allow the full judicial process to be followed.

Why Chapter 3 is important for our *SAWA* framework:

- Existing frameworks are not enforced in developing countries as can be seen by the lack of court cases in developing countries as well as the shortage of formal frameworks in these developing countries.
- There is once again a clear need for a local framework that can be adopted and potentially enforced.

Chapter 4 introduced two organisations that aim to specifically create frameworks with standards that provide ways to make your website accessible. We touched on these frameworks towards the end of Chapter 4.

Why Chapter 4 is important for our *SAWA* framework:

- A framework needs to have robust structure that is based on guiding principles such as perceivable information, easy operability and clear understanding.

In chapter 5 we critically analyzed two of the most popular global frameworks namely: WCAG 2.0 and Section508.

Why Chapter 5 is important for our *SAWA* framework:

- To identify which standards are currently available and to identify the potential pool of standards that would be drawn on for the *SAWA framework*.
- These standards were listed in Section 5.5.
- We also identified four distinct themes that we can group our standards by:
 - Theme 1: Web page aesthetics and construct
 - Theme 2: Web page forms
 - Theme 3: Web page navigation
 - Theme 4: Media

Chapter 5 also showed us the top 10 challenges where developers fall short when building accessible websites and evaluated against the two main global frameworks: WCAG 2.0 and Section 508. The purpose of this chapter is to highlight key standards that should be focused on in our *SAWA* framework.

The key focus in chapter 6 is to show the culmination of this literature study (chapters 1 to 5) and to showcase our *SAWA* framework.

In the next section, Section 6.4, we will introduce our *SAWA* framework.

6.4 The *SAWA* Framework

In Chapter 5 we have taken the best of both the W3C's WCAG 2.0 standards and combined them with Section 508's standards. We have also taken into account the top 10 Web Accessibility challenges for web designers and developers.

We have then grouped the standards from WCAG2.0 and Section 508 into the following four themes:

- Section 6.4.1 Theme 1: Web page aesthetics and construct
- Section 6.4.2 Theme 2: Web page forms
- Section 6.4.3 Theme 3: Web page navigation
- Section 6.4.4 Theme 4: Media

Each theme consists of methods (or standards), which is essentially a statement that a website should conform to, as well as one or more success criteria is used to measure if the statement is met.

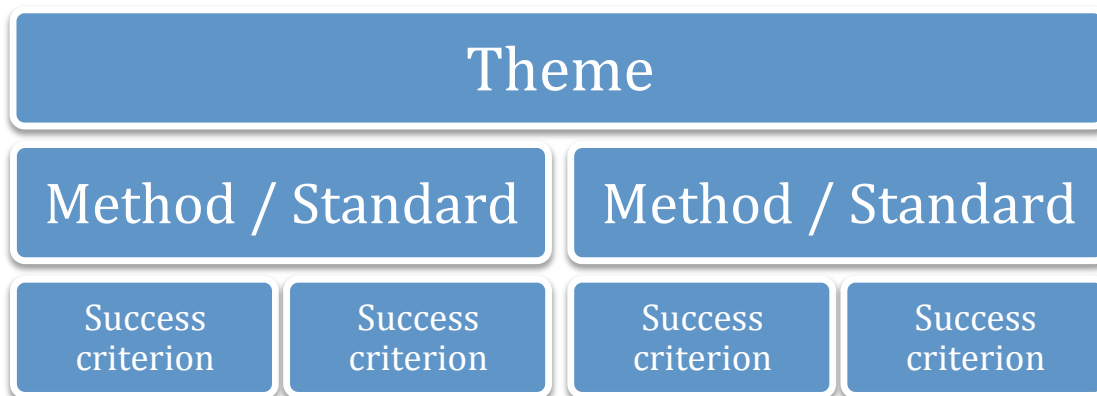


Figure 6.1: Our SAWA framework constructed by the author

In section 6.4 we will be expanding on these themes, providing an explanation of each method or standard as well as success criteria on how to successfully meet the requirements of the method. We also introduce the concepts of ‘Silver’ and ‘Gold’ status. The minimum requirement met will result in ‘Silver’ status being obtained, whilst extended success criteria met will result in ‘Gold’ status being obtained.

Silver status items are configuration items only and therefore do not require significant capital investment making it a lot more achievable for developing country websites.

For each theme we will discuss the relevant method/standard and criteria.

6.4.1 Theme 1: Web page aesthetics and construct explained

The first category of our SAWA framework emphasizes the webpage look and feel is predominantly focused on the HTML (Hyper Text Mark-up Language) components of the page as well as the general understandability of a page. It consists of the following 13 methods or standards:

6.4.1.1 Method 1: Every image use on the webpage should have alternative text present

6.4.1.1 Method 2: Images are not used to represent text

6.4.1.1 Method 3: Headings are clearly distinguishable from the rest of the content

6.4.1.1 Method 4: Clear semantic mark-up is used for page elements.

6.4.1.1 Method 5: Navigation elements are consistently in the same place on the page

6.4.1.1 Method 6: All abbreviations are explained at least once on a page

- 6.4.1.1 Method 7: Instructions do not rely on specific senses
- 6.4.1.1 Method 8: The page still makes sense if CSS and Javascript files are disabled
- 6.4.1.1 Method 9: No flashing content without warning
- 6.4.1.1 Method 10: The ability to resize the text is present on every page
- 6.4.1.1 Method 11: Unusual words are explained
- 6.4.1.1 Method 12: External CSS and Javascript files are used
- 6.4.1.1 Method 13: Plain English is used

We will now discuss each of the 13 methods and its corresponding success criteria individually.

6.4.1.1 Theme 1, Method 1: Every image used on the webpage should have alternative text present

Explanation:

Images, maps, photos etc. all require a good description that can be read by screen-readers in order to provide users with a sight-disability the same experience as a user than can the image. This is a Silver requirement.

Success criteria:

- Images that add value to the context contain descriptive alternative text in the alt="" element.
- Images that do not add value and are considered decorative are given a background value in the CSS (Cascading Style Sheet).

6.4.1.2 Theme 1, Method 2: Images are not used to represent text

Explanation:

Images should never be used to convey a text message. A better alternative is to use actual text. This is a Silver requirement.

Success criteria:

- No images are used to convey a textual message i.e. an image of text is not used.

6.4.1.3 Theme 1, Method 3: Headings are clearly distinguishable from the rest of the content

Explanation:

Headings should be clearly identifiable visually in the hierarchy of the page. This is a Silver requirement.

Success criteria:

- Headings are a different size to the body copy and correctly marked up in the HTML (Hyper Text Mark-up Language).

6.4.1.4 Theme 1, Method 4: Clear semantic mark-up is used for page elements.

Explanation:

Every page element should be clearly defined according to the requirements of the code-language utilized in the page and checked using an HTML validator. This is a Silver requirement.

Success criteria:

- Each HTML element is clearly defined and has unique identifier where applicable:
 - Frames
 - Lables
 - Tables etc.
- Tables are used for tabular data

6.4.1.5 Theme 1, Method 5: Navigation elements are placed consistently in the same place on the webpage

Explanation:

Elements that take a user to a different page or position in a page are positioned in the same position on the webpage. This is a Silver requirement.

Success criteria:

- The Search box is placed in the same position on every page
- The homepage icon links back to the homepage and is the same position on every page
- The primary and secondary navigation is in the same position on every page
- The footer links are placed in the same position on every page

6.4.1.6 Theme 1, Method 6: All abbreviations are explained at least once on a page**Explanation:**

When wanting to make use of abbreviations or acronyms it is important that it is explained to the user who might not be familiar with it. This is a Silver requirement.

Success criteria:

- Where an abbreviation or acronym is used for the first time, the full name is written out with the abbreviation placed in brackets. Thereafter the abbreviation can be used without the full text.

6.4.1.7 Theme 1, Method 7: Instructions do not rely on specific senses**Explanation:**

When providing instructions to users it is important not to rely on a specific sense to convey a message. For example – Do not use colour or direction as ways to identify position or uniqueness - “Click on the red link on the right hand side”. This is a Silver requirement.

Success criteria:

- Colour is not used to convey a message
- Direction is not used to convey a message

7.4.1.8 Theme 1, Method 8: The page still makes sense if Cascading Style Sheets (CSS) and Javascript files are disabled

Explanation:

Using the browser settings one should switch off scripts as well as styling to ensure that the content still flows logically. Many users prefer to browse without the benefit of styling or scripting and therefore rely on content to be constructed in a logical way. This is a Silver requirement.

Success criteria:

- Content flows logically even without scripts and styling enabled

6.4.1.9 Theme 1, Method 9: No flashing content without warning

Explanation:

Flashing content can be harmful for users with epilepsy and very distracting for users with attention disorders. It is important to provide these users with a warning that a page contains flashing images or alternatively provide them with the opportunity to disable flashing images and view a static alternative. This is a Silver requirement.

Success criteria:

- No flashing images are used
- A warning is present where flashing images are used
- Where flashing images are used, they should not flash more than 3 times per second

6.4.1.10 Theme 1, Method 10: The ability to resize the text is present on every page

Explanation:

Many users are not familiar with the workings of their default browsers and that it may contain the ability to increase text. It is therefore important to have a control on the webpage that allows users to increase the text size. This is a Gold requirement

Success criteria:

- A text-size control is present on every webpage

6.4.1.11 Theme 1, Method 11: Unusual words are explained**Explanation:**

When using unusual words or words from another language that users will not be familiar with, it is important to explain the meaning of the word in an accessible way on the webpage. This is a Gold requirement.

Success criteria:

- The word is in a different font and has either been hyperlinked to an explanation or the explanation is indicated somewhere else on the page.

6.4.1.12 Theme 1, Method 12: External Cascading Style Sheets (CSS) and Javascript files are used**Explanation:**

HTML should be used for mark-up only. Any stylesheets or Javascript files should be referenced in the <head> of the document and not utilized in the document itself. This is a Gold requirement as significant re-engineering might be required to retrofit an existing website.

Success criteria:

- No in-line styles or <script> tags are used in the body of the HTML

6.4.1.13 Theme 1, Method 13: Plain English is used

Explanation:

The levels of education of people that visit a website vary and not all users will have English as their first language. It is thus very important to ensure that you do not write the content to a level of understanding that is too high for most. This is a Gold requirement as an additional resource proficient in copywriting might be required.

Success criteria:

- The level of English used on the page is understandable to a person with the equivalent of 9 years formal education

We will now look at the second Theme and its corresponding methods and success criteria in section 6.4.2.

6.4.2. Theme 2: Web page forms

Webpages rely heavily on forms to acquire information from the user to process and provide value back to the user. It is therefore of critical importance to ensure that forms are as accessible and easy to fill in as possible.

This theme has 6 methods or standards and are discussed as follows:

- Section 6.4.2.1: Method 1: An on-screen indication is present of where the focus currently is within a form
- Section 6.4.2.2: Method 2: Labels should be present and should wrap around the input field as well
- Section 6.4.2.3: Method 3: Instructions are present on how to complete each field e.g. hints
- Section 6.4.2.4: Method 4: When forms are submitted, clear error validation plus instructions on how to correct the error is present
- Section 6.4.2.5: Method 5: Field validation occurs without the user having to interact
- Section 6.4.2.6: Method 6: Clickable areas are larger than normal

6.4.2.1 Theme 2, Method 1: An on-screen indication is present of where the focus currently is within a form

Explanation

When navigating with a keyboard it is very important to have an indicator to show users which field currently has focus and can be used to enter data into. (Geier, 2016) Refer to figure 8.2. This is a silver requirement.

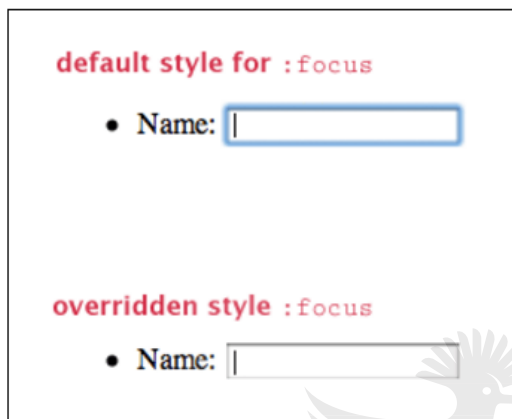


Figure 6.2 When a field has focus vs when focus has been removed (Geier, 2016)

Success criteria

- A clear visual indicator is present to represent that the field or element currently has focus and has been selected.

6.4.2.2 Theme 2, Method 2: Labels should be present

Explanation

Every element on a form such as text fields, radio buttons and dropdown-menu's should have the HTML component <label> associated with them. This allows screen-readers and other assistive technologies to associate the label with the input mechanism. (Eggert & Abou-Zahra, 2015) Refer to figure 8.3. This is a Silver requirement.

CODE SNIPPET:

```
<label for="search" class="visuallyhidden">Search: </label>
<input type="text" name="search" id="search">
<button type="submit">Search</button>
```

Figure 6.3: An example of a code snippet that contains the <label> element. (Eggert & Abou-Zahra, 2015)

Success criteria

- The <label> component is used for each input element on a form used on a webpage
- The ARIA label component is used for each input element on a form used on a webpage

6.4.2.3 Theme 2, Method 3: Instructions are present on how to complete each field should be filled in

Explanation

When completing forms, it is important to provide clear instructions on how to complete the form. Refer to figure 8.4 and 8.5 for examples. This is a Silver requirement.

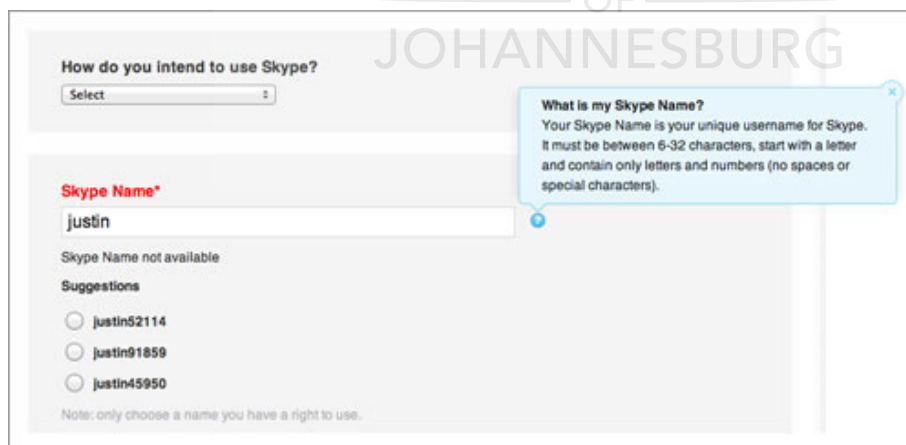
The image shows a screenshot of a web form for creating a Skype account. At the top, there is a dropdown menu labeled "How do you intend to use Skype?" with "Select" as the current choice. Below this is a text input field for "Skype Name*" containing the text "justin". Underneath the input field, it says "Skype Name not available" and "Suggestions" with three radio button options: "justin52114", "justin91859", and "justin45950". A note at the bottom states "Note: only choose a name you have a right to use." A light blue tooltip box is positioned over a question mark icon, containing the text: "What is my Skype Name? Your Skype Name is your unique username for Skype. It must be between 6-32 characters, start with a letter and contain only letters and numbers (no spaces or special characters)."

Figure 6.4 Example of a useful hint in the format of a tooltip that is displayed on a page when a user clicks or hovers over the question mark (Pal, 2016)

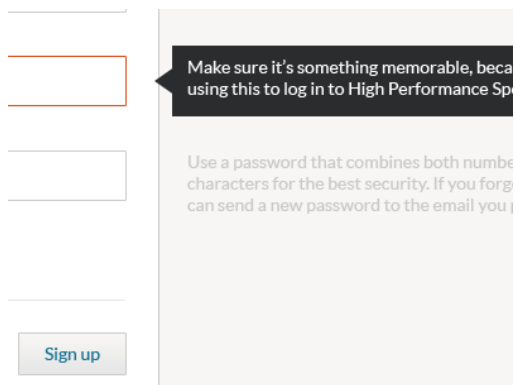


Figure 6.5 Example of dynamic tooltips that are displayed to the right of the input field once a user has shifted focus to that field (Pal, 2016)

Success criteria

- Helpful hints and tips are displayed alongside input elements on a form

6.4.2.4 Theme 2, Method 4: When forms are submitted, clear error messages must be displayed plus instructions on how to correct the error

Explanation

When a user has made an error on a webpage, provide clear and help explanations to help users correct their errors. Refer to figure 8.6. This is a Silver requirement.

your Google Account

Figure 6.6 The red text below the fields are examples of error messages that are returned and are useful once a user has hit the submit button of the form (Pal, 2016)

Success criteria

- When submitting a form and an error has been encountered, is helpful text displayed to help you complete the form?

6.4.2.5 Theme 2, Method 5: Field validation occurs without the user having to submit the form

Explanation

Some forms provide feedback whilst you complete the form. These helpful hints or information help the user correct their errors as they complete the form. Refer to figure 6.7. This is a Gold requirement as it does require additional coding experience.

ir Google Account

Figure 6.7 Example of error messages in red text being returned as the user completes the form. An error message is returned as soon as the user moves away from the field. (Pal, 2016)

Success criteria

- Whilst completing the form, is helpful text or information displayed whilst the user is trying to fix their errors?

6.4.2.6 Theme 2, Method 6: Clickable areas are larger than normal

Explanation

Areas are links can be enlarged and included in the clickable area to ensure users with motor disabilities can easily click on the link to take them to their destination. Refer to figure 6.6. This is a Gold requirement is it will require re-engineering to a large extent.

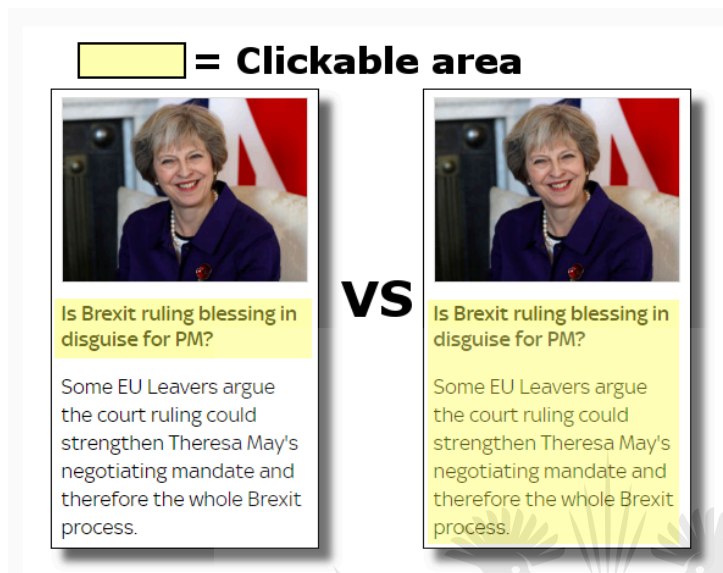


Figure 6.6 An example of where a link's clickable area has been enlarged to allow a user with motor disability for instance to click anywhere near the link (UX Stackexchange, 2016)

Success criteria

- Areas around links or clickable areas are enlarged to allow users to click close to the link and still be taken to their destination

6.4.3. Theme 3: Web page navigation

It is most often the ability to navigate between different sections/pages of a website where users with disabilities encounter the most difficulty.

This theme consists of 7 methods and are the following:

- Section 6.4.3.1: Method 1: Ensure that skip-links are present
- Section 6.4.3.2: Method 2: The user can navigate the page without getting stuck using only the keyboard
- Section 6.4.3.3: Method 3: Two methods of navigation is present
- Section 6.4.3.4: Method 4: Descriptive links are used
- Section 6.4.3.5: Method 5: Links with the same text all go to the same location

- Section 6.4.3.6: Method 6: Page breadcrumbs are present or a different way to show which page you are on
- Section 6.4.3.7: Method 7: Four methods of navigation is present

6.4.3.1 Theme 3, Method 1: Ensure that skip-links are present

Explanation

An invisible link that is placed at the top of a page that allows screen-readers to pick up the link and skip the navigation section of a webpage and go straight to the content. This is a Silver requirement.

Success criteria

- A link that is either visible or invisible is present that allows users to skip the main navigation to the first heading of the main content block.

6.4.3.2 Theme 3, Method 2: The user can navigate the page using the keyboard only without getting stuck

Explanation

Many users navigate webpages using only the keyboard e.g. screen-readers as well as users with mobility disabilities find the keyboard easier to navigate. Users use the 'Tab' key to tab through different sections of a webpage, as well as some bespoke shortcut keys. This is a silver requirement.

Success criteria

- Navigate through a webpage using only the keyboard and ensure all content areas as well as functional buttons and forms can be accessed.

6.4.3.3 Theme 3, Method 3: Two primary methods of navigation are present

Explanation

Users navigate websites using different mechanisms. Some users prefer to search for an item whilst some users prefer to browse for content. (Michael, 2011) This is a Silver requirement.

Success criteria

- The following two navigation methods are present on a website: Site search and a primary method of navigation such as a horizontal or vertical menu bar.

6.4.3.4 Theme 3, Method 4: Descriptive links are used

Explanation

Descriptive links i.e. links that describe the destination of the link in easy to understand vocabulary, sets the context for screen-readers that read out the text to people with sighted disabilities but also provides easy scannability for every user. (Oregon State University, 2017) This is a Silver requirement.

Success criteria

- Links set the context of where a user will go without being able to read the surrounding text. Also, the words 'Link', 'Click here' etc. are not used as the screenreader already tells the user that it is a link.

6.4.3.5 Theme 3, Method 4: Links with the same text all go to the same location

Explanation

Apart from having descriptive titles, links with the same text should go to the same location. E.g. 'Descriptive links explained' and 'Descriptive links explained' should both go to the same webpage and cannot go to two different webpages. This is a Silver requirement.

Success criteria

- Evaluate the page and the links on the page. If repetitive links are found, ensure that they link to the same location.

6.7.3.6 Theme 3, Method 6: Page breadcrumbs are present or a different way to show which page you are on

Explanation

A breadcrumb is a series of links or text that indicates where a user is on a website. It is a hierarchy of links that show the various levels of where you are located. Refer to figure 8.8.

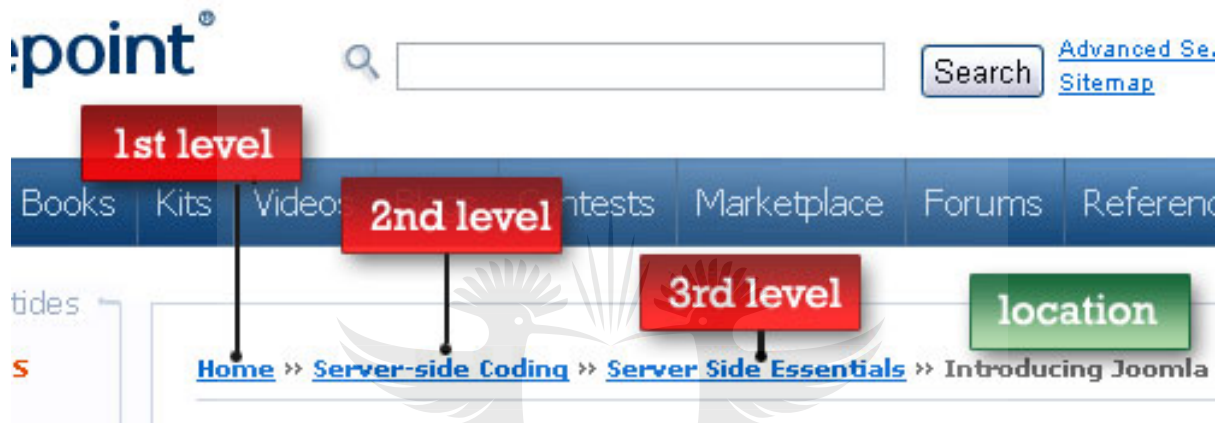


Figure 7.8 An example of a breadcrumb on a webpage (Gube, 2009)

Success criteria

- A breadcrumb or a method that acts as an indicator of where you are on the website is present on the page.

6.4.3.7 Theme 3, Method 7: Four methods of navigation are present

Explanation

Users use various methods to navigate to content on a website. This is a Gold requirement as it will require a significant investment or restructuring of an existing website.

Success criteria

- One of the following four mechanisms are present on the webpage: Site Search, Primary Navigation, Site-map, Secondary navigation, Breadcrumb, Related Content, Customised Content/Offers

6.4.4. Theme 4: Media

Interactive media and content are great ways to illustrate content to able-bodied users but can be extremely difficult to digest for users with disabilities. The next theme outlines 8 methods or standards that can be utilized to ensure at the very minimum that an alternative is present.

- Section 6.4.4.1: Method 1: A text alternative is available for any audio files
- Section 6.4.4.2: Method 2: A text alternative is available for any video
- Section 6.4.4.3: Method 3: A text alternative is available for any dynamic content
- Section 6.4.4.4: Method 4: Good colour contrast exists for text and backgrounds
- Section 6.4.4.5: Method 5: Links to required plug-ins are provided
- Section 6.4.4.6: Method 6: Applications do not override user preferences
- Section 6.4.4.7: Method 7: Timed responses are clearly identified
- Section 6.4.4.8: Method 8: Videos have synchronized captions

6.4.4.1 Theme 4, Method 1: A text alternative is available for any audio file

Explanation

Deaf users obviously cannot utilise audio clips so it is essential that a visual format of an audio clip is provided. This can be done through a transcript of the audio clip. This is a Silver requirement.

Success criteria

- When audio clips are positioned on the website, ensure that a hyperlink to a location exists that contains a transcript of the audio file in text format.

6.4.4.2 Theme 4, Method 2: A text alternative is available for any video file

Explanation

Deaf users might have difficulty with video clips as well if they are not familiar with lip reading and sighted users might have similar issues understanding audio only. It is therefore important to have a text format available of the video that explains what is happening on the screen. This is a Silver requirement.

Success criteria

- When video clips are positioned on the website, ensure that a hyperlink to a location exists that contains a transcript of the video file in text format.

6.4.4.3 Theme 4, Method 3: A text alternative is available for any dynamic content

Explanation

When inaccessible format such as Flash are used that contain animation or convey a key message in a dynamic display, then users with sighted or hearing disabilities are most likely not able to understand or access the content. This is a Silver requirement.

Success criteria

- When dynamic content is positioned on the website, ensure that a hyperlink to a location exists that contains a transcript of the dynamic content in text format.

6.4.4.4 Theme 4, Method 4: Good colour contrast exists for text and backgrounds

Explanation

Generally it is acceptable to use common sense to judge legibility. Formally it is required to have a contrast ratio of at least 4:5:1 for normal text and 3:1 for larger text. (WebAIM, 2017) This is a silver requirement.

Success criteria

- A contrast ration of at least 4:5:1 has been used for normal text and 3:1 for larger text. Larger text is text larger than 14pt. (WebAIM, 2017)

6.4.4.5 Theme 4, Method 5: Links to required plug-ins are provided

Explanation

When using an external application such as Adobe reader, it is required that a link is provided to acquire the application if the user does not have the application. This is a Silver requirement.

Success criteria

- A link is provided to the application if the application is not installed on the user's machine

6.4.4.6 Theme 4, Method 6: Applications do not override user preferences

Explanation

Many times a user with a disability has preferences set on their browser to increase the accessibility of their browser e.g. larger text. A webpage must not override said preferences. This is a Silver requirement.

Success criteria

- When browsing a website, own preferences must not be overridden by any controls of the website.

6.4.4.7 Theme 4, Method 7: Timed responses are clearly identified

Explanation

Where possible, do not use timed responses i.e. a time limit to complete a specific task. If used, it is important to alert the user of the time allowed and provide control over the time permitted. This is a Silver requirement.

Success criteria

- Where timed responses are used, the user is alerted in an accessible way that they have limited time to enter information

6.4.4.8 Theme 4, Method 8: Videos have synchronized captions

Explanation

When creating video it is required to provide text captions at the bottom of the screen synchronized with the speech of the actor on the screen. Refer to figure 8.9. This requires significant capital investment and therefore is a Gold requirement.



Figure 6.9 An example of how captions are synchronized with the conversation of the person on screen (Webaim, 2013)

Success criteria

- For a video that has been recorded, captions that have been synchronized with the speech of the actor is present.

Now that we have introduced the categories, methods as well as their corresponding success criteria, we will now start looking at implementation and for that we have created our *SAWA Framework* checklist.

6.5 The *SAWA* Checklist

The *SAWA Framework* Checklist is a snapshot of the *SAWA Framework* and its purpose is to act as a quick reference guide or summary of our *SAWA Framework*.

It is divided into the same 4 main categories as our *SAWA Framework* for ease of reference:

- Section 6.5.1: Theme 1 Web page aesthetics and construct
- Section 6.5.2: Theme 2 Web page forms
- Section 6.5.2: Theme 3 Web page navigation
- Section 6.5.2: Theme 4 Media

As indicated in our *SAWA Framework* there are two levels of compliance: Silver and Gold. For some methods there are therefore potentially two sets of criteria – one that acts as a basic level of compliance (Silver) and one that goes a bit further in terms of ensuring accessibility (Gold). It should be each web developer/owner's goal to reach gold status where applicable and failing to do that; silver should be their minimum standard.

For example:

Within Theme 3 of the *SAWA Framework*, **Web page navigation**, there is a method outlining the following:

'There must be at least two methods of navigation within a website.'

To reach silver status the website owner must have at least two methods to navigate the website such as:

- Site search
- Top or side navigation
- Site map
- Related content

To reach gold status a website owner must have at least 4 methods.

In section 6.5.1 we are going to summarise the first Theme of the SAWA checklist in more detail.

6.5.1 Section1: Theme 1 Web page aesthetics and construct

Each method is listed in the table below. A method can either be a silver requirement or a gold requirement. A ✓ is added to either the silver or gold requirement column to indicate if it is a silver or gold requirement. A reference to the method is also shown in the 'Ref' column.

Method	Silver	Gold	Ref
Every image used on the webpage should have alternative text present [Silver]	✓		6.4.1.1
Images are not used to represent text [Silver]	✓		6.4.1.2
Headings are clearly distinguishable from the rest of the content [Silver]	✓		6.4.1.3
Clear semantic mark-up is used for page elements [Silver]	✓		6.4.1.4
Navigation elements are placed consistently in the same place on the webpage [Silver]	✓		6.4.1.5
All abbreviations are explained at least once on a page [Silver]	✓		6.4.1.6
Instructions do not rely on specific senses [Silver]	✓		6.4.1.7
The flow of the page does still make sense if CSS and Javascript files are disabled [Silver]	✓		6.4.1.8
No flashing content without warning [Silver]	✓		6.4.1.9
The ability to resize the text is present on every page [Gold]		✓	6.4.1.10
Unusual words are explained [Gold]		✓	6.4.1.11
External CSS and Javascript files are used [Gold]		✓	6.4.1.12
Plain English is used (if English website) [Gold]		✓	6.4.1.13

Now that we've established on how to visually represent webpages as well as how to structure them, we will move onto how to interact with forms on a webpage in section 6.5.2.

6.5.2 Section 2: Theme 2 Web page forms

Method	Silver	Gold	Ref
An on-screen indication is present of where the focus currently is within a form [Silver]	✓		6.4.2.1
Labels should be present and should wrap around the input field as well [Silver]	✓		6.4.2.2
Instructions are present on how to complete each field e.g. hints [Silver]	✓		6.4.2.3
When forms are submitted, clear error validation plus instructions on how to correct the error is present [Silver]	✓		6.4.2.4
Field validation occurs without the user having to interact [Gold]		✓	6.4.2.5
Clickable areas are larger than normal		✓	6.4.2.6

We've discussed how best to layout webpages but also how to best design forms to ensure maximum engagement from users with disabilities.

In section 6.5.3 we will look at best practices on how to design websites that are easy to navigate for users with disabilities.

6.5.3 Section 3: Theme 3 Web page navigation

Method	Silver	Gold	Ref
Ensure that skip-links are present [Silver]	✓		6.4.3.1
The user can navigate the page without getting stuck using only the keyboard [Silver]	✓		6.4.3.2
2 Methods of navigation is present [Silver]	✓		6.4.3.3
Descriptive links are used [Silver]	✓		6.4.3.4

Links with the same text all go to the same location [Silver]	✓		6.4.3.5
Page breadcrumbs are present or a different way to show which page you are on [Silver]	✓		6.4.3.6
4 Methods of navigation is present [Gold]		✓	6.4.3.7

6.5.4 Section 4: Theme 4 Media

Method	Silver	Gold	Ref
A text alternative is available for any audio files [Silver]	✓		6.4.4.1
A text alternative is available for any video [Silver]	✓		6.4.4.2
A text alternative is available for any dynamic content [Silver]	✓		6.4.4.3
Good colour contrast exists for text and backgrounds [Silver]	✓		6.4.4.4
Links to required plug-ins are provided [Silver]	✓		6.4.4.5
Applications do not override user preferences [Silver]	✓		6.4.4.6
Timed responses are clearly identified [Gold]	✓		6.4.4.7
Videos have synchronized captions [Gold]		✓	6.4.4.8

In Chapter 6 we have introduced and explained our SAWA Framework and have established that the framework consists of 4 themes. Each theme has a series of methods (or standards) that should be followed to create accessible websites. To ensure the proper implementation of each method, we added success criteria to allow creators of websites to check if the method has been met.

We also introduced the concept of Silver and Gold status. Certain methods are easier to adhere to than others and they are categorized as Silver methods. The harder methods are classified as Gold. We concluded with an operational checklist guide.

It is important that website developers constantly refer to the SAWA checklist to ensure that they do not develop components that contradict good web accessibility. Once they have completed their development, it is useful to run through the SAWA checklist and evaluate their website against the Silver and Gold methods.

Chapter 7 will look at the best ways of evaluating a website against a framework of standards.

Chapter 7: Web Accessibility Evaluation

7.1 Introduction

In chapter 2 we defined Web Accessibility and outlined the different types of accessibility and the available assistive technologies designed to help people with disabilities. We then looked at the developing and developed world in chapter 3 to establish if there are any frameworks or legislation in place to ensure people with disabilities have equal access to content on the Web.

Chapter 4 we looked at the two main organisations and the their associated two frameworks that can be used to ensure a website is accessible to people with disabilities.

In chapter 5 we analysed each of the two frameworks highlighted by chapter 4 to gain insight into what standards will form the basis of our SAWA framework.

Chapter 6 was the culmination of the first 5 chapters as we constructed our SAWA framework.

7.2 In this chapter



Web Accessibility Evaluation

- Section 6.3: Why evaluate websites for Accessibility?
- Section 6.4: Review against Standards
- Section 6.5: Heuristic reviews
- Section 6.6: Design Walkthroughs or Prototypes
- Section 6.7: Screening Techniques
- Section 6.8: Usability testing

In chapter 7 we will be looking at ways of evaluating the accessibility of an existing website. We will also look at why it is important to evaluate websites and the extent to which an evaluation needs to take place.

The goal of this chapter is to establish how our SAWA Framework should be used when evaluating websites.

7.1 Why evaluate websites for accessibility?

In chapter 5 we looked at the WCAG 2.0 and Section 508 Web Accessibility frameworks and learned that some countries require websites to conform to either of these frameworks as part of legislation. Evaluation of conformance to these standards is therefore a legal requirement for many companies.

We have also learned in Chapter 2 that it is a moral obligation to ensure all content is accessible to your widest possible audience. We've also realized the financial benefits of creating an inclusive website that is accessible to all.

To ensure that our SAWA Framework caters for the broadest possible audience it is important to not only review a website against a framework but also to include actual users with disabilities in practical user testing. User testing provides real-time feedback from actual users and valuable insight can be derived from interviewing these users.

By using the following evaluation techniques to review or evaluate a website, one has a greater opportunity to create inclusive websites: (Henry, Evaluating for Accessibility, 2007)

- Section 7.3: Evaluation technique 1: Review against Standards
- Section 7.4: Evaluation technique 2: Heuristic reviews
- Section 7.5: Evaluation technique 3: Design Walkthroughs or Prototypes
- Section 7.6: Evaluation technique 4: Screening Techniques
- Section 7.7: Evaluation technique 5: Usability testing

In the next sections we will be looking at each of these evaluation techniques in more detail to find out when each technique should be used.

7.3 Evaluation technique 1: Review against standards

A standards-based review can be considered as a formal review to determine if a specific design or product conforms to a specific set of guidelines. These guidelines can include design specifications or external standards such as the WCAG 2.0 or Section 508 framework with standards.

Evaluation tools include:

7.3.1 Section 7.3.1: Software evaluation tools

7.3.2 Section 7.3.2: Expert reviews

7.3.1 Software evaluation tools

Software evaluation tools or online checkers are automated agents designed to perform a predetermined range of tasks and checks in order to provide a report on compliance. Various tools exist and can be run in various environments for example, many browsers now have ad-on applications that can check your development or designs at every step of the process.

Examples of software evaluation tools include: (W3C Web Accessibility Initiative, 2016)

- '508checker' by Formstack
- 'Accessibility Developer Tools' by Google
- 'ARIA Validator for Chrome' by Rick Brown
- 'ColorTester' by Alfasado Inc.
- 'Wave' by WebAim

The downside of using software evaluations only is that they do not do 'smart' evaluations and a lot of critical elements could be missed. (Henry, Evaluating for

Accessibility, 2007) For example, a checker can indicate that an image has 'alt text' present but cannot determine if the 'alt text' is useful to the user or not. User testing or the help of an accessibility expert is required to determine if the 'alt text' is of benefit to a person with a sight disability.

7.3.2 Expert reviews

Expert reviews are important to use as the primary method of evaluating websites for Accessibility as they help:

- Identify broad issues that affects most users
- Ensure all major issues are resolved before bringing in users for user testing
- Assist with the creating and facilitating the user tests

It's important to use both methods of evaluation and to think of software evaluations as an aid to human evaluations.

7.4 Evaluation technique 2: Heuristic Reviews

The goal of a Heuristic Review is used to determine if a design or product conforms to a series of usability or accessibility principles.

(Usability.gov, 2018)

The process involves systematically going through a website using a heuristics or best practice checklist.

As a general rule, most usability principles also impact on accessibility and vice versa. By using a heuristic checklist to check specific components or sequences of events on a website, one can uncover many accessibility or usability issues and address them early on before involving users in the user testing process.

7.5 Evaluation technique 3: Design Walkthroughs or Prototypes

A design walkthrough or walkthrough of a prototype involves members of the design and development team going through the design with each member of the team being an 'actor' or component of the system.

(Goel, 2009)

Typically one member of the team would be the person with the disability whilst other members of the teams would be the design components for example, the acting user would say 'I would click on this' – indicating on the prototype or design where they would click. The remainder of the team would then check if the mouse action is also available through the keyboard, or if the clickable area is big enough or even if the HTML component used is appropriate for the action.

7.6 Evaluation technique 4: Screening Techniques

Screening techniques are activities that help identify possible Accessibility issues by interacting with a website or product with one or more sensory agents disabled or modified. For example, wearing low vision goggles to see what it is like for people with low vision and to establish if your design caters for this disability. (Henry, Accessibility in User-Centered Design: Screening Techniques, 2007)

Screening is an inexpensive activity performed by designers, developers and evaluators alike. It involves using assistive technologies in a normal environment to help eliminate big stumbling blocks in accessibility.

Figure 7.1 and 7.2 provide some idea of this evaluation technique.



Figure 7.1: An example of a low vision screening test (Henry, Accessibility in User-Centered Design: Screening Techniques, 2007)



Figure 7.2: An example of a person using a mouthstick to screen the use of a telephone (Henry, Accessibility in User-Centered Design: Screening Techniques, 2007)

7.7 Evaluation technique 5: Usability testing

Usability testing provides both qualitative and quantitative data whereby users with disabilities are recruited in various phases of the development process to test actual functionality. (Henry, Accessibility in User-Centered Design: Usability Testing, 2007)

Usability testing is a great tool to assess if a product is useful and succeeds at being accessible in certain aspects but it does not guarantee conformance to standards. Therefore it is recommended that usability testing be combined with the other evaluation techniques discussed in this chapter.

A typical usability test includes the following: (Henry, Accessibility in User-Centered Design: Usability Testing, 2007)

- Recruiting people with disabilities to assist with the test
- Allowing people with disabilities to perform tasks on a prototype or interactive design
- Observe people whilst they interact with your product
- Discussing accessibility issues with the participants
- Using the think-aloud principle where users express verbally what they are doing and what they are struggling with
- The focus is on the issues experienced more than the time it takes to complete a task

7.8 Conclusion

In chapter 7 we looked at the various ways of how websites can be evaluated. We have learned that a combination of the various techniques yields the best results. When creating our SAWA framework, we will now know which evaluation techniques to consider when applying our SAWA framework to a website.

In the next chapter we are going to use the SAWA Framework on a well-known South African website to measure its compliance to the newly create framework.

Chapter 8: Practical application

8.1 Introduction

In this chapter we are going to be applying the *SAWA Framework* to a well-known Telecommunications Website: Vodacom. We have chosen to do a deep, narrow evaluation of one website instead of a wide evaluation of multiple websites as the results will be similar for a single website versus multiple websites. The selection is also based on ethical reasons as Vodacom employs the author and it would not be ethical to conduct a similar analysis on competitor websites.

The Vodacom Website was selected as it is a popular Telecommunications website with an excess of 3 million visitors per month that has multiple facets that could be evaluated including:

- Static webpages
- Multi-media webpages
- Transactional webpages
- Web-forms
- Rich content such as images

We will be evaluating the homepage of Vodacom's website to check levels of compliance to the newly created *SAWA Framework*. We will systematically work our way through the *SAWA* checklist and assess if the Vodacom website can obtain Silver or Gold status.

8.2 Practical application

As mentioned in section 8.1, we will be evaluating Vodacom's website against each of the *SAWA Framework* methods.

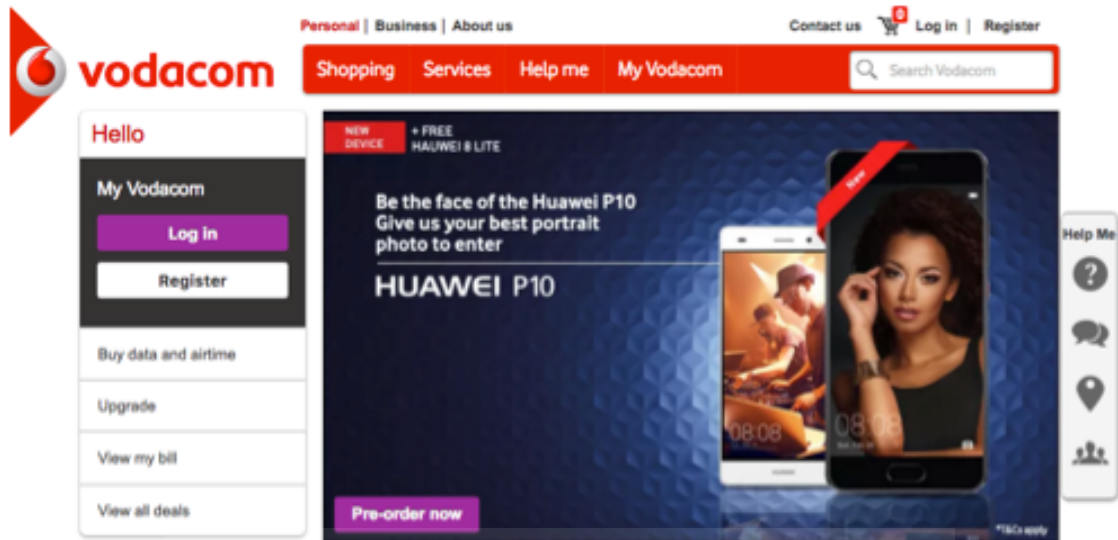


Figure 8.1 Vodacom's homepage (www.vodacom.co.za)

8.2 Theme 1 Web page aesthetics and construct

8.2.1 Every image used on the webpage should have alternative text present [Silver]

Every image on the homepage, including the logo, background images, banners, icons etc. should contain alt text describing what the image is. This is used by screen-readers to identify the image and is used to tell the story of what is visually contained on the homepage.

Of the 28 images located on the homepage (see figure 8.2), 7 of the images did not have adequate alt text or no alt text.

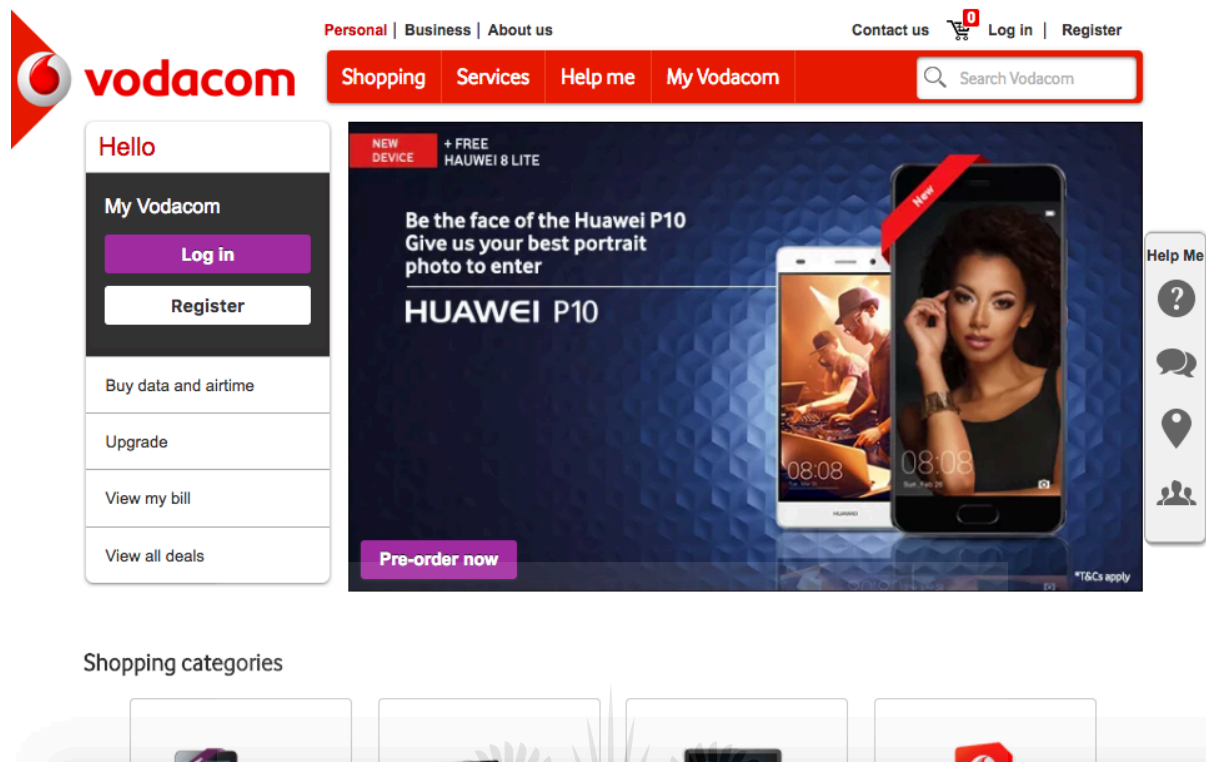


Figure 8.2 Vodacom's homepage contains 28 images

8.2.2 Images are not used to represent text [Silver]

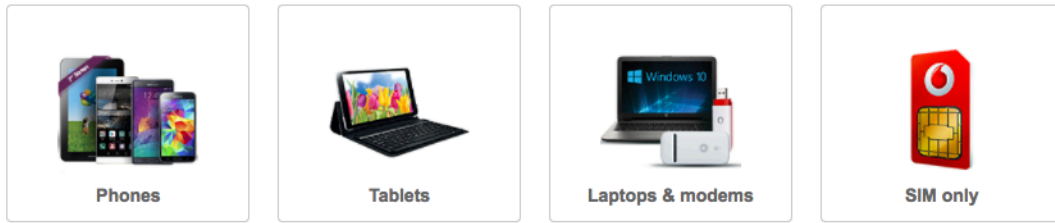
In 8 instances Vodacom's website uses images that contain text. The text should be selectable and should not be part of the actual image.

Buttons used on the homepage are also images with text on them as part of the image.

8.2.3 Headings are clearly distinguishable from the rest of the content [Silver]

Headings should be clearly distinguishable from other parts of the content. A user should be able to quickly scan the webpage and headings should be surrounded by enough white space and potentially bigger or in a different font to differentiate them. In figure 8.3 you can clearly see which text are headings.

Shopping categories



Featured Deals

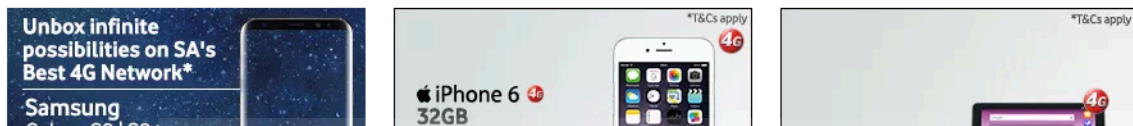


Figure 8.3 Headings are bigger and surrounded by sufficient white space and the result is clearly discernable headings.



8.2.4 Clear semantic mark-up is used for page elements [Silver]

Cascading Style Sheets (CSS) are used to style the HTML elements on a page, for example, it dictates the font size, the colour of the font etc. Javascript on the other hand is used to create dynamic effects on a HTML webpage such as a banner moving or rotating.

8.2.5 Navigation elements are placed consistently in the same place on the webpage [Silver]

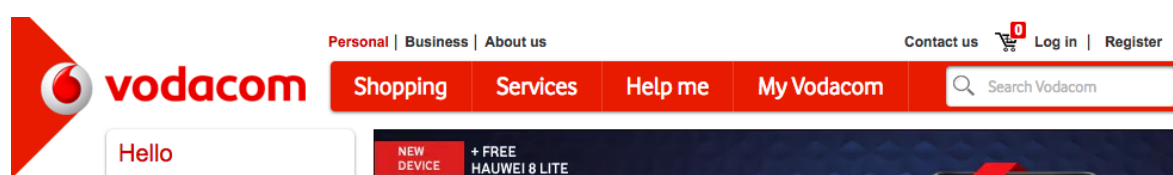


Figure 9.4 Vodacom's website's primary and secondary navigation

The primary and secondary navigation system i.e. the top navigation bar and 'Home' icon (the logo) is in the same position throughout the website.

8.2.6 All abbreviations are explained at least once on a page [Silver]

This method is not required, as the page does not use any abbreviations.

8.2.7 Instructions do not rely on specific senses [Silver]

The webpage does not rely on specific senses as it does not make mention of instances such as 'Click on the green button'.

8.2.8 The flow of the page does still make sense if CSS and Javascript files are disabled [Silver]

The flow of the page does not make sense when CSS and Javascript files are switched off. In addition, the heavy reliance on internal Stylesheets results in this page structure being broken when they are not being used.

8.2.9 No flashing content without warning [Silver]

No flashing content is used as all the elements on the page are static and no moving imagery was observed.

8.2.10 The ability to resize the text is present on every page [Gold]

8.2.11 Unusual words are explained [Gold]

This method is not required, as the page does not use any unusual words.

8.2.12 External CSS and Javascript files are used [Gold]

```

101 <!--
102 <style type="text/css">ul#nav-menu{width:71%;important}ul#nav-menu .mm_ctaContainer{float:left}ul#nav-menu .mm_ctaContainer .mm_ctaBtn{background:none
repeat scroll 0 0 #9e2aa0!important;color:#fff!important;-webkit-text-shadow:0 -1px #222;text-shadow:0 -1px #222;font-weight:700;font-
size:16px!important;line-height:1.4;-moz-border-radius:3px;-ms-border-radius:3px;-o-border-radius:3px;-webkit-border-radius:3px;border-radius:3px;-moz-
box-shadow:0 1px 3px rgba(50,50,50,.75);-webkit-box-shadow:0 1px 3px rgba(50,50,50,.75);box-shadow:0 1px 3px rgba(50,50,50,.75);margin:0 10px 10px
0;padding:6px 15px!important;border:none;text-align:center;cursor:pointer;-moz-appearance:none;white-space:nowrap;text-decoration:none}ul#nav-menu
.mm_ctaContainer a:hover{-webkit-text-shadow:0 -1px #222!important;text-shadow:0 -1px #222!important;-moz-border-radius:3px!important;-ms-border-
radius:3px!important;-o-border-radius:3px!important;-webkit-border-radius:3px!important;border-radius:3px!important;-moz-box-shadow:0 1px 3px
rgba(50,50,50,.75)!important;-webkit-box-shadow:0 1px 3px rgba(50,50,50,.75)!important;box-shadow:0 1px 3px rgba(50,50,50,.75)!important}ul#nav-menu
.mm_ctaContainer a.mm_ctaBtn{margin-bottom:20px;margin-top:20px;margin-left:15px}@media only screen and (max-width:817px){ul#nav-
menu{width:92%!important}#nav-menu .megamenuControl_ds{padding:0!important}ul#nav-menu .mm_ctaContainer a.mm_ctaBtn{margin:0!important}ul#nav-menu
.mm_ctaContainer a:hover,ul#nav-menu .mm_ctaContainer a:active,ul#nav-menu .mm_ctaContainer a:visited{margin:0!important}ul#nav-menu
.mm_ctaContainer{margin:12px 0 12px 12px}}</style>
103 <!--[if lte IE 8]>
104 <style type="text/css">
105
106 #nav-menu a.megamenuOption_ds {
107     border-right: none !important;
108     font-size: 14px !important;
109     line-height: 4px !important;
110 }
111 }
112
113 #nav-menu a.megamenuTitle_ds {
114     border-right: none !important;
115     font-size: 16px !important;
116     line-height: 4px !important;
117 }
118 }
119 #nav-menu .megamenuControl_ds a {
120     border-right: none !important;
121 }
122 }
123 </style>
124 <![endif]-->
125 <a class=" megamenuBtn_ds mmdClosed cm-content-boundary" data-target="#null" data-for="megamenu23ADE144B7361279856823CC8FB54C63EFD79">

```

Figure 8.5 A HTML source extraction showing that stylesheets are embedded on the actual HTML file and not purely referenced as external files

8.2.13 Plain English is used (if English website) [Gold]

This requirement is met as plain English equivalent to Grade 6 is used throughout the Homepage.

8.2.14 Summary of Theme 1: Webpage aesthetics and construct

Method	Silver	Gold
Every image used on the webpage should have alternative text present [Silver]	No	
Images are not used to represent text [Silver]	No	
Headings are clearly distinguishable from the rest of the content [Silver]		
Clear semantic mark-up is used for page elements [Silver]	No	
Navigation elements are placed consistently in the same place on the webpage [Silver]	Yes	
All abbreviations are explained at least once on a page [Silver]	Yes	
Instructions do not rely on specific senses [Silver]	Yes	
The flow of the page does still make sense if CSS and Javascript files are disabled [Silver]	No	
No flashing content without warning [Silver]	Yes	
The ability to resize the text is present on every page [Gold]		No
Unusual words are explained [Gold]		Yes
External CSS and Javascript files are used [Gold]		No
Plain English is used (if English website) [Gold]		Yes

We have now evaluated Theme 1 and will move onto evaluating Theme 2.

8.3 Theme 2: Web page forms

As the homepage does not contain any forms, we have chosen a page, as seen in figure 8.6, that does contain a form:

Customise your device

Choose your device

Huawei P10 Huawei P10 Plus

Select your device colour

Dazzling Blue Mystic Silver Prestige Gold Graphite Black

Enjoy this device with:

- Dual Rear Leica 2.0 lens (20MP + 12MP) to redefine Artistic Portraits
- Huawei super charge, 30 min charge for a whole day use
- Android 7.0 Nougat + EMUI5.1, 4GB RAM + 64GB ROM, 5.1" FHD

What's in the box:

- Huawei P10
- Data Cable
- EU Travel Adapter
- White Headset
- Ejection Pin

Your details

For business pre-order [click here](#).

* First Name

* Last name

* Cellphone number

South African ID

* ID/Passport number

* Email address

I accept Vodacom's [Terms and Conditions](#).

Figure 8.6 A webpage on the Vodacom website that contains a form

8.3.1 An on-screen indication is present of where the focus currently is within a form [Silver]

When clicking within the first field, the indicator show that you are indeed in the first field.

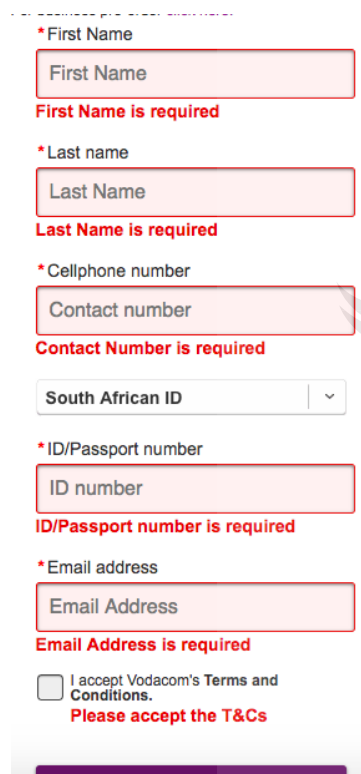
8.3.2 Labels should be present and should wrap around the input field as well [Silver]

Even though labels are present, they do not wrap around the entry field so this method is only partially met.

8.3.3 Instructions are present on how to complete each field e.g. hints [Silver]

Helpful hints are not present near or next to the field (or at all for that matter).

8.3.4 When forms are submitted, clear error validation plus instructions on how to correct the error is present [Silver]



*First Name
First Name
First Name is required

*Last name
Last Name
Last Name is required

*Cellphone number
Contact number
Contact Number is required

South African ID

*ID/Passport number
ID number
ID/Passport number is required

*Email address
Email Address
Email Address is required

I accept Vodacom's Terms and Conditions.
Please accept the T&Cs



Figure 8.7 Clear error messages when you try to submit the form

Clear error messages are provided when a user tries to submit the form without completing the fields.

8.3.5 Field validation occurs without the user having to interact [Gold]

Field validation only occurs when the user interacts and presses the submit button.

8.3.6 Clickable areas are larger than normal [Gold]

When clicking on the label or just outside the field, it does not enter the field.

8.4.7 Summary of theme 2: Web page forms

Method	Silver	Gold
An on-screen indication is present of where the focus currently is within a form [Silver]	Yes	
Labels should be present and should wrap around the input field as well [Silver]	No	
Instructions are present on how to complete each field e.g. hints [Silver]	No	
When forms are submitted, clear error validation plus instructions on how to correct the error is present [Silver]	Yes	
Field validation occurs without the user having to interact [Gold]		No
Clickable areas are larger than normal		No

We have finished evaluating themes 1 and 2 and will now be moving over to theme 3: Web page navigation.

8.4 Theme 3: Web page navigation

8.4.1 Ensure that skip-links are present [Silver]

A skip-link should be present in the source code of the HTML page at the very top of the page. After investigating the source code, no skip-link is present.

8.4.2 The user can navigate the page without getting stuck using only the keyboard [Silver]

Using only the 'Tab' key, the Homepage was easy to navigate and easy to enter links.

8.4.3 Two methods of navigation is present [Silver]

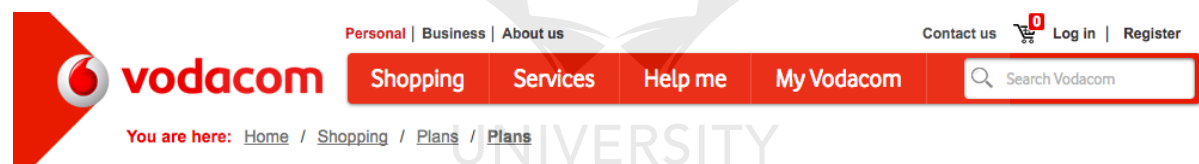


Figure 8.8 The top navigation of a content page in the Vodacom website.

A primary, secondary, search and breadcrumb is visible in this example.

8.4.4 Descriptive links are used [Silver]

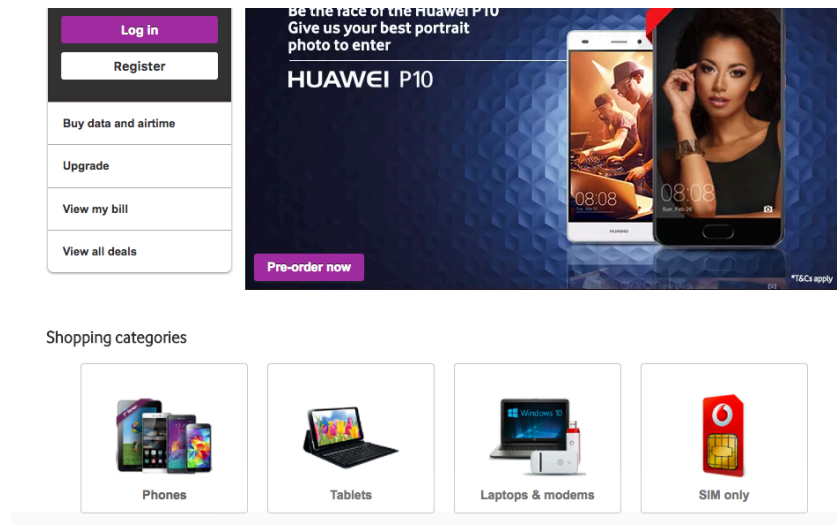


Figure 8.9 An illustration of descriptive links being used

It is clear from the example above that descriptive links instead of 'Read more' or 'Click here' links are used.

8.4.5 Links with the same text all go to the same location [Silver]

This method is not met as we have more than one link with the text 'Buy now' going to different locations.



Figure 8.10 An example of the same text that goes to two different locations

8.4.6 Page breadcrumbs are present or a different way to show which page you are on [Silver]

As seen in figure 8.7, breadcrumbs are present on the majority of the pages.

8.4.7 Four methods of navigation is present [Gold]

As seen in 9.8, 4 methods of navigation is present in the Vodacom website i.e. Primary navigation, secondary navigation, search, a site-map as well as breadcrumbs.



8.4.8 Summary of Theme 3:

Method	Silver	Gold
Ensure that skip-links are present [Silver]	No	
The user can navigate the page without getting stuck using only the keyboard [Silver]	Yes	
2 Methods of navigation is present [Silver]	Yes	
Descriptive links are used [Silver]	Yes	
Links with the same text all go to the same location [Silver]	No	
Page breadcrumbs are present or a different way to show which page you are on [Silver]	Yes	
4 Methods of navigation is present [Gold]		Yes

We have now evaluated theme 1, 2 and 3 and will be moving onto our last theme, Theme 4: Media.

8.5 Theme 4 Media

As the homepage does not contain any video, we have chosen a page with a media element embedded on it.



Just4You

We all have different interests so why should our data plans be the same? Our top tips - Just4U - will help you manage data usage and SAVE! It's the perfect way to ensure that you buy the data you need and use it wisely.



Top tips to save data

1. Buy a data bundle

Figure 8.11 An example of a webpage with a Youtube video embedded on it.

8.5.1 A text alternative is available for any audio files [Silver]

8.5.2 A text alternative is available for any video [Silver]

8.5.3 A text alternative is available for any dynamic content [Silver]

8.5.4 Good colour contrast exists for text and backgrounds [Silver]

8.5.5 Links to required plug-ins are provided [Silver]

8.5.6 Applications do not override user preferences [Silver]

8.5.7 Timed responses are clearly identified [Gold]

8.5.8 Videos have synchronized captions [Gold]



Summary

Method	Silver	Gold
A text alternative is available for any audio files [Silver]	No	
A text alternative is available for any video [Silver]	No	
A text alternative is available for any dynamic content [Silver]	No	
Good colour contrast exists for text and backgrounds [Silver]	Yes	

Links to required plug-ins are provided [Silver]	No	
Applications do not override user preferences [Silver]	Yes	
Timed responses are clearly identified [Gold]		No
Videos have synchronized captions [Gold]		No

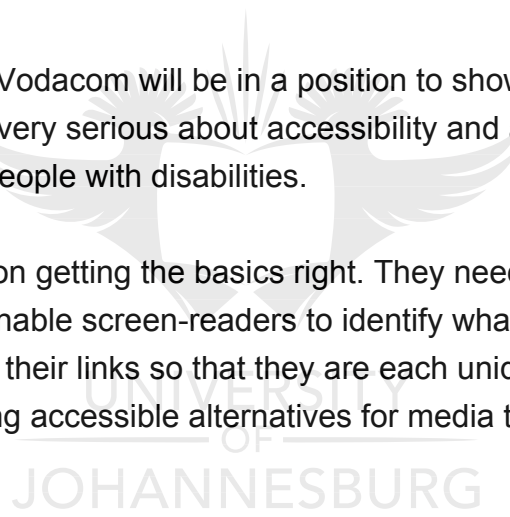
We have now finished our evaluation using our SAWA framework.

Vodacom has not succeeded in meeting all the Silver methods or the Gold methods. It is expected that Vodacom revisit the evaluation report and fix the areas where they did not meet Silver or Gold status.

By meeting Silver status, Vodacom will have the opportunity to showcase that they have an accessible website and are pro-actively creating content that is suited for the widest possible audience.

By meeting Gold status, Vodacom will be in a position to showcase to the web-community that they are very serious about accessibility and are willing to invest in going the extra mile for people with disabilities.

Vodacom need to focus on getting the basics right. They need to ensure that images have alternative text to enable screen-readers to identify what the images are. They also need to differentiate their links so that they are each unique. Lastly, Vodacom needs to focus on creating accessible alternatives for media that is used on the website.



Chapter 9: Conclusion

9.1 Introduction

Chapter 1 outlined the problem statement that this research study attempted to resolve. Chapter 9 evaluates if the problem statement was indeed answered as well as the implications for South Africa and other developing countries.

The next section (9.2) explains the outline of Chapter 9 and what items we should understand upon completing the reading thereof.

9.2 In this chapter

Chapters 1 to 8 showed the evolution of the SAWA framework and how the SAWA framework can be practically applied to evaluate a website. Chapter 9 concludes this research study by looking at key research results and what this means for the digital economy of South Africa as well as next steps for the SAWA framework.

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Accessibility

- Research results (Section 9.3)
- Next steps (Section 9.4)

In the next section (9.3), we are going to highlight the key results from this research study as well as their implications.

9.3 Research results and implications

In Section 1.1 we defined the problem statement in that South Africa and a large contingent of developing countries do not have a set of standards that can be applied to websites to ensure that the disabled population also have equal access to websites. We resolved this problem statement by developing our *SAWA framework*.

In Section 1.2, the hypothesis was set to develop a framework for South Africa as well as other developing countries for equal access to websites. We have succeeded in creating such a framework by drawing on best practices as well as analyzing various challenges faced when developing websites.

In Section 1.3, we set the objective of this thesis to develop a standardized framework for equal web access for South Africa. The framework was developed and called the South African Web Accessibility (*SAWA*) framework.

In broad terms we looked at what Web Accessibility is, what it means to disabled people and we concluded that a large section of the population do not currently have equal access to the Web.

We did this by evaluating the presence of existing frameworks, guidelines and legislation and compared this to the International stage. We concluded once again that South Africa, like so many other developing countries, do not have the necessary ecosystem in place to support the rapid pace of the digital economy.

We identified a clear need for a simple and affordable framework to be developed to address the main issues that plague disabled people. The *SAWA* framework was developed as a simple alternative to International frameworks.

Section 9.4, our last section, we outline the logical next steps on how to progress the adoption of the *SAWA* framework.

9.4 Future work

As mentioned in section 9.1, the goal of this research study was to develop a framework of standards that can be applied to any website to ensure equal access to people with disabilities.

Now that the framework and checklist has been developed, it remains to be digitised and developed into an electronic version. This digital version will take the following formats:

- An HTML validator to ensure that all HTML formatting is according to the SAWA framework
- Language checker to evaluate the level of English used to ensure that Plain English is used

A comprehensive manual must also be developed to help identify pitfalls but more importantly it will also consist of recommendations on how to fix identified pitfalls.

Lastly, active lobbying of Government will need to happen to ensure that visibility is created for the plight of disabled users and recommendations in the form of the SAWA framework will be submitted.

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