



# The implementation of web accessibility standards by Dutch municipalities

*Factors of resistance and support*

Eric Martin Velleman



THE IMPLEMENTATION OF WEB ACCESSIBILITY STANDARDS BY DUTCH MUNICIPALITIES,  
FACTORS OF RESISTANCE AND SUPPORT

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Eric Martin Velleman

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De promotor  
Prof. Dr. J.A.G.M. van Dijk

De co-promotor  
Prof. Dr. W.E. Ebbers

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Voorzitter/secretaris: Prof. Dr. Th.A.J. Toonen

Promotor: Prof. Dr. J.A.G.M. van Dijk

Co-promotor: Prof. Dr. W.E. Ebbers

Leden: Prof. Dr.ir. R. Arendsen  
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## Abstract

There are laws and regulations in place requiring public sector bodies to adopt and implement international standards for web accessibility. Municipalities in the Netherlands have collectively adopted these standards. However, they often seem unable to fully implement web accessibility standards even if the law requires them to and they are actively pursuing it. Based on existing models, literature, questionnaires and extensive audits of the websites of participating municipalities, this dissertation identifies processes that support or resist implementation of the standards within the specific context of web accessibility for local government websites. Awareness of these processes is important for stakeholders willing to implement web accessibility standards. The result is a set of recommendations for local governments that help them identify processes that support or resist the actual implementation of web accessibility standards. This not only contributes to the accessibility of the web for people with disabilities, it may also be helpful for the implementation of other guidelines and (open) standards within local governments.

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## Executive summary

**There are laws and regulations in force, requiring public sector bodies to adopt and implement standards for web accessibility. Municipalities in the Netherlands have freely and collectively adopted these standards. However, like in other countries, they often seem unable to fully implement web accessibility standards even if the law requires them to and they are actively pursuing it.**

Many studies looking into web accessibility implementation focus on compliance theory, based on a more normative approach of the problem (is the law applied, are the standards applied). This dissertation uses adoption and implementation theory and looks for an empirical approach observing the actual factors that play a role in the process of web accessibility implementation. The result is an exploratory 'web accessibility innovations initiation and implementation model' to identify organizational processes of resistance and support to web accessibility implementation. The model contains many of the innovation related elements identified in other models and frameworks but instead of being focused on the individuals within organizations, or extending such models to include organizational aspects, this model describes organizational processes, their indicators, indices and items that support or resist the initiation and implementation of innovations within e-government organizations.

The model is applied to web accessibility using a questionnaire and detailed manual web accessibility audits of the 69 participating municipalities. The results include the audit results and their correlation with the processes. It also provides a long list of web accessibility failures and describes 'low hanging fruit'. Eight implementation processes were identified. Correlations with the audit results or with other processes in the model were found in (1) Developing awareness and knowledge; (2) Involvement of (top) management; (3) Adaptation of the organizational structure; (4) Monitoring and reporting and (5) Applying information systems. Because municipalities are not directly involved in the adaptation of the standards, (6) Adaptation of the innovation is not considered an indicator. For (7) adaptation of policies and standards there is a correlation with the size of the municipality and with (top) management involvement. For (8) deploying financial resources there is a correlation with the size of the municipality, but not with the audit results. Respondents indicate the budget for web accessibility implementation is sufficient (62 percent). This may be caused by their belief that the website of their municipality is accessible for persons with disabilities. Finally, the size of the municipality correlated with internal web accessibility training of web professionals, with web accessibility included into job descriptions for new employees, with the appointment of a specific person to continuously monitor web accessibility and with the percentage of yearly website costs spent on web accessibility.

# PART 1: INTRODUCTION AND THE DEFINITION OF THE PROBLEM, RESEARCH GOAL AND RESEARCH QUESTIONS

## 1.1 Background and motivation

According to the European Commission<sup>1</sup>, around 80 million people in the EU are – to some degree - affected by a disability. The ageing population will further increase that number to over 120 million by 2020. If we want all these people to fully and equally participate in society, we need to ensure that our society is inclusive.

The (mobile) web has become an essential and ubiquitous part of our daily life and it is continuing to converge with and even replace other media and technologies, including television, mobile telephony and a multitude of various devices at home, at school and in the workplace. The web and web applications have become intertwined in our daily social, political and economic life. They can be used for information, communication, reading, gaming, banking, shopping, job hunting, watching videos, listening to music, linking with other people, finding a partner and much more. Furthermore, information and services are increasingly only available online (BSI, 2016).

Municipalities make more and more use of the power of the web and mobile web applications. It provides them with a way to achieve important public goals in several policy domains (Gil-Garcia, 2012) and also to reduce time and costs on direct interactions with citizens (Ebbers, Pieterse, & Noordman, 2008; P. T. Jaeger & M. Matteson, 2009).

In the Netherlands, citizens in many municipalities can arrange meetings, discuss with their local government officials and order products using the web or other mobile (web) applications. And more and more citizens are using these channels (CBS, 2017a). The local government can also send and receive messages through mobile apps or provide information in case of crisis situations. This saves the municipality and the citizen time and money and provides users with a 24/7 opportunity to interact with the government. Of course, citizens need to be comfortable, able or willing to use these channels (Ebbers et al., 2008; Gil-Garcia, 2012; Pieterse, Ebbers, & van Dijk, 2005), but if they are, the digital channels should be accessible.

The Dutch government decided that after 2017 citizens and companies in the Netherlands should be able to handle their affairs with the (local) government through digital channels (MinBZK, 2013). This requires these channels to work for all people ‘regardless of disability’. As far as the technical accessibility of the web channel is concerned, the author of the standards for the web, the World Wide Web Consortium (W3C) says everything is ready made for this purpose (W3C, 2017a):

*“The Web is fundamentally designed to work for all people, whatever their hardware, software, language, culture, location, or physical or mental ability. When the Web meets this goal, it is accessible to people with a diverse range of hearing, movement, sight, and cognitive ability. Thus the impact of disability is radically changed on the Web because the Web removes*

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<sup>1</sup> [http://europa.eu/rapid/press-release\\_IP-15-6147\\_en.htm](http://europa.eu/rapid/press-release_IP-15-6147_en.htm) (Last viewed: 28 August 2018).

*barriers to communication and interaction that many people face in the physical world. However, when websites, web technologies, or web tools are badly designed, they can create barriers that exclude people from using the Web.”*

But websites and web applications are not automatically accessible to people with disabilities. Regrettably, web accessibility is not as obvious as it would seem from the description of W3C. For people with disabilities, websites can still be hard to read, understand or navigate (BSI, 2016). This can severely restrict their employment opportunities, social networks and their interaction with a broad spectrum of products, services and resources. It can also severely restrict their abilities to access and interact with their government. “Accessibility concerns equality of citizens, a cornerstone of democracy” (Nurmela, Pirhonen, & Salminen, 2013).

W3C has a wide definition of web accessibility: “the way to fulfill the basic promise of the web - making information and communication readily available to all people regardless of barriers in geography, language, or disability” (W3C, 2016a). Besides this broad approach to web accessibility, W3C more specifically describes how people with disabilities use the web (W3C, 2017b). Most authors more specifically zoom in on people with disabilities when they define web accessibility. De Andrés states that people with disabilities “should be able to perceive, understand, navigate, interact and contribute to the web” (Andrés, Lorca, & Martínez, 2009). Disabilities affecting web access include physical, sensory, and cognitive disabilities (Andrés et al., 2009). Others take a more technical perspective (Forrester, 2016).

Accessibility is a fundamental aspect of the modern information and knowledge society that is recognized by the United Nations Convention on the Rights of People with Disabilities (hereafter UN Convention) as a basic human right (United Nations, 2006). The UN convention has been signed and ratified by a large number of countries in the world. Earlier, the European Council adopted Resolution 7087/02 about “accessibility of public websites and their content” that calls for adoption of accessibility standards by all EU Member States (EU Council, 2002). In 2006, the ministers of 34 EU Member States unanimously signed the Riga Declaration that formulates concrete targets for e-inclusion and required “that all public websites are accessible by 2010” (European Commission, 2006). Based on that work, the European Parliament and the Council of the European Union published a Directive of the European Parliament and of the Council on the accessibility of the websites and mobile applications of public sector bodies (European Parliament & Council of the European Union, 2016). In short, this directive requires all Member States to ensure that public sector body websites and mobile applications are accessible for people with disabilities.

As a result of the Riga Declaration, the Dutch Council of Ministers adopted the ‘Besluit Kwaliteit Rijksoverheidswebsites’ (Ministerial Decision about the Quality of Government websites) in 2006 (MinBZK, 2006). That ‘Besluit’ required new and existing central government websites to comply with web accessibility standards. The deadline was set to 2011. Local and regional government agencies in the Netherlands signed separate administrative agreements with the government in 2008 and 2011 (Bestuursakkoord, 2008, 2011) that required them to have the accessibility standards implemented by 2015.

While these commitments have contributed to more awareness among stakeholders, the actual implementation of accessibility standards both in the Netherlands and elsewhere is still

behind the target set by the EU. In this light, it is important to note that lack of full conformance with accessibility standards does not necessarily mean that nothing is being done. The EC funded MeAC studies of 2006, 2009 and 2013 (Kubitschke, Cullen, Dolphin, Laurin, & Cederbom, 2013) show that the overall conformance of websites with the standards may be improving, but is still far below the targeted level of accessibility. However, many authors indicate that public sector bodies are working hard to reach the full accessibility goal. This is also visible when comparing yearly accessibility monitoring of government websites in the Netherlands (Velleman, Beenen, & Houtepen, 2011). It is clear that progress is being made, but the overall result is still below the set target (Plasterk, 2012).

Reports from the responsible Dutch minister to Parliament indicate that many efforts have been made to support municipalities and actively help them implement the standards (Plasterk, 2012). Examples of these efforts include a four-year program with ambassadors with disabilities to create awareness, information about the positive aspects of implementing accessibility standards (Barriers Away, Dutch: Drempelsweg), a national urgency program (i-NUP) that supports municipalities in the process, an accessibility testing tool, a benchmarking website, co-creation of best practices and examples and more. Still the minister concludes “that municipalities, provinces, water boards, non-departmental public bodies and central government agencies websites fail to conform with the required quality and accessibility standards.” He expects “that this will also be the outcome of the following reports except for central government websites.” This means that the Internet, created to offer equal opportunities to all users, including people with disabilities, has become a medium that creates a digital divide that excludes large groups of users.

The responsible Dutch minister proposes an approach that is less focused on testing conformance at the end of the process and one that is more focused on the implementation process as a whole. This dissertation follows that proposed approach by studying adoption and implementation theory (rather than compliance theory) to see whether that approach can better help identify factors that indicate resistance to and/or support for the implementation process of web accessibility standards to municipality websites. This is done by operationalizing organizational innovation processes into questions that are relevant for web accessibility standards implementation and then correlating the results with actual audit data of the conformance of the municipality websites with the web accessibility standards. Where most literature focuses on compliance and on acceptance by individuals, this dissertation looks for organizational implementation processes and searches for indicators that support or resist implementation of web accessibility standards by municipalities.

## 1.2 People with disabilities and the web

According to the World Health Organisation (WHO, 2011), the economic, legislative, social and physical environment in a country may help create or maintain barriers to full participation of people with disabilities. This directly influences their economic, civic and social life. The barriers include inaccessibility of buildings, transport, information and communication technologies and other products and services by public and private organizations and individuals. The barriers also include a shortage of data and analysis for evidence-based, efficient and effective policies. This dissertation looks only at a small aspect of those barriers,

namely the accessibility of websites with a specific focus on what a municipality can do to implement standards for web accessibility.

These barriers may also increase the risk of inadequate access to education, healthcare and culture, etc. Unemployment, the inaccessibility of education, low wages and increased cost of living may also increase the risk of poverty for people with disabilities (Braithwaite & Mont, 2009; OECD, 2009, 2010, 2014; WHO, 2011).

When looking for a definition of people and numbers of people with disabilities, it is clear that the term disability has many different statistical and operational definitions (Eurostat, 2017a). Article 31 of the UN Convention (United Nations, 2006) addresses statistics and data collection and requires State Parties to collect appropriate information, including statistical and research data, to enable them to formulate and implement policies to give effect to the UN Convention. To collect appropriate information, it helps to define the term disability and its indicators.

The following section provides the definition of disability and accessibility that will be used in this dissertation. Based on the definition and its indicators, it is possible to determine the number of people with disabilities.

### 1.2.1 Disability

People with disabilities include users of all ages, educational levels and levels of computing experience. They may have various types of disabilities, including sensory (e.g. auditory and visual), motor (e.g. limiting the use of hands) and/or cognitive (e.g. learning disabilities). Some people experiencing functional limitations do not consider themselves as having a disability (W3C, 2017b). On the Web pages, W3C continues to describe a ‘diversity of abilities’ where “websites and web tools that are designed for people with a broad range of abilities benefit everyone, including people without disabilities.” This diversity includes age-related impairments, multiple disabilities, health conditions, changing abilities, temporary impairments and situational limitations. Specific disabilities named by W3C are:

- Auditory disabilities
- Cognitive, learning and neurological disabilities
- Physical disabilities
- Speech disabilities
- Visual disabilities

Although included in the W3C overview, BSI specifically adds “older people who experience problems” as a separate bullet point in the British Standard for Accessibility.

In the ‘sample survey’ to gather data for Regulation 317/2010 on employment of disabled people (Commission, 2010), the European Commission references the UN Convention and describes disabled people as “those persons having at least one basic activity difficulty (such as, seeing, hearing, walking, sitting, remembering, etc.).”

According to the World Health Organisation report on disability (WHO, 2011), the term disability is “the umbrella term for impairments, activity limitations and participation restrictions, referring to the negative aspects of the interaction between an individual (with a

health condition) and that individual's contextual factors (environmental and personal factors)." The WHO International Classification of Functioning, Disability and Health (ICF) (WHO, 2001), offers a framework that helps define and measure functioning and disability. The ICF offers a model that combines medical and social factors. It is not a classification of disability, but an all-encompassing classification of functioning, disability and health that categorizes human functioning into three areas: impairments, activity limitations and participation restrictions. Disability refers to barriers in one or more of these areas.

Since the late nineties, we have seen a transition from an individual, more medical perspective on disability to a more social perspective that sees people as being disabled more by their environment than by their body. Both play a role when it comes to accessibility of the web for people with disabilities.

The UN Convention (United Nations, 2006) defines persons with disabilities as:

*"persons who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others."*

*[disability is] "an evolving concept and that disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others."*

This extends the definition of the WHO and further supports the social perspective of disability. By defining disability as an evolving, interactive and multi-dimensional concept, disability is no longer only an attribute of the person. This means that it is possible to improve social participation and inclusion of people with disabilities by specifically addressing the barriers that hinder them in their attempts to fully and effectively participate in society on an equal basis with others. The UN Convention calls on State Parties to take appropriate measures to ensure this. These measures are wider than just requiring conformance with web accessibility standards. The WHO report (WHO, 2011) supports this in its statement that "the environment may be changed to improve health conditions, prevent impairments, and improve outcomes for persons with disabilities. Such changes can be brought about by legislation, policy changes, capacity building, or technological developments."

Specifically interesting is the addition of the term 'situation disability' by W3C and Forrester (Forrester, 2016; W3C, 2017b). The Forrester report "Assessing the Value of Accessible Technologies for organizations" refers to three types of disabilities: permanent disability, temporary disability and situation disability. The latter is described as "a more generic accessibility requirement for a specific use case not tied to disability; for example, a natural circumstance might limit a person's ability such as glare of the sun making it hard to read a screen or a loud environment limiting hearing". Most people will probably recognize these examples from their own experience. It is not a disability, but it can be an additional driver for accessibility. For example, if video is played in a loud environment like a tradeshow or a cafe, it helps to have captions. At the same time, captions make the video accessible for people who have a hearing impairment. De Andrés (Andrés et al., 2009) describes this as "although initially intended to benefit users with disabilities, it can also contribute to enhance the

relationship between a certain organization and people without disabilities but in certain situations.” These could also include recent immigrants and people with limited access to the Internet.

This dissertation uses the definition of disability as described in the UN Convention because it specifically addresses accessibility and universal design of information and communications technologies and systems for persons with a disability.

#### *1.2.1.1 Measuring disability*

As can be read from the UN Convention and from the WHO documents, the social integration of people with disabilities in all aspects of life is related to many policy areas like health, sport, housing, transport, culture, education, social security and employment. It is therefore important to provide policy makers with reliable data on all aspects of disability.

These data depend on the chosen disability model (medical or social model or a combination). The various disability models mean that there is not one single method to measure disability.

This is recognized by the secretariat of the UN Convention (United Nations, 2015) which published a note addressing “the lack of a uniform definition and understanding of disability among countries and the application of non-comparable methodologies in the measurement and collection of data and statistics.” The secretariat concludes that this would mean “data are not consistent or comparable among countries.” They point to the requirements in the UN Convention stating that “reliability of data and statistics is essential for the formulation of policies, and to monitor progress and assess the effectiveness of measures to implement the Convention, and to advance disability inclusive development and realize all internationally agreed development goals for persons with disabilities.” State Parties are required to collect “appropriate information, including statistical and research data, to enable the formulation and implementation of policies to give the full effect to the Convention.”

In Europe, disability statistics data are collected in the European Health Interview Survey (EHIS), the annual Statistics on Income and Living Conditions (EU-SILC), the Labour Force Survey (LFS) and the European Health and Social Integration Survey (EHSIS). Some countries have (additional) national questionnaires. This section discusses some of the most common international indicators that are also used in the Netherlands by Statistics Netherlands as indicators to determine the number of people with disabilities.

First GALI: European statistics organizations including Eurostat worked on a harmonized method consisting of a single question to determine the dimension of health/disability (Berger et al., 2015; Robine et al., 2003; Robine, Jagger, & Romieu, 2002; Van Oyen, Van der Heyden, Perenboom, & Jagger, 2006). The Global Activity Limitation Instrument (GALI) asks respondents about activity limitations using the single question: “For at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do?” Responses are on a 3-level scale: severely limited / limited but not severely or / not limited at all. One of the aspects measured concerns the health status. This includes self-perceived health, chronic diseases, limitation in activities, etc. The GALI also asks about health determinants (like smoking and alcohol) and use of health care (like hospitalization). The

question refers to general restrictions in activity and does not address any specific type of activity like work, school, sport, personal care, etc. The aim of the questions is not to produce a prevalence rate of impairments or conditions, but rather to provide an estimate of persons experiencing limitations in their daily activities or restrictions in their participation in various settings. The GALI indicator is part of the EU-Statistics on Income and Living Conditions (EU-SILC) instrument (Eurostat). It is the basic indicator for the European Health Interview Survey (EHIS) and is used in disability statistics by national statistics bureaus like CBS in the Netherlands. It can be extended with the ADL and IADL scales. Note that EU-SILC and the EHIS do not cover the institutionalized population (people living in health and care institutions). Therefore, both data sources may underestimate the size of the group of people with limitations.

The ADL scale contains questions about difficulties in Activities of Daily Living (ADL). ADL asks respondents about important and severe activity limitations. The scale is based on the difficulty a person has or the need for assistance in basic daily activities. These activities include taking a bath, using the toilet, getting (un)dressed, etc. If people cannot do these activities by themselves, they will be dependent on human assistance and thus risk dependence and social exclusion.

The IADL scale contains questions about the limitation in instrumental activity of daily living (IADL). It is broader than the ADL limitations and looks at domestic activities that allow a person to live independently. It includes activities like difficulty or need for assistance in using the phone, going shopping, cleaning the house, preparing meals, etc.

Secondly, the OECD Long-Term Disability (LTD) indicator for disability and sickness looks into functional limitations. This indicator was developed by the Organisation for Economic Co-operation and Development (OECD) and uses a questionnaire that asks respondents about daily life activities (Gignac, Cao, McAlpine, & Badley, 2011; McDowell, 2006; McWhinnie, 1979).

As with the GALI indicator, people evaluate their own functioning and the indicator is based on long-term activity limitations. There are 16 questions and some organizations use abbreviated forms. The Dutch CBS for example, uses 7 questions. They include: “Is your eyesight good enough to read ordinary newspaper print (with glasses if usually worn)? Is your eyesight good enough to see the face of someone from 4 meters (with glasses if usually worn)? Can you hear what is said in a normal conversation with 3 or 4 other persons (with a hearing aid if you usually wear one)? Can you carry an object weighing 5 kilos (like groceries) for 10 meters?”

Responses for OECD TLD are on a 4-level scale: yes, without difficulty; yes, with minor difficulty; yes with major difficulty and no, not able to do that.

GALI	OECD LTD	ADL	IADL
1. For at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do?	* 1. Is your eyesight good enough to read ordinary newspaper print (with glasses if usually worn)?	The ADL-indicator (Activities of Daily Living).  1. Sitting down and standing up from a	The IADL indicator (Instrumental Activities of Daily Living) asks about domestic activities caused by health problems.

<p>Responses are on a 3-level scale: severely limited / limited but not severely or / not limited at all</p>	<p>* 2. Is your eyesight good enough to see the face of someone from 4 meters (with glasses if usually worn)?</p> <p>* 3. Can you hear what is said in a normal conversation with 3 or 4 other persons (with hearing aid if you usually wear one)?</p> <p>* 4. Can you hear what is said in a normal conversation with one other person (with hearing aid if you usually wear one)?</p> <p>5. Can you speak without difficulty?</p> <p>* 6. Can you carry an object weighing 5 kilos for 10 meters?</p> <p>7. Could you run 100 meters?</p> <p>* 8. Can you walk 400 meters without resting?</p> <p>9. Can you walk up and down one flight of stairs without resting?</p> <p>10. Can you move between rooms?</p> <p>11. Can you get in and out of bed?</p> <p>12. Can you dress and undress?</p> <p>13. Can you cut your toenails?</p> <p>* 14. Can you (when standing), bend down and pick up a shoe from the floor?</p> <p>15. Can you cut your own food (such as meat, fruit, etc.)?</p> <p>16. Can you both bite and chew on hard foods (for example, a firm apple or celery)?</p>	<p>chair</p> <p>2. Getting in and out of bed</p> <p>3. Walking up and down the stairs</p> <p>4. Eating and drinking</p> <p>5. (un)dressing</p> <p>6. Washing face and hands</p> <p>7. Taking a bath or shower</p> <p>8. Using the toilet</p> <p>9. Moving from one room to another on the same floor</p> <p>10. Leaving and entering the house</p> <p>11. Moving outdoors</p>	<p>1. Preparing a meal</p> <p>2. Using a phone</p> <p>3. Shopping</p> <p>4. Managing medications</p> <p>5. Light household activities</p> <p>6. Heavy household activities</p> <p>7. Managing personal finances</p>
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Table 0.1. Questions to determine the dimension of health/disability.

Table 0.1 shows the questions for the GALI and the OECD indicators as described. These questions are used by Statistics Netherlands for the GALI, OECD, ADL and IADL indicators. The shortlist of GALI that is also used by Statistics Netherlands is marked with an asterisk (\*).

### 1.2.1.2 Numbers

The World Health Organisation report on disability (WHO, 2011) states that “About 16 to 18 percent of the world population lives with some kind of disability, including those related to ageing. More than one billion people live with life-altering disabilities (vision, hearing, speech, cognitive and mobility) and two thirds of this demography live in developing countries.” The indicators described in the previous section ask people to evaluate their own functioning and disability. This is impacted by someone’s personal situation, environment and their experience of functioning and disability within that environment. For example, deaf people may not have access to a sign language interpreter, blind people may not have access to screen readers and braille lines, but access to websites and accessibility technology may also be influenced by motivation, attitude, intention and social support (Van Dijk, 2017).

Eurostat statistics (Eurostat, 2015, 2017a) show that out of the 511.8 million inhabitants of the 28 Member States, 26.9 percent are affected by some sort of disability. For the Netherlands, these numbers are slightly higher. The ageing population will further increase those numbers to over 120 million by 2020.

Health and healthcare use (period: 2016)											
Period:	2016										
Subject:	Disabilities						Assistive devices				
	Persons with GALI disab.	EOCD disabilities, 12 years and older					ADL, 55 and older	IADL, 55 and older	hearing (4 y and older)	vision (4 y and older)	movement (12 y and older)
%		persons with min. 1 disab.	No. of disab. pp	Hearing disab.	Visual disab.	Motor disab.	No. of disab. pp	No. of disab. pp			
Total persons	27,2	12,3	2	3,1	3,2	9,4	2,8	2	4,7	63,3	6
Men	23,8	9,4	1,9	3	2,7	6	2,5	1,9	5,2	58,6	4,2
Women	30,6	15,2	2	3,2	3,8	12,8	2,9	2	4,3	67,8	7,9
0 to 4											
4 to 12	7								0,5	11,6	
12 to 16	8,9	2,2		0,2	0,7	1,6			0,8	28,4	1,2
16 to 20	12,3	3,1		0,2	2,3	0,9			1,3	37,1	0,7
20 to 30	16,9	3,4		0,9	0,9	1,8			0,6	42	1,2
30 to 40	22,2	5,7		1,6	1,3	4,3			0,8	43,7	1,8
40 to 50	26,3	9,5	1,6	1,8	2,9	6,2			1,4	64,7	2
50 to 55	33,1	13,5		3,6	3,5	9,9			3	90,8	4,1
55 to 65	38,3	15,6	1,9	3,8	4,1	11,6		1,7	4,6	96	5,2
65 to 75	42,3	17,9	1,8	2,9	3,4	14,6	2,4	1,8	9,9	97	10,2
75 and older	55,2	42,1	2,4	14,5	11,4	36,8	3,2	2,3	29,8	7	34,1

Table 0.2. Persons with disabilities in the Netherlands and use of assistive devices. Source: Statistics Netherlands, 2017.

Statistics Netherlands (CBS) uses the GALI and OECD-LTD indicators to measure disability in the Netherlands. This produces the overview in Table 0.2. It shows that in 2016, depending on the indicator, 27.2 percent of the population reported a long-term activity limitation according to the GALI scale, while 12.3 percent of the population over 12 years of age reported a long-term activity limitation using the OECD classification (CBS, 2017b). Both percentages are used in articles and presentations, not always with a proper explanation.

The figure also shows that older people are disproportionately represented. People over the age of 55 make up 31.3 % of the general population of the Netherlands (in 2016) and 58.2% of all Dutch citizens with disabilities. Please note that this ‘silver wave’ is also the fastest growing age group worldwide and will account for 20% of the global population by 2050. In that same period, the 55+ group will grow to 37% of the Dutch population (Table 0.3).

According to a report by Nivel (NIVEL, 2016), in the Netherlands 5.3 million people visited their doctor for a chronic disease in 2014. This is based on a list of 109 chronic diseases (Nielen, Davids, Gommer, Poos, & Verheij, 2017) diagnosed by a general practitioner or another official caretaker. This would mean that almost one third (32%) of the Dutch population has a chronic disease, defined by Nivel as a disease without the possibility of full recovery. Most of them are over the age of 65. Almost 80% of the 75+ report a chronic disease. Although the elderly form a large part, chronic disease affects all age groups. All age groups are also increasingly active on the web. Figures from Statistics Netherlands (CBS, 2017c) support this and show that all age groups in the Netherlands are more active on the web for both personal and other business (Figure 0.1).

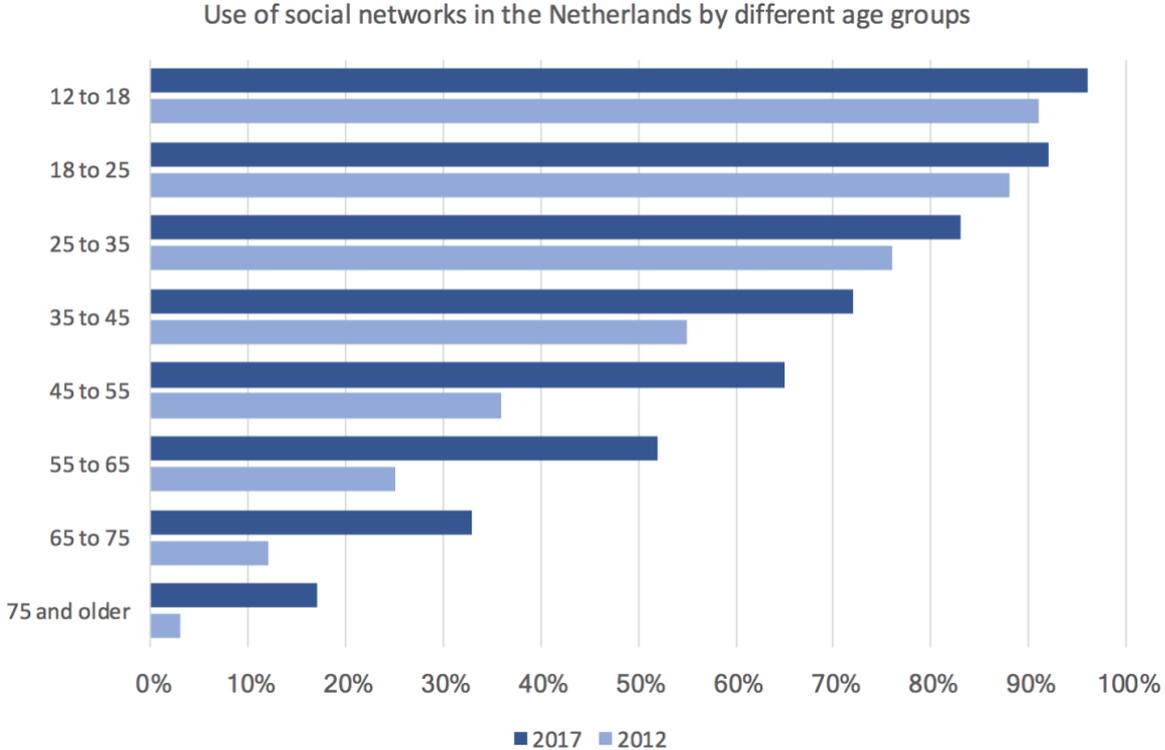


Figure 0.1. Use of social networks in the Netherlands by different age groups (source: Statistics Netherlands, 2018).

Use of the web grew from 76.2% to 86.1% in 2017. The use of websites is quickly shifting from PCs to mobile devices. An important indicator of this shift is the increased use of social media like Facebook, Twitter and specifically WhatsApp by all age groups in 2017.

Netherlands population forecast 2017 - 2060		2017	2020	2030	2040	2050	2060
Sex	Age	Number					

Total men and women	Total age	17 089 794	17 342 426	17 837 096	18 111 373	18 134 708	18 159 662
	0 to 20 years	3 816 839	3 782 080	3 762 939	3 910 804	3 835 069	3 816 640
	20 to 65 years	10 112 251	10 164 521	9 828 688	9 391 087	9 543 293	9 576 832
	65 years and older	3 160 704	3 395 825	4 245 469	4 809 482	4 756 346	4 766 190
Men	Total age	8 477 531	8 619 535	8 847 127	8 948 363	8 930 110	8 932 302
	0 to 20 years	1 953 207	1 933 881	1 925 538	2 002 174	1 964 158	1 955 280
	20 to 65 years	5 077 092	5 110 819	4 917 395	4 689 570	4 763 625	4 768 697
	65 years and older	1 447 232	1 574 836	2 004 194	2 256 618	2 202 327	2 208 325
Women	Total age	8 612 263	8 722 891	8 989 968	9 163 011	9 204 597	9 227 360
	0 to 20 years	1 863 632	1 848 199	1 837 401	1 908 630	1 870 911	1 861 361
	20 to 65 years	5 035 159	5 053 702	4 911 293	4 701 517	4 779 668	4 808 135
	65 years and older	1 713 472	1 820 989	2 241 274	2 552 864	2 554 019	2 557 865

Table 0.3. Population forecast for the Netherlands 2017 – 2060. Source: Statistics Netherlands, 2018

The group of elderly on the web is quickly growing. In the 65–75 age group, web use with mobile phones grew from 15.4 to 75.7% in 2017. Mobile use of the web for all ages grew from 51.4% in 2012 to 82.4% in 2017. Of the people on the web, using a Personal Computer declined from 70.5% in 2012 to 60.3% in 2017. The use of mobile phones and smartphones on the web rose significantly from 56.5% in 2012 to 89% in 2017. Tablet use rose from 45.1% in 2012 to 71.7% in 2017.

### 1.2.2 Accessibility

The UN Convention describes accessibility as a subset of universal design “to enable persons with disabilities to live independently and participate fully in all aspects of life.” If usability implies accessibility, accessible web design means ensuring that Web pages are user-friendly for all people visiting the website (Abanumy, Al-Badi, & Mayhew, 2005). This “includes layout, readability, colour choice and browser-independence, as well as considering the requirements of those using adaptive or alternative technology, assistive or haptic devices” (Forrester, 2003). The British Standard (BSI, 2010, 2016) on accessibility defines accessibility as “usability of a product, service, environment or facility by people within the widest range of capabilities.” Specifically, for the web, it is “the degree to which people with disabilities can perceive, understand, navigate, and interact with the web, and that they can contribute to the web.”

In a report by Forrester (Forrester, 2016), the researchers conclude that accessible technologies “make it easier for people to see, hear, and use devices and services. Examples of accessible technologies include: screen readers, adaptive input devices, voice recognition, cognitive assistance tools, and wearables (e.g., smart glasses). Their focus is broad and includes people without disabilities as a group that benefits from accessible technologies. Therefore, technologies of this type can be part of both mainstream technology and assistive technology.”

The UN Convention uses this broader approach to accessibility and uses the term universal design for the “design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. “Universal design” shall not exclude assistive devices for particular groups of persons with disabilities where this is needed.”

The UN Convention does not define “accessibility” separately, but the term is a fundamental provision that is embedded in the structure of the UN Convention (GAATES, 2015; United Nations, 2006). Article 9 of the UN Convention specifically addresses accessibility.

For accessibility, websites can be designed using an agreed set of accessibility rules and guidelines. According to the W3C (W3C, 2017a), this is not much work since it is built into the technical standards of the web: “The Web is fundamentally designed to work for all people, whatever their hardware, software, language, culture, location, or physical or mental ability.” “Websites in general, and public sector body websites in particular, should serve all citizens equally. For example, if a Web page is designed to receive the user's input merely through mouse clicks, then people with disabilities preventing them from using a mouse or people using e.g. mobile phones to browse the internet will not be able to use this webpage” (Abdelgawad, Snaprud, & Krogstie, 2010). “Websites that are flexible enough to meet different user needs, preferences, and situations” (Andrés et al., 2009).

The W3C web accessibility guidelines (Caldwell, Cooper, Guarino Reid, & Vanderheiden, 2008) require that websites (including mobile applications and the Web of Things) should be Perceivable, Operable, Understandable and Robust for all people, whatever their hardware, software, language, location, or ability (further explained in section 2.1.1). “When the web meets this goal, it is accessible to people with a diverse range of hearing, movement, sight, and cognitive ability.”

On their website (W3C, 2017a) Tim Berners-Lee - W3C Director and inventor of the World Wide Web - states that “The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect.” Following the UN Convention, W3C continues “the web must be accessible to provide equal access and equal opportunity to people with diverse abilities.” This includes access to information and communications technologies, including the web. For W3C, accessibility does not only support social inclusion for people with disabilities but also for others like “older people, people in rural areas, and people in developing countries.” Accessibility not only benefits people with disabilities but “it can also be useful for everyone in a variety of situations.” In the notes of the British Standard (BSI, 2010) the concept of accessibility addresses the full range of user capabilities and is not limited to users who are formally recognized as having a disability.

Based on the W3C requirements, this dissertation defines accessibility as:

*Accessibility means that websites, mobile applications and the Internet (Web) of Things are Perceivable, Operable, Understandable and Robust for all people, whatever their hardware, software, language, location, or ability.*

### 1.2.3 How people with disabilities use the web

Users with disabilities use various forms of assistive technology to allow them to browse web sites (Forrester, 2016; House of Commons, 2018; Lazar, Dudley-Sponaugle, & Greenidge, 2004). ISO defines assistive technology as a “piece of equipment, product system, hardware, software or service that is used to increase, maintain or improve the functional capabilities of individuals with disabilities.” “Assistive technologies include hardware and software such as screen readers, voice recognition, alternative pointing devices, alternate keyboards, and refreshable Braille displays” (Paciello, 2000). Assistive technology used to be expensive but over the past 10 years, it has become integrated in standard software of computers, smartphones and other networked technology and applications. Windows, OSX, iOS and Android deliver extensive support for accessibility built into their mainstream operating systems. This has a direct impact on the actual participation possibilities for persons with disabilities. The Report on assistive technology by the House of Commons (House of Commons, 2018) describes it as “a critical employment resource for individual disabled people” and stresses the importance of creating more awareness about standard existing AT solutions in mainstream technology that can benefit large groups. Many employers still think it is expensive and complex while this has not been the case for a long time.

Users with disabilities can use a website if that website is compatible with the various assistive technologies (Slatin & Rush, 2002). This mostly requires nothing more than a developer or content editors correctly applying the technologies they are using.

Many people with disabilities use assistive technology. However, one of the main problems of assistive technology is that it is not used by everyone who could benefit from it. There is often an equal or greater level of ‘unmet need/demand’ (Cullen, Dolphin, & Wynne, 2015). Based on a survey among people with disabilities, Cullen et al. conclude that in Ireland the demand for assistive technology was greater than 50 percent for 11 out of 32 types of assistive technology. This means that many people who should be using assistive technology do not have, want or use it. This may be easy to understand. Most people with disabilities want to function as normally as possible. Using assistive technology makes a person’s disability more visible. Furthermore, many older people do not feel they are disabled but find that fonts are smaller, contrast is lower and audio is less loud than it used to be. Also people who become disabled when they are older are not a frequent user of assistive technology.

This section provides some examples of the problems encountered by people with different disabilities when using the web and some solutions provided by both the web standards and assistive technology. As noted before, the web standards already include full support for accessibility. Web developers, designers, editors etc. only have to implement their technology and content correctly to support people with disabilities.

### **How people with auditory disabilities use the web**

People with auditory disabilities may experience problems understanding audio and video. Not all auditory information in a video is always visible.

Imagine watching a performer in a theatre. He looks sad because the crowd is booing. However, if the crowd is not visible in the video, this is not obvious to a deaf person. This can be helped by providing captions or transcripts for the video content. In the above case, the captions could say “(crowd is booing).”

There are many media players that can show captions and some even provide settings to adjust their size and color.

Note that for some people with auditory disabilities, text is like a second language so they may prefer sign language. In all cases, it helps to add images and graphs to make content more understandable.

### **How people with cognitive, learning and neurological disabilities use the web**

Cognitive, learning and neurological disabilities can impact different aspects of a person's life, including hearing, vision, speech, mobility and understanding. For this reason, people can experience problems with navigation, reading levels, movement etc. However, the web together with assistive technologies also provides us with enormous possibilities to render content in ways that are more usable and understandable. For example, there are tools that can change the presentation of a Web page to better fit an individual's need. Screen reader software can read aloud the content of a Web page and even provide a marker to show where the speaker is. There are also tools that provide a quick overview of a page (list of links, list of headings, etc.).

It generally helps if a website is clearly structured, has no distracting content (blinking, moving and flickering) and provides 'easy to read' text with images and graphs that add understanding to the content.

There is a group in W3C that is working on adding specific success criteria for people with cognitive disabilities to the web accessibility standards.

### **How people with physical disabilities use the web**

One of the main problems for people with physical disabilities is the lack of support for other input devices than for example a mouse. If you use a sip-and-puff switch to navigate a Web page, it can be difficult to navigate if the area you have to click on is very small. And Web pages do not always give you enough time to finish a task, such as successfully clicking on the menu item you want to choose from a pull-down menu. And if the page is not accessible, the menu item may not even be available with a keyboard. For people writing text with a head-pointer, filling out a form may take more time or the form may even time-out before the user is ready to press the send button.

There are many hardware and software solutions for people with physical disabilities, depending on their specific disability. Examples include eye tracking, head pointers, specially designed keyboards and/or mouse, mouth sticks, on-screen keyboards, (foot/arm/sip-and-puff) switches and voice recognition. But despite these solutions, Web pages should still provide sufficiently large clickable areas, give users enough time to operate controls and fill out forms or provide them with a possibility to extend the time limits, make sure that the active focus is visible and provide mechanisms to skip repeating menus and go straight to the content of a page. Most of this is provided for in the web accessibility standards.

### **How people with visual disabilities use the web**

Blind people on the web can experience problems with visual information like images, controls, graphs and other visual elements that do not have a text alternative. Also repeating menus, video without audio description, inaccessible pdf documents, missing labels in forms and recurring links called “click here” make it challenging to navigate or operate a website if you have a visual disability.

For example, many blind people generate a list of links or headings on a page as a strategy to gain an overview of the page content. This is not useful if links are called “click here.” Also, if a content editor uses ‘bold’ for a heading instead of correctly using heading-markup, the headings will not be visible for assistive technology.

People with a visual disability can use ‘screen magnifiers’ to zoom in and out of the content or ‘screen readers’ to read aloud the contents of a Web page or translate it to braille. The braille is then visible on a piece of hardware called a braille display. Web developers, designers and editors do not have to do anything special for this. The screen reader and software can automatically generate speech output and braille from accessible Web pages. Examples of problems for partially sighted people include when there is low contrast, when text and images cannot be resized and when keyboard support is lacking.

For further reading, the W3C has an extensive set of pages on how people with disabilities use the web (W3C, 2017b). This resource includes personas and more detailed description of web accessibility guidelines in relation to specific disabilities and of assistive technologies.

#### 1.2.4 Effects of inaccessibility

The most important effect of inaccessibility is that it may hinder the full and effective online participation of people with disabilities in society on an equal basis with others (United Nations, 2006).

Europeans increasingly rely on technology for their daily activities, jobs, education and leisure. But with a disability, this can be quite a challenge. Less than half (47%) of all EU citizens with disabilities are employed (Eurostat, 2014). This means that more than 38 million people in the EU experience difficulties in participating fully and equally on the labor market. To improve this, it is necessary to create a society that is accessible for people with disabilities in all domains, not only the labor market. Accessibility standards play an essential role in the empowerment of individuals. The Forrester research even shows that this is a good business case (Forrester, 2003, 2016).

The Forrester Research (Forrester, 2003), on behalf of Microsoft, estimates that 60% of working age adults with disabilities in the United States are likely or very likely to benefit from the use of accessible technology. This amounts to more than 100 million people who could benefit in the US alone. If we transpose this calculation to the Netherlands, more than 5.4 million people could benefit. That is much more than the number of people with disabilities. Also interesting is their conclusion that “57% (74.2 million) of computer users, aged 18 to 64 in the United States, are likely or very likely to benefit from the use of accessible technology due to experiencing mild to severe difficulties or impairments.”

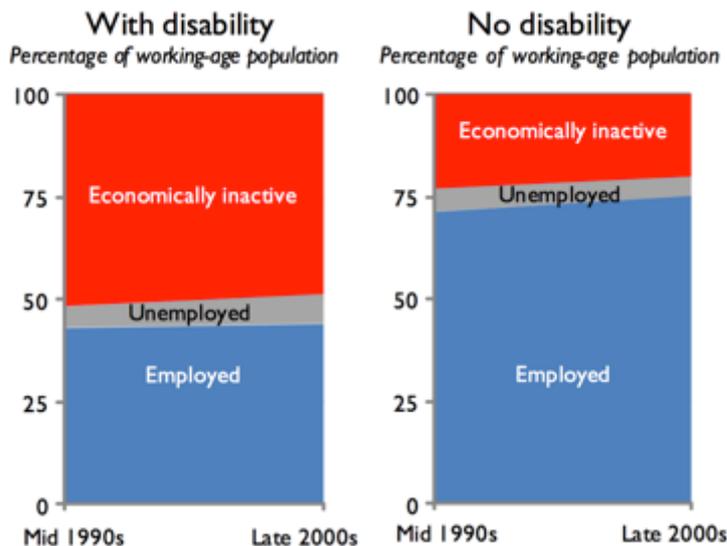


Figure 0.2. Percentage of working-age population with and without disability. Source: OECD, 2009.

After analyzing 27 countries, the OECD (OECD, 2009, 2010) concludes that “in the late 2000s, just before the onset of the recent economic downturn, the employment rate for people with disabilities was only slightly over half that of people without a disability” (Figure 0.2). The reports also show that 22% of people with disabilities live in poverty (living in a household with less income than 60% of the median) while for people without disabilities, the income-poverty rate is 14%.

In the Netherlands (OECD, 2009), in 2006, the employment rate for people with disabilities was approximately 43% compared to 81% of people without a disability. The figures remained almost unchanged in the 2011 Eurostat figures (Eurostat, 2014). People with disabilities frequently end up on unemployment, disability or other social benefits. In 2012, 7.9% of the working-age population received a disability benefit (OECD, 2014). From the nineties, the Dutch government has invested in strengthening obligations and incentives to stimulate individuals and employers to co-operatively achieve better return-to-work rates. This policy has led to “improved labour market outcomes for people with health problems. Sickness absences and disability benefit claims have fallen overall.”

The WHO world report on disability (WHO, 2011) states that employment should be accessible to people with disabilities so that they do not have to live in poverty or from charity. The report calls for mainstreaming of all products and services so that they are equally accessible to people with disabilities and they do not need to use separate ‘accessible’ products and services. The barriers mentioned include “stigma and discrimination; a lack of adequate health care and rehabilitation services; and inaccessible transport, buildings and information and communication technologies.” The report concludes that consequently “people with disabilities experience poorer health, lower educational achievements, fewer economic opportunities and higher rates of poverty than people without disabilities.”

The report recommends “that governments and their development partners provide people with disabilities access to all mainstream services, invest in specific programmes and services for those people with disabilities who are in need, and adopt a national disability strategy and plan of action.” In addition, governments “should work to increase public awareness and

understanding of disability, and support further research and training in the area. Importantly, people with disabilities should be consulted and involved in the design and implementation of these efforts.”

### 1.3 Municipalities and compliance (theory)

The focus of this dissertation is on municipalities. They constitute more or less comparable autonomous organizations that stand close to citizens and – independent of their size - are more or less organized in the same way. In the Netherlands, they are also obliged to comply with national and regional policy requirements regarding web and mobile accessibility and internationally, they form a group that is monitored by many authors for compliance. Municipalities are an interesting group because it may be possible to use the results in other countries in the world. In Europe, municipalities are an important and comparable element of local government with their own mayor and council and autonomous powers to implement national policy. Think of communes in France, gemeinden in Germany, kommuner in Norway, commune in Italy etc. Many municipalities in European countries have their own website where they interact with their citizens.

Research into the conformance of websites of municipalities with the web accessibility standards has focused primarily on measuring technical conformance with the standard and on applying legal measures to pressure organizations to apply the standards within a certain timeframe. Authors generally use compliance theory to ascertain in a normative way whether an organization objectively implements web accessibility policy (including conformance with web accessibility standards). They study the level of policy and technical conformance with individual criteria in the standard and/or focus on individuals and what individuals/groups do or have to do to achieve compliance. But the individual and social psychology of compliance theory does not or only partially seem to explain the implementation of web accessibility standards. The focus should be on the organization and only indirectly on the individual (unless the individual is a replacement for the organization). In this view, compliance theory is mostly unsuitable to explain why municipalities have or have not implemented the web accessibility standards.

Even though monitoring studies show that the overall level of conformance is rising, there is still a basic lack of conformance among most municipality websites (Beenen et al., 2016; Velleman et al., 2011).

The commitment and activities by municipalities in the Netherlands show that they are willing and motivated to implement web accessibility policies including conformance with the standards. Local and regional government agencies in the Netherlands have freely committed themselves to legal measures with regard to the implementation of web accessibility standards (Bestuursakkoord, 2008, 2011).

At the same time, there are best-practice implementation examples showing that the standard can be applied to (local and regional) government agencies websites.

National, local and regional government agencies have worked together to raise awareness in different government programs such as iNUP where 241 municipalities were helped by raising awareness, training and implementing accessibility standards to their websites (KING, 2013).

The monitoring studies in the Netherlands (Beenen et al., 2016; Velleman et al., 2011) indicate that individuals within municipalities are working hard to raise the level of awareness and implementation of the web accessibility standards.

Could it be that not the individual, the law or the standard but the organization is the primary object we should focus on to find an explanation for the ongoing non-conformance?

In his famous book 'diffusion of innovations' (Rogers, 2003), Rogers focused primarily on the diffusion of innovations to and by individuals. But in more recent editions of his book, he concludes that many innovations are adopted by organizations where "an individual cannot adopt a new idea until an organization has previously adopted it." We could argue that this also applies to the implementation phase and that organizations play an important role in providing actual support for implementation. So instead of using compliance theory to ascertain in a normative way whether individuals of a certain organization are objectively implementing the criteria, this dissertation uses adoption and implementation theory to identify factors that can be enablers of support or barriers of resistance to the implementation of web accessibility standards from an organizational standpoint. In short, what can the organization do to support implementation of web accessibility standards and what should they leave behind.

This approach will hopefully provide more practical explanations to support organizations and thus the individuals within these organizations in implementing web accessibility standards.

## 1.4 Adoption and Implementation

The previous section describes the choice for adoption and implementation theory. In the field of accessibility implementation, this approach is rather new. As described earlier, most research into the implementation of web accessibility standards is based on compliance. Studying adoption and implementation theory, there is a wide range of approaches. Some authors have built models for adoption and implementation based on the diffusion of innovation to and by individuals. Others have built on that individual level and applied it to organizations or they have defined new models specifically for organizations (e.g. (Fichman & Kemerer, 1993; Hovav, Patnayakuni, & Schuff, 2004; Rogers, 1983; Ven & Poole, 1990). As described above, the focus of this dissertation is to find factors that can be enablers of support or barriers of resistance specifically to the implementation of web accessibility standards from an organizational standpoint.

Bouwman et al. (Bouwman, van den Hooff, van de Wijngaert, & Van Dijk, 2005) describe the adoption phase as "the phase of investigation, research, consideration and decision making in order to introduce a new innovation in the organization." In this dissertation, the innovation would be the web accessibility standards and the organization the municipality. In that case, the decision to adopt web accessibility standards has already been made.

As a result of the legal measures with regard to implementing web accessibility standards (Bestuursakkoord, 2008, 2011) and an extensive awareness campaign like iNUP (KING, 2013), it is safe to say that municipalities in the Netherlands have formally adopted web accessibility and are now in a phase of implementation. This dissertation will therefore focus on implementation by municipalities in the Netherlands. We hope the results will also be

applicable to comparable public sector body organizations elsewhere. Part 3 will explore this further.

## 1.5 Resistance and support

To define enablers of support and barriers of resistance to the implementation of web accessibility standards from an organizational standpoint, literature does not provide many examples. Articles on e-government implementation of Information Systems or ICT projects use the terms success and failure. They mostly provide lists of factors that influence this success or failure rate, e.g. (Gichoya, 2005; Heeks, 2002; Montequin, Cousillas, Ortega, & Villanueva, 2014; Ven, Polley, Garud, & Venkataraman, 2008). However, the definition and the extent of success and failure vary between the authors and none of the articles cover or discuss the implementation of web accessibility standards.

An example of an author who extends the concepts of success and failure is Gichoya (Gichoya, 2005). He studied factors affecting the successful implementation of ICT projects in government. Besides reviewing case studies from developed and developing countries, he undertook a preliminary study of the Kenya e-Government reality. His research is interesting because he adds a more process-oriented content to success and failure and looks at both organizational and technological factors as is the focus of this dissertation. He defines factors for success as drivers and enablers and factors for failure as barriers and inhibitors.

Drivers (like vision, government support, external pressure) encourage or reinforce successful implementation. Enablers (like effective project management, coordination) help overcome potential barriers.

Barriers (like infrastructure, finance) hinder implementation. Inhibitors (like user needs, technology, coordination, donor push) “prevent advancement and restrict successful implementation and sustainability” (Gichoya, 2005).

Ebbers and van Dijk (Ebbers & van Dijk, 2007) take a similar approach to success and failure to Gichoya but focus more on innovation. In their article, they use the terms resistance and support and take a first step to identify organizational processes of resistance to and support for e-government innovations. In view of this dissertation, an example of such an innovation could be improving accessibility. Ebbers and van Dijk indicate that innovations follow a multi-disciplinary and non-linear path. This fits well with today’s non-linear and multi-disciplinary development process of websites and thus the implementation of web accessibility standards. To answer their research questions about resistance and support for the adoption and deployment of new electronic government services, Ebbers and van Dijk define resistance and support. This dissertation uses their definition as a basis, with a specific focus on the implementation of web accessibility standards.

*Resistance is an influence or force that hinders or stops. It is the extent to which the implementation of web accessibility standards is not supported, obstructed, delayed or prevented from making progress by empirically verifiable decisions and actions of collective actors within governments including internal and external technology and service providers.*

Resistance also includes barriers to implementation like lack of support or passivity of the organization regarding the implementation. As implementation of web accessibility standards is obligatory, taking no action is regarded as a form of resistance.

*Support is an influence or force that encourages, accelerates, or advances the implementation of web accessibility standards for municipality organizations by empirically verifiable decisions and action of collective actors within governments including internal and external technology and service providers.*

Ebbers & van Dijk add that they see an “opposite” effect with most factors. If the presence of a certain factor stimulates success, the absence stimulates failure and if a factor stimulates failure, its absence stimulates success. Gichoya (Gichoya, 2005) (pp179) also describes this effect as “factors for success are those occurrences whose presence or absence determines the success of an ICT project.”

## 1.6 Conceptual and Research Framework and Research Questions

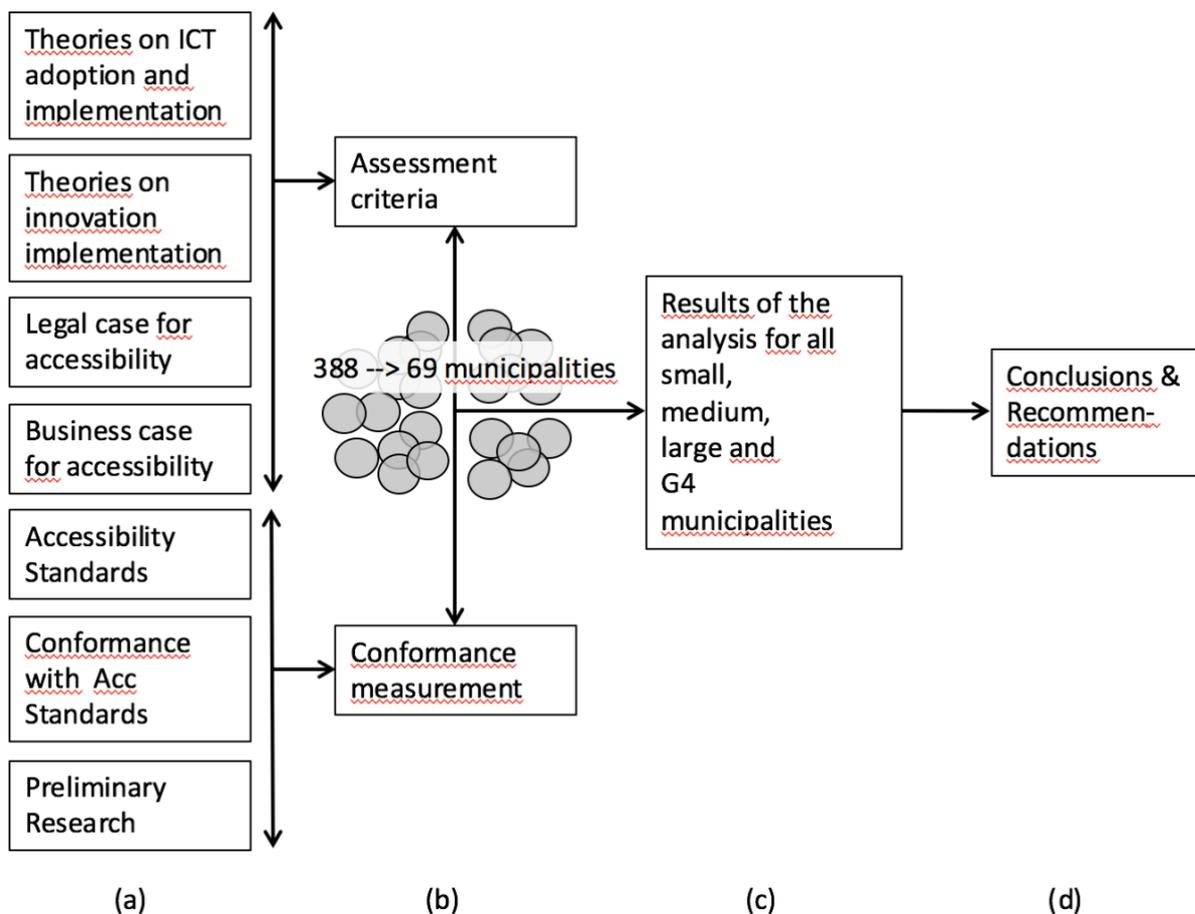


Figure 0.3: Overview of the Research Framework.

### 1.6.1 Research objective

The research objective of this study is to formulate *recommendations* to Dutch municipality organizations to improve the level of implementation of web accessibility standards.

The research objects consist of a selection of 69 out of the 388 municipalities that are different in number of citizens and in accessibility conformance level. We selected 21 small, 22 medium and 22 large municipalities and within each of these a group with zero, with medium and with full conformance with level AA of the accessibility standards. Also added are the four largest municipalities known as the G4. This makes a total of 69 organizations.

The following key concepts are determined within the theoretical frameworks.

<i>Key concepts:</i>	<i>Theoretical Frameworks:</i>
<ul style="list-style-type: none"> <li>• Implementation</li> <li>• Legal requirements</li> <li>• Business case</li> <li>• Accessibility standards</li> <li>• Accessibility conformance</li> <li>• Accessibility statements</li> <li>• Municipalities</li> </ul>	<ul style="list-style-type: none"> <li>• Theory on organizational adoption and implementation process of ICT</li> <li>• Innovation implementation frameworks, models and theory</li> </ul>

Table 0.4: Conceptual framework

The focus of the research framework in (a) this study is on the implementation process of accessibility standards within municipalities, more specifically on the process between the decision to create an accessibility conformant municipal website and the actual completion of that website or innovation or of a new part of a website. This study will identify factors that indicate resistance to and/or support for the implementation process of web accessibility standards within municipality organizations. The theoretical framework is based on literature that treats different dimensions of influence on the implementation of innovation in organizations and if available on implementation of (accessibility) standards. This (b) yields a list of factors (processes, indicators, indices and items) with which municipality organizations will be assessed. (c) The analysis will include a study of the possible causal relationship(s) between the outcomes of these factors and their effectiveness with regard to the actual implementation of web accessibility standards. (d) The study will conclude with recommendations for successful implementation.

#### General Research Question:

**Which organizational factors influence resistance to and/or support for the implementation of web accessibility standards to local government websites in the Netherlands?**

Sub questions:

1. To what extent are municipality websites in the Netherlands conformant with the accessibility standards?
  - a. How to measure the implementation of web accessibility standards for websites of municipalities (guidelines, data, conformance)?
  - b. What is the current conformance level of municipalities?
2. Do municipalities in the Netherlands have a good understanding of the state of accessibility of their website?
3. What do Dutch municipalities publicly declare about their websites' accessibility standards conformance and does this reflect the actual accessibility evaluation results?
4. What are the relevant factors (processes, indicators, indices and items) for web accessibility standards implementation by municipality organizations?
  - a. What factors can be derived from theories on organizational adoption and implementation process of ICT?
  - b. What factors can be derived from theories on web accessibility implementation?
  - c. What factors can be derived from real life web accessibility conformance and evaluation?
  - d. Is there a legal case for web accessibility?
  - e. Is there a business case for web accessibility?
5. To what extent do Dutch municipalities meet these factors?
  - a. What factors indicate resistance or support?
6. Is there a causal relation between the different factors and the actual implementation level of the standards to the websites of Dutch municipalities?
  - a. What factors indicate support for and what factors indicate resistance to successful implementation of web accessibility standards?

## 1.7 Academic relevance

There are laws and regulations in force requiring public sector bodies to adopt and implement international standards for web accessibility. Municipalities in the Netherlands have collectively adopted these standards (e.g. (Bestuursakkoord, 2008, 2011; Forum Standaardisatie, 2016). However, they often seem unable to fully implement web accessibility standards even if the law requires them to and they are actively pursuing it (Beenen et al., 2016; Velleman et al., 2011; Vlerken-Thonen, 2012). This is not unique for the Netherlands. Similar research findings are available from many countries (Hanson & Richards, 2013; Kubitschke et al., 2013).

Most studies show that public sector body organizations are making progress, but regardless of all their efforts (including awareness campaigns, laws, regulations and hardworking individuals), they conclude that the standards are still not widely implemented and sometimes not even mentioned during website development (Hanson & Richards, 2013).

These findings could be partly explained by the rigid approach to measuring web accessibility standards implementation. If we look at the vast amount of literature, the focus has long been on technical 'post mortem' compliance measurement. This means that website compliance is measured from a predominantly technical viewpoint and at the end of the

process/development. The output is mostly provided including a description of the errors that were found (i.e. missing descriptions for images, bad use of headings etc.).

Several studies have looked further than this technical approach, discussing the impact of other factors that may be related to the successful implementation of innovation or (web accessibility) standards (Andrés et al., 2009; Loiacono & Djasmasbi, 2013; Yu, 2002). But, however important, the impact of other than technical factors with regard to the implementation of web accessibility standards has so far only received minimal attention.

Therefore, this dissertation explores another path, looking into adoption and implementation theory (instead of compliance theory) to see whether that approach can better help identify factors that indicate resistance to and/or support for the implementation process of web accessibility standards to municipality websites.

Based on literature, questionnaires and interviews, this dissertation identifies factors that indicate resistance to and/or support for the implementation process of web accessibility standards to municipality websites and correlates them with actual audit of the websites. Awareness of these factors is important for stakeholders willing to implement web accessibility standards. The result is a set of recommendations for local governments that help them with the actual implementation of web accessibility standards. This not only contributes to the implementation of web accessibility standards, it may also be helpful for the implementation of other guidelines and (open) standards within local or other public sector bodies or even other sectors.

## 1.8 Structure of this dissertation

Part 1: Introduction and definition of the problem, research goal and research questions.

Part 2: Provides an explanation of the web accessibility standards, the legal and business case for accessibility and a description of the actual progress of the implementation of web accessibility in the last decade(s).

Part 3: Describes adoption and implementation models relevant for implementation of web accessibility standards in municipalities and proposes a model for use in this dissertation.

Part 4: An empirical investigation of the implementation of web accessibility standards in Dutch municipalities. Describes how the model in part 3 has been operationalized in the conformance measurement, the questionnaire and interviews.

Part 5: Results of the conformance measurements (audits), the questionnaires and the interviews of Dutch Municipalities.

Part 6: Conclusions, recommendations, general discussion and implications for theory and practice.



## 2 PART 2: THE IMPLEMENTATION OF WEB ACCESSIBILITY STANDARDS IN GOVERNMENT ORGANIZATIONS. GUIDELINES, LEGAL AND OTHER ASPECTS OF WEB ACCESSIBILITY

The Web Content Accessibility Guidelines (WCAG) (Caldwell et al., 2008) are considered to be the worldwide referenceable technical standard for web accessibility. The guidelines are published by the Web Accessibility Initiative of the World Wide Web Consortium (W3C/WAI). W3C is also known for more famous standards like HTML, one of the core components of the world wide web. WCAG describes how to make web content accessible to persons with disabilities. It includes multimedia content, online documents like PDF, interactive components, rich and mobile web applications and the web of things. It was promoted to ISO standard ISO/IEC 40500:2012 in 2012 and is an integral part of policy requirements in many countries (W3C, 2016a). More recently an Evaluation Methodology was added (WCAG-EM) that provides a step by step description of how to evaluate websites for accessibility using WCAG (Velleman & Abou-Zahra, 2014).

There are many studies about the use, implementation, validity and testing of the above mentioned web content accessibility standard. Some studies focus on the usability and validity (Giorgio Brajnik, Yesilada, & Harper, 2012; Donnelly & Magennis, 2003; Duchateau, Boulay, & Burger, 2010; Kapsi, Vlachogiannis, Darzentas, & Spyrou, 2009), some on the test quality (G. Brajnik, Yesilada, & Harper, 2010), some on evaluations using the standard (Nietzio, Strobbe, & Velleman, 2008; Velleman & Abou-Zahra, 2014; E. Velleman, C. Strobbe, J. Koch, C. Velasco, & M. Snaprud, 2007) and some are comparative (Li, Yen, Lu, & Lin, 2012; Vigo, Brown, & Conway, 2013). There are also many studies that measure the actual status of website accessibility in certain countries or areas at a certain time. This includes research into the accessibility of government websites in the UK, Netherlands, Saudi Arabia and all member states of the European Union (Al-Khalifa, 2012; Kubitschke et al., 2013; J. M. Kuzma, 2010; Plasterk, 2012; Velleman et al., 2011).

There is overwhelming policy and legislation about web accessibility. Kubitschke et al. worked on a benchmark for the status of e-accessibility in the 27 Member States and added some external countries like the US and Canada for reference (Kubitschke et al., 2013). For accessibility, the UN Convention on the Rights of Persons with Disabilities (signed by the Netherlands in 2016) provides the overarching framework. Many countries have translated the Convention into policies that incorporate the accessibility standards (W3C, 2017c). Governments are generally willing to pass legislation that helps the disabled participate in society (Loiacono & Djamasbi, 2013). Government induced legislation is thus a key influencer when it comes to website accessibility. However, the problem is not with passing a law, but with implementation. Studies indicate that even after a decade of availability of standards and even in countries where there is clear legislation, not all municipalities have successfully implemented the web accessibility standards (Kubitschke et al., 2013; Nurmela et al., 2013;

Velleman et al., 2011). This part will describe relevant guidelines, legal and other aspects of web accessibility.

## 2.1 Web Accessibility Standards

### 2.1.1 Web Content Accessibility Guidelines

The Web Content Accessibility Guidelines version 2.0 (WCAG2.0) (Caldwell et al., 2008) are widely considered the de-facto global standard for the accessibility of web content. They are developed by W3C in cooperation with experts and organizations from around the world. The standard explains how to make web content (more) accessible to people with disabilities and is primarily intended for evaluators and developers of websites, Web pages and tools (e.g. for page authoring or for evaluation). In WCAG, the term Web page is not limited to static Web pages but includes multimedia content, interactive components, rich and mobile web applications, office documents (e.g. PDF) and even single dynamic 'pages' that can contain complex interactive solutions.

WCAG 2.0 was published in 2008. As time passed and new web-related technologies emerged, there was a need for an extension. WCAG 2.1 adds Success Criteria to support mobile use cases (small screen use and touch) and to increase accessibility for low vision and people with cognitive or learning disabilities. It has been a Recommendation since 5 June 2018. During the audits for this dissertation, WCAG2.1 was not yet available, but websites that conform to WCAG2.1 also conform to WCAG2.0.

The WCAG2.0 standard (W3C calls it a Recommendation) consists of 12 guidelines divided over 4 accessibility principles (Table 2.1). For each guideline, there are testable Success Criteria. For each of the Success Criteria, there is also a wide variety of sufficient and advisory techniques to help users understand the standard. These techniques are constantly changing with technology and are therefore regularly updated. They are not normative but described in 'Notes'. Most Success Criteria are containers for up to 60 different techniques. Summarizing, WCAG2.0 has:

- **4 accessibility principles:** They summarize the foundations for web accessibility: perceivable, operable, understandable and robust.



- **12 Guidelines:** Every one of the principles has a number of guidelines. In total there are 12 guidelines (13 in WCAG2.1). They provide a framework and objectives for designers, developers and content editors. The guidelines are not testable.



- **61 Success Criteria:** Every guideline has two or more testable Success Criteria. They are ranked for levels of conformance: A (lowest), AA, and AAA (highest). Most legislation requires AA conformance. There are 38 AA Success Criteria (these include A level Success Criteria).

- **Sufficient and Advisory Techniques and failures:** These are documents that describe how to meet the Success Criteria (sufficient) or how to better address the guidelines (advisory) or to recognize/avoid failures. The Techniques documents are not normative. Content developers may develop new techniques for new technologies. If they want, they can submit these techniques to W3C for inclusion into the next version of the Techniques documents.

W3C also provides an extensive explanation for a better understanding of WCAG2.0 and (technical) guidance for the implementation (both linked from within the standard itself).

The **4 accessibility principles** of WCAG2.0 and of WCAG2.1 are:

1. **“Perceivable: Information and user interface components must be presentable to users in ways they can perceive.”**

Examples: if you provide text alternatives for video, images, graphs, icons and buttons, they can be read to people with visual disabilities or shown on their braille display. They can also be used as labels for speech input by people with motor disabilities. This principle also supports users in changing the presentation of the content to better fit their abilities. For example, assistive technologies can change the style, text size, button size, contrast, etc. They can sometimes even compute automatic summaries. This can help people with cognitive or learning disabilities.

2. **“Operable: user interface components and navigation must be operable.”**

Examples: websites should also be navigable without using a mouse. This helps blind people, but also people with motor disabilities who use switch or other control devices. It also benefits people with cognitive disabilities using a touch screen. Websites should also provide enough time for users to read and use the content. If a person needs more time to fill out a form, make sure they do not lose their data because of a time-out on the page.

Also make sure that users always know where they are on a website or Web page. One example of doing this is by providing a clear keyboard focus. Users with a motor disability or impaired vision can then see where they are on the page.

3. **“Understandable: information and operation of the user interface must be understandable.”**

Examples: by identifying the language of a page or page elements (Dutch, English, etc.) assistive technology can read the content in that language and even shift language if necessary. Also make text easy to read for the target audience, providing explanations for abbreviations etc.

This principle is also about the predictability and consistency of the user-interface. For example, it helps users if navigational elements found on every page are the same (or have the same labels).

Try to help users avoid or correct mistakes. Make sure error messages are clear to the user. Don't ask a blind person to correct the form fields "that are marked red."

4. **"Robust: content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies."**

Examples: this helps assistive technologies understand Web pages and present them to the user to read and operate.

WCAG has three conformance levels (A, AA and AAA). The EU Directive and the UN Convention both require level AA for websites and mobile applications. In this dissertation, WCAG2.0 level AA is used to evaluate municipality websites. Table 2.1 presents an overview of the principles (POUR), guidelines and AA Success Criteria of WCAG2.0. The table also offers a short clarification of the Success Criteria.

1	Perceivable
1.1.1	Make sure that images, photos, buttons and form fields have a description or a name. This helps persons who are blind because their software can read this information to them or provide it in braille. For people who are low literate, software can be changed to symbols or simpler language. If images are decorative or for formatting a page (e.g. whitespace), make sure that they are not read to persons with disabilities.
1.2.1 – 1.2.5	Persons with a visual or auditory disability may have problems understanding video or audio on your website. If you show pre-recorded media like a video on your website, make sure you add captions and an audio description so they can understand the video. Note that live video also requires captions. There are 5 AA Success Criteria that cover 'time based media'. For example, sign language is a AAA requirement.
1.3.1	<p>Info and Relationships: If a form has required fields, the form can display them in red. This is however not visible for blind persons. You could also add an asterix *. This makes it easier to find for assistive technology. Assistive technology can even change the color, form or text for the user to be more readable or understandable.</p> <p>If a table is correctly formatted, assistive technology can read the table to the user. It can then read both the row and the column header or change the table for a user that wants less complexity. Create content that can be presented in different ways (for example simpler layout) without losing information or structure.</p>
1.3.2	<p>Meaningful Sequence: Make sure the content is also read in the right order if the page is linearized. This includes tables, lists. By doing this, assistive technology can read the page to a user in the correct order (if that order is important).</p>
1.3.3	<p>Sensory Characteristics: If you use sensory information like a large blue arrow button to go to the next or previous page, make sure users understand the meaning even if they cannot perceive shape or size. In this example, add the text "Previous" or "Next" to the arrow and explain what it is for: "to go to the next page, select the large blue arrow button labeled Next".</p>

1.4.1	Use of color: Make sure a user can also use the Web page if he has difficulties seeing colors. For example, if someone makes a mistake when completing a form, make sure the errors are not only marked with the color red, but also with an asterisk, * or other symbol.
1.4.2	Audio control: A user can pause or stop any audio on a Web page that plays for more than 3 seconds. Or he can change the volume independently from the system volume.
1.4.3	Contrast: Make sure there is sufficient contrast between text and background (except in case of a logo).
1.4.4	Resize text: Make sure all text on a page can be resized without assistive technology up to 200% of its original size. This way elderly persons and persons with (temporary) visual disabilities can enlarge the text for readability. This includes text in form fields and buttons (except for images of text).
1.4.5	Images of text: Text in images cannot be read by persons who are blind. If it is possible to use text instead of an image, then use text. If not, then provide a description as required in SC 1.1.1.
<b>2</b>	<b>Operable</b>
2.1	Make all functionality available from a keyboard
2.1.1	Keyboard: Not all people can use a mouse or touch. Make sure the elements of the page are also operable using a keyboard (also see WCAG2.1). This includes the (hamburger) menu, form fields etc.
2.1.2	No keyboard trap: Make sure when using the keyboard, the 'focus' (the active element, mostly visible because there is a dotted line around it) can always be moved to the previous or next element. If that is not possible, it is called a keyboard trap. The focus is then stuck in one place or one part of the page and cannot leave.
2.2.1	Timing adjustable: Provide users enough time to read and use content. If there is a time limit, provide a possibility to adjust the time limit or to turn it off. Also make sure the user is warned timely that the time is running out (at least 20 seconds before). This is important for users who have difficulties with time because of their disability. It is important because sometimes a page time-out requires a new login and all earlier information is then deleted requiring a person to redo all actions or answers. There are exceptions for tests etc.
2.2.2	Pause, stop, hide: Users can pause, stop or hide moving, scrolling, blinking and auto updating content. This is important for users who have difficulties concentrating. If the content moves, blinks or otherwise attracts their attention, they will have difficulties interacting with a Web page.
2.3.1	Three flashes or below threshold: Do not design content in a way that is known to cause seizures. This means no content that flashes more than 3 times per second. This can happen in videos or in advertisements.
2.4.1	Bypass blocks: Provide skiplinks on your page like 'skip to content', etc. This is then the first link on the page and helps people who use a keyboard or swipe through a page to skip the menu and go directly to the content of the page. Without this link, users would have to navigate through all the menu items before they reach the content.
2.4.2	Page Titled: A web page has a title that describes the topic or purpose of the page. In most CMSs it is possible to choose a page title. This title provides

information to a blind user about the page he is on and can help him perceive if the page has changed.

- 2.4.3 Focus Order: Many users with disabilities use the tab-key to navigate a website. Make sure the tab order on your pages is logical.
- 2.4.4 Link Purpose (in context): Assistive technology can give the users an overview of a page by providing a list of all links. Make sure the links on your page are clear. Do not use “click here” or “read more” as a link. For a book available in three formats, use “dissertation of Eric”, “pdf”, “epub3”.
- 2.4.5 Multiple Ways: Users with visual disabilities may prefer to use the search function instead of having to go through the complete menu all the time. Others may prefer a table of contents etc. Provide multiple ways for a user to navigate through the website.
- 2.4.6 Headings and Labels: Make sure they describe the contents or purpose. In case of a bibliography, one letter may be enough (a,b,c etc.). If a form field asks for your last name, the label should be “Last name”.
- 2.4.7 Focus Visible: If you navigate a Web page using a keyboard or swiping, make sure the focus is visible (mostly visible because there is a dotted line around it). This is important for persons with motor disabilities who use the keyboard or other input devices (like sip-and-puff) so they know where they are on the page.

### 3 Understandable

- 3.1.1 Language of Page: If the language is indicated in a correct way, assistive technology will read the page in the indicated language. That way Frisian will be spoken by a Frisian voice (if available). Make sure the language of the page is indicated in the code of the page. Some CMSs support changing the language of a page.
- 3.1.2 Language of Parts: The same as 3.1.1 but then for parts of the page. If part of the Frisian page is in English, then it is possible to indicate that. Assistive technology will then read that part to the user in English.

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- 3.2.1 On Focus: If a blind user uses the keyboard to navigate a website, the focus moves over the Web page. It is disorienting if the page suddenly changes without clicking. The SC therefore requires that just changing the focus on a Web page does not change the context of the page.
- 3.2.2 On Input: Do not change the context without warning the user first. For example, when the user selects the answer to the last question in a questionnaire, he should not unexpectedly be moved to another page.
- 3.2.3 Consistent Navigation: Make sure navigation elements on your website are consistent.
- 3.2.4 Consistent Identification: Make sure components that have the same functionality are consistent if they are repeated on other pages. This makes it easier for assistive technology and for persons with disabilities to recognize and understand them.

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- 3.3 Input Assistance: Help users avoid and correct mistakes.

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- 3.3.1 Error Identification: If a disabled user makes a mistake when completing a form he would have to go through the complete form to search for the mistake. This SC requires the Web page to describe the error to the user: “You forgot to fill in your last name.”

- 3.3.2 Labels or Instructions: Provide labels or instructions so people know what they are expected to do: “Fill in your last name here”, “click the send button if you have finished completing the form”, etc.
- 3.3.3 Error Suggestion: If a user makes a mistake completing a form field, the system immediately provides a suggestion. Only if the error is automatically detected.
- 3.3.4 Error Prevention: This SC is for legal, financial and data purposes. It requires that the user can reverse any submission, check/change a submission or confirm before finalizing a submission. This is important for persons with visual disabilities so they can check/change their submission before finalizing it.

<b>4</b>	<b>Robust</b>
4.1	Compatible: Maximize compatibility with current and future user agents, including assistive technologies.
4.1.1	Parsing: Check of code errors. Assistive technology can better use pages with valid markup. There are online tools to check pages.
4.1.2	Name, Role, Value: This is mostly covered by the standard software, but make sure assistive technology can see if a checkbox is checked or unchecked, if a radio button is checked, etc. Users can quickly check this with their assistive technology.

Table 2.1. Overview of the Principles and Guidelines of WCAG2.0 (Caldwell et al., 2008) with extra clarification per Success Criterion.

Brajnik and Yesilada (G. Brajnik et al., 2010; Giorgio Brajnik et al., 2012; Yesilada, Brajnik, & Harper, 2009) researched the reliability of conformance testing by experts and non-experts. They conclude that even though the standards are objectively testable, even experts do not always find the same failures/barriers. Although they are much better than non-experts, cross testing can improve the reliability of the results.

### 2.1.1.1 Conformance requirements of WCAG2.0

Testing for conformance is more than just following the WCAG2.0 Principles, Guidelines and Success Criteria. To help organizations monitor conformance, WCAG2.0 provides readers with a list of conformance requirements. This includes information about how to make conformance claims. For conformance measurements, there are five requirements that have to be satisfied (Caldwell et al., 2008):

1. Full conformance with one of the levels (A, AA, AAA).
2. Conformance is for full Web pages only. It is not possible to exclude parts of a Web page in order to claim conformance.
3. All steps in a process from start to finish should be included.
4. All technologies *relied upon* to use the Web page should be accessibility-supported.
5. If technologies are not *accessibility-supported* they do not block the use of the rest of the page (non-interference).

“Relied upon” means that the content of a Web page does not conform if a specific technology (for example Flash or JavaScript) is turned off or is not accessibility supported.

“Accessibility supported” means that users of assistive technologies can use the Web page as intended. It also means that the Web page works well with accessibility support options in

browsers, other user agents and plugins (e.g. a pdf viewer or a video player). These support options should be widely available (widely-distributed) and not cost more than non-disabled persons would have to pay for them.

WCAG conformance also offers the possibility of “partial conformance”. This is mostly related to third party or crowd-sourced content. Examples include uncontrolled content like a chat function, reaction fields for users of a Web page, Facebook and Twitter feeds, advertisements, newsfeeds from different sources and other ways that users can add content that was not available at the moment of publication of the Web page. If this content is monitored and repaired within a certain timeframe, the municipality can claim conformance. If not, they can claim “partial conformance”. This means that the website would be conformant if a certain part would be removed or left outside the scope.

There is an authorized translation of WCAG2.0 to Dutch (linked from the online WCAG2.0 document).

## 2.1.2 Other W3C accessibility guidelines

Most people only know the Web Content Accessibility Guidelines. But W3C has more accessibility guidelines. The other guidelines are less directly related to content, but address the accessibility of authoring tools, user-agents and specific techniques. They are:

- Authoring Tool Accessibility Guidelines (ATAG): these guidelines describe requirements for tools that help users add content to websites or mobile applications. Examples include CMS systems, HTML editors, blogs, etc.
- User Agent Accessibility Guidelines (UAAG): examples of user agents include browsers, media players and other tools that show web content.
- W3C also provides specific accessibility requirements for technical specifications like WAI-ARIA, Timed Text, etc.

## 2.1.3 ISO 40500, EN 301549 and Section 508

### 2.1.3.1 ISO 40500

To support harmonization and implementation of WCAG by government agencies and to facilitate referencing by lawmakers, WCAG2.0 is also available as an ISO standard: ISO/IEC 40500 (ISO/IEC, 2014). This standard is exactly the same as WCAG 2.0, but in some countries it is easier to adopt a formal ISO standard than to adopt the W3C Recommendation.

### 2.1.3.2 EN 301 549

To facilitate harmonization and referencing of the standard in Europe, the EU asked the standardization organizations to incorporate WCAG into a European Norm (EN). This significantly impacts the European harmonization effort because the 33 CEN-CENELEC countries have an obligation to give EN standards the status of national standard and to withdraw any conflicting national standards. The resulting EN 301 549 describes accessibility requirements suitable for public procurement of ICT products and services in Europe. Chapter

9 of the EN norm specifically addresses accessibility and includes Web accessibility. To make sure there are no international differences, the WCAG 2.0 standard was copied into the web part of the EN. To ensure there are no differences with future versions of the WCAG standard, the EN will be updated as soon as there is a new version of WCAG.

The EN 301 549 standard is intended as the basis for an accessible ICT procurement toolkit. This toolkit has been made and placed online through the CEN CENELEC and ETSI work for Mandate 376. The results can be used by both public and private procurers and includes an online Accessible ICT Procurement Toolkit and an Accessibility Requirements Generator<sup>2</sup>. The toolkit is non-normative and issued as support material.

Besides the Internet, the requirements also cover software and electronic equipment (like ticket machines, smartphones, etc.). The EN 301 549 Standard comes with three Technical Reports (TR 101 550, TR 101 551 and TR 101 552). These reports offer accessibility requirements for a wide range of products and services related to ICT.

### 2.1.3.3 Section 508

Section 508 of the Rehabilitation Act is the law in the United States that governs accessibility of ICT in the Federal government (Access-Board, 2017; U.S. Access Board, 2015). It was updated to WCAG2.0 level A and AA and came into effect on 18 January 2018. For reasons of international harmonization, a 'refresh' of the requirements to incorporate the newer WCAG2.0 standards was coordinated with W3C and with the European Commission work on EN 301 549. Section 508 applies to all federal agencies which develop, procure, maintain or use ICT. Like the European EN standard, Section 508 also extends to software and electronic equipment.

Section 508 requires equal access for the disabled. Although until 2018, section 508 consisted of the much older WCAG1.0 guidelines, most researchers and implementers have been using WCAG2.0 since its launch in 2008.

### 2.1.4 WCAG-EM

The WCAG Evaluation Methodology, WCAG-EM (Velleman & Abou-Zahra, 2014) describes how to evaluate the conformance of websites with the WCAG2.0 standard. Where WCAG2.0 always covers single Web pages, WCAG-EM can be used for complete websites. WCAG-EM provides a clear procedure to evaluate websites and includes considerations to guide evaluators. The methodology is intended for people who are experienced in evaluating web accessibility using WCAG2.0 and its supporting resources.

It provides evaluators with a guide to defining the evaluation scope, exploring the target website, selecting representative samples from websites where it is not feasible to evaluate all content, auditing the selected samples and reporting the evaluation findings.

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<sup>2</sup> <http://mandate376.standards.eu> and <http://mandate376.standards.eu/procurement-stages/writing-a-call-for-tenders/wizard/technical-requirements/> (Last viewed: 20 May 2018).

The methodology is suitable for use in different evaluation contexts, including self-assessment and third-party evaluation. WCAG-EM will be used as a basis for the evaluation of websites in this dissertation.

To help developers and owners of websites who have difficulties implementing the standards because of third party or crowd-sourced content or who work in a closed environment (corporate network), WCAG-EM includes conformance requirements like partial conformance and information about the accessibility support baseline. Specifically, for new technologies, it is not always realistic to require that they work with all combinations of operating systems, browsers, plugins, assistive technology and other user agents. In WCAG-EM, the evaluator consults with the evaluation commissioner to determine the minimum set of combinations that the website is supposed to work with. In this way, the accessibility support baseline offers the website owner or developer an opportunity to define the web browsers, assistive technologies and other user agents for which features provided on the website are to be accessibility supported (Caldwell et al., 2008; Velleman & Abou-Zahra, 2014).

The Web Accessibility Initiative (WAI) has also made a tool to generate WCAG-EM reports. This tool is called the WCAG-EM report tool<sup>3</sup>. The tool is designed for experienced evaluators and requires detailed knowledge of the WCAG standards. It guides users through the steps of WCAG-EM. It does not perform any accessibility checks.

### 2.1.5 Using tools to monitor web accessibility

Tools can significantly increase efficiency when testing for accessibility (A. Aizpurua, Arrue, Vigo, & Abascal, 2009; Velleman & Abou-Zahra, 2014; Vigo & Brajnik, 2011). The positive aspects of tools include that they are faster than humans and can easily process very large numbers of Web pages and they cost less. They also lead to easier reproducible results. The W3C Accessibility Conformance Testing (ACT) effort is working on tests for accessibility standards like WCAG. This work includes development of test cases to improve the automatic coverage of web accessibility evaluation and support for tools. These test cases include automated, semi-automated and manual testing procedures. In the future, machine learning may learn from a combination of automated and manual evaluation to extend the range of automatically testable criteria. The project WAI-Tools (2017 – 2020) is working on extending these ACT rules, building on the Evaluation and Report Language (EARL) and the Test Case Description Language (TCDL)<sup>4</sup>. The author is involved in this activity<sup>5</sup>.

The most important limitation of tools is the low number of web accessibility criteria that can be fully automatically tested (between 5 and 15 percent). For example, a tool can easily see if an image has a description (alt-text) or if a form field has a label. However, most tools cannot see whether the text in the description or label is adequate. It can however help flag these cases so they can be more easily found for manual evaluation.

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<sup>3</sup> <https://www.w3.org/WAI/eval/report-tool/#/> (Last viewed: 8 August 2018).

<sup>4</sup> <https://www.w3.org/TR/act-rules-format/> (Last viewed: 20 May 2018).

<sup>5</sup> <https://www.w3.org/WAI/Tools/> (Last viewed: 20 May 2018).

A potential problem for tools is the unlimited potential of websites and Web pages to change dynamically: Web pages of organizations can sometimes show different content depending on the user's preferences, platform, device (e.g. smartphone, tablet) and data collected by the website about the user (e.g. age, browser history, online information), as well as time of day, location, context of use, etc. Modern tools sometimes have a way of programming certain choices or paths that could reproduce this, but at the moment this would require complex manual intervention.

Another limitation of web accessibility tools is that they produce false positives (warning the user for non-existent failures) and false negatives (missing existing failures).

There are many tools that can help evaluate web accessibility. W3C provides a curated page that shows tools available in the world (W3C, 2016b). The list contains more than 100 accessibility evaluation tools. If we consider the situation in the Netherlands, the most used tool was [gewoontoegankelijk.nl](http://gewoontoegankelijk.nl), but this was taken offline in 2017. There are many tools that test one page for free like: SiteImprove (Chrome plug-in), AChecker, aXe, CynthiaSays, EIII Page Checker, Evaluera, Functional Accessibility Evaluator, Powermapper/SortSite, Tenon.io, TAW, WAVE. Some have a commercial model for larger numbers of pages and reporting. A number of Dutch municipalities have tools that are integrated into their website management process such as SiteImprove or aXe to monitor and report on the web accessibility status and progress.

The EU EIII project worked on a tool to facilitate crowdsourcing of web evaluation (Snarud, Rasta, Andreasson, & Nietzio, 2014; Teinum, 2013). The users could be experts, people with disabilities and others. The output of the tool was intended to complement and validate the output of the EIII Multi-Page Checker tool. A major problem with crowd sourcing web evaluation is the fact that evaluating websites is not fun to do and thus needs some sort of incentive to work. Also, web accessibility evaluation requires knowledge in order for the results to be reliable. The outcome User Testing Tool (UTT) is currently online as a bookmarklet at [accessiblecheck.com](http://accessiblecheck.com). The output is used to complement the measurements by the EIII tool. Further research is planned.

### 2.1.6 Side-effect of using monitoring tools

Organizations are not always aware that (semi-) automatic tools only fully measure a small portion of the criteria. Some websites even carry a conformance logo whilst not being conformant. This can partly be explained by an overreliance on tools without additional manual evaluation during development and during the life cycle of the website. Vigo et al. (Vigo et al., 2013) concludes that even if the best tools for specific WCAG Success Criteria are used without additional manual evaluation, half of the Success Criteria would be missed and 6 out of 10 failures would not have been found.

Since 1999, the Dutch government has monitored the quality of public websites with the automated Overheid.nl Monitor tool (MinBZK, 2017). Ministries, municipalities, provinces and water management boards took the tool based Monitor very seriously and a step up in the ranking on the website was often a reason for celebration by the responsible officials. We can thus conclude that the Monitor has played its role in increasing awareness, but at the same

time it has not provided government agencies with adequate information about the number and nature of the accessibility failures on their websites.

A side effect of the tool was the annual increase in scores by almost all municipalities. Many web developers made minor changes to the websites to score better in the rankings (During the EU WADEX subgroup expert meetings in Brussels this was sometimes referred to as the 'Dutch tool effect').

Due to a lack of automated tooling, the Dutch government commissioned a follow-up automated tool specifically catering for accessibility called 'gewoontegankelijk'. This tool was active from 2014 to 2017 and showed a slow improvement in the accessibility in public sector websites. Due to the high cost of maintenance, the tool was terminated in 2017. The dataset is no longer available.

## 2.2 The legal and human rights case for web accessibility

National rules and regulations for applying, monitoring and reporting accessibility of websites and mobile applications rely on requirements set by the UN, the EU and by national, regional or local governments and regulators. First and foremost are the requirements set by the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). They set the boundaries for the application of accessibility for people with disabilities. To further help implement the UN Convention, many (inter)national laws and regulations have been harmonized and adapted.

### 2.2.1 United Nations Convention on the Rights of Persons with Disabilities

The focus of the United Nations Convention on the Rights of Persons with Disabilities (United Nations, 2006) is on promoting, protecting and ensuring "the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities." The Convention is not limited to public sector bodies but includes private entities providing facilities and services to the public.

The European Union ratified the Convention in 2010, thereby making it binding for the institutions of the Union and all Member States. The Netherlands ratified the Convention in 2016.

Article 9 of the Convention addresses web accessibility. It requires State Parties to take appropriate measures to ensure equal access to facilities and services open or provided to the public. This includes the physical environment and transportation but also information and communications (technologies and systems).

State Parties are obliged to submit regular reports on how the rights are being implemented. Regarding web accessibility, the measures are not limited to the monitoring of technical conformance. Below is a list of measures that State Parties should report about and that directly or indirectly touch on the subject of web accessibility implementation. The list includes measures to:

- Adopt, harmonize and implement technical standards and guidelines for accessibility
- Set up a framework to promote, protect and monitor the implementation
- Change or implement rules and legislation with relation to web accessibility
- Use public procurement and other measures to require web accessibility
- Enforce compliance, including sanctions
- Involve civil society and persons with disabilities in monitoring and reporting
- Audit results of the implementation of the standards and guidelines for accessibility
- Identify and eliminate obstacles and barriers to accessibility in both the public and the private sector
- Integrate disability issues on the agenda of all government agencies
- Implement national accessibility plans with clear targets and deadlines
- Designate one or more focal points for public and private sector
- Promote awareness and training about accessibility
- Implement budget allocations for national implementation and monitoring

The Convention requires State Parties to report two years after signing the Convention and thereafter every four years. The reports are openly available on the website of the Committee on the Rights of Persons with Disabilities. This Committee consists of independent experts who monitor the implementation of the Convention by the State Parties. The members of the Committee provide the State Parties with suggestions and general recommendations on their reports. The Committee can also examine individual complaints about violations of the Convention by State Parties if the State Party has also signed the Optional Protocol to the Convention. If a State has not (yet) signed the Optional Protocol, individual complaints can mostly be directed to a national organization appointed by the State Party. In the Netherlands, that is the Institute for Human Rights.

Note that not everything can be made accessible. This is why the UN includes the concept of 'Reasonable accommodation'. This means that the modifications and adjustments should not impose a disproportionate or undue burden. The legal explanation of undue burden is left to the courts to decide. The Dutch Institute for Human Rights website covers a number of court cases regarding web accessibility.

### 2.2.2 EU Directive 2016/2102

To implement the UN Convention, the EU issued Directive 2016/2102 on the accessibility of the websites and mobile applications of public sector bodies. (European Parliament & Council of the European Union, 2016). Article 4 of that Directive requires Member States to "ensure that public sector bodies take the necessary measures to make their websites and mobile applications more accessible by making them perceivable, operable, understandable and robust." Pointing to the principles of the Web Content Accessibility Guidelines supports worldwide harmonization. To stop Member States from further adapting or making their own standards for web accessibility, the Directive requires websites and mobile applications to at least ensure a level of accessibility equivalent to that of European standard EN 301 549 (CEN, CENELEC, & ETSI, 2014).

The Directive has a cascaded model for compliance of public sector body websites and mobile applications:

- Websites built after 23 September 2018 need to be conformant **23 September 2019**
- Websites older than 23 September 2018 need to be conformant **23 September 2020**
- Mobile applications need to be conformant **23 June 2021**

The Directive is limited to public sector bodies, described as the “state, regional or local authorities, bodies governed by public law, or associations formed by one or more such authorities or one or more such bodies governed by public law, if those associations are established for the specific purpose of meeting needs in the general interest, not having an industrial or commercial character.” The Directive comes along with the European Accessibility Act that covers a much wider number of products and services.

Besides assuring accessibility of websites and mobile applications, The Directive also requires Member States to regularly update a detailed, comprehensive and clear accessibility statement on the compliance of their websites and mobile applications with the Directive. More information about the Statement is given in section 2.4.2.

The Directive also requires Member States to take measures to promote and facilitate implementation. These measures will ensure uniform conditions for the implementation of the Directive and include requirements like:

- Transposition of the Directive text into their national legislation by 23 September 2018.
- Promote and facilitate training programs about how to create, manage and update the content of websites and mobile applications in an accessible way.
- Raise awareness about benefits to users and owners of websites and mobile applications as well as about the need to provide a feedback mechanism.
- Facilitate cooperation and exchange of best practices.

Member States have to report the text of the main measures of national law which they adopt to cover the Directive. These measures apply to both websites and mobile applications.

Starting on the 23 December 2021 and every three years thereafter, Member States are required to report to the Commission about their progress. The report should include the outcome of the monitoring, the measurement data and even tips for repairing failures. The reports will be made openly available to the public. All Member States have to appoint (in 2018) a body designated to perform the monitoring and reporting functions. They also have to designate an enforcement body.

The Commission provides a model for the statement, the monitoring methodology and for the report.

### 2.2.2.1 *Disproportionate burden and other exceptions*

The Directive (in article 1) describes exceptions for specific websites and mobile applications like for: public service broadcasters and their subsidiaries, NGOs whose services are not considered essential to the public, or intended for persons with disabilities and websites and mobile applications of schools (except for necessary administrative services).

The Directive also excludes specific content like live media, online maps, specific types of third party content and reproductions of items in heritage collections that cannot be made fully accessible (see exact description in Directive). Other exclusions are made for websites that are only available for a closed group of people like in some cases content of intranets or extranets (published before 23 September 2019 and until they undergo a substantial revision) and archives marked as such and containing content that is not needed for active administrative processes and not updated or edited after 23 September 2019.

Like the UN Convention, the Directive also describes exceptions due to disproportionate burden (article 5). If a public sector body uses this exception, it shall explain: “the parts of the accessibility requirements that could not be complied with and shall, where appropriate, provide accessible alternatives.”

Most requirements set by the Directive are compliance based: how conformant are the Web pages and mobile applications with the standard, what is the status of the legislative measures (including feedback mechanism etc.) and what measures, mechanisms or procedures have been set up to promote and facilitate the uptake. Similar to the U.S. Congress supervision over its agencies, the European Commission monitors the Member States’ implementation activities and may start infringement proceedings against noncomplying Member States (König & Mäder, 2014).

An overview of preceding EU activities and policy actions is available at: [http://ec.europa.eu/ipg/standards/accessibility/eu\\_policy/index\\_en.htm](http://ec.europa.eu/ipg/standards/accessibility/eu_policy/index_en.htm) (last accessed 13 Mai 2018).

### 2.2.3 Rules and Legislation in the Netherlands

The UN Convention has been in force since the Dutch government signed the document on 14 June 2016 (see section 2.2.1). This means that since that moment the Dutch government is responsible for promoting, protecting and ensuring “the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities.” But before that, there were already legal and other requirements that included (web) accessibility for people with disabilities. Examples include article 429q of the Dutch Penal Code (Wetboek van Strafrecht) with fines up to 8,200 Euros or two months in jail (Also see section 2.2.5) and the Equal Treatment Act on the grounds of Disability or Chronic Illness (WGBH/cz)(see section 2.2.3.1).

For Dutch (semi-) public sector body websites accessibility has been part of the ‘comply or explain’ standards since 2008 making web accessibility standards implementation obligatory for all (semi-) public sector bodies (First for the Webguidelines version 1, then in 2011

Webguidelines version 2 and since 15 November 2016 EN 301 549). These standards are compulsory for (semi) public sector bodies in the Netherlands (Forum Standaardisatie, 2016). In practice, this means that (semi) public sector bodies in the Netherlands must require application of this standard when they buy, develop or make changes to ICT products and services above the amount of 50,000 Euros ex VAT. They are also required to provide an accessibility statement on their website or mobile (web) application. The government provided a model statement based on the work for the implementing acts by the European Commission. In August 2018 this model included questions that extend beyond compliance measurement. The website [digitoegankelijk.nl](http://digitoegankelijk.nl) provides links to the statements.

The Netherlands, like other countries in the EU, have an obligation to incorporate European Directives into national legislation. After signing the EU Directive 2016/2102 on 22 December 2018 the Dutch government had until 23 September 2018 to transpose the Directive into Dutch legislation.

Due to time constraints, the changes necessary to implement the requirements of both the Directive and the UN Convention have been placed in a so-called 'Algemene Maatregel van Bestuur/Administrative Decree' (AMvB) with the title 'Tijdelijk Besluit digitale toegankelijkheid overheid' and will be included into the 'Wet Digitale Overheid' (Digital Government Law). Until then, the AMvB is a legal requirement and can be used to further broaden or narrow the application scope. Both the Decree and after that, the law replace the comply-or-explain approach since 1 July 2018.

With regard to procurement and accessibility, a few major Directives have already been incorporated in national legislation, Directive 2014/24/EU on public procurement and Directive 2014/25/EU (European Parliament & Council of the European Union, 2014a, 2014b) have been incorporated in the Dutch "aanbestedingswet" (Staatsblad, 2016). This includes the accessibility requirements that were added in the updated EU Directives. The "aanbestedingswet" is obligatory for all public sector bodies since 1 January 2017 (Public Sector Bodies are defined in article 3 of Directive 2016/2102/EU).

None of this is new. As in most countries in the world, (web) accessibility has long been an inherent part of the constitution and covered in anti-discrimination laws and other regulations (Kubitschke et al., 2013). Back in 2006, the Dutch government agreed to the Besluit Kwaliteit Rijksoverheidswebsites (MinBZK, 2006). It meant that all existing public sector body websites under ministerial responsibility should have implemented web accessibility standards by the end of 2010 and all new websites from September 2006. It required the organizations to report about the implementation of web accessibility in their annual report. Because there was no formal (legal) standard that could be used, many countries made their own version of the web content accessibility guidelines based on WCAG (French: RGAA, Italy: Legge 9 gennaio 2004 n.4, UK: Equality Act, Spain: UNE 139803, US: Section508, etc.). The Dutch government wrote the 'Webguidelines' and later adapted these to fully cover WCAG2.0. In 2008 the Webguidelines were adopted by the "bestuursakkoord Nationaal Uitvoeringsprogramma Betere Dienstverlening en e-overheid (NUP)" (Bestuursakkoord, 2008). This is not a legal requirement but a common agreement between the different parties. This meant that conformance was also required for municipalities, provinces and water boards. After ratifying

the UN Convention and the finalization of the EU Directive 2016/2102 in 2016, the Dutch government replaced the Webguidelines by the European EN 301 549 standard.

For the Netherlands, the new standard broadened the legislative scope for accessibility to not only include accessibility of websites, but also mobile applications, hardware, software, documents and intranets and extranets.

(Semi) public sector bodies using one of the standards from the list of compulsory standards of the 'Standardisation Forum' have to report about the use in their annual report.

#### *2.2.3.1 Equal Treatment Act on the grounds of Disability or Chronic Illness*

As a result of the UN Convention on the rights of persons with disabilities, the Dutch 'Wet Gelijke Behandeling op grond van handicap of chronische ziekte' (Wgbh/cz) (Staatsblad, 2003) was adapted to include general accessibility. Besides living, work, education and public transport, the law now includes products and services. The change has been in force since 1 January 2017. This law requires, if requested, effective adaptations for people with disabilities. The law is applicable to both private and public websites and mobile applications. For municipalities, compliance with this law is also specifically repeated and required in the 'Wet gemeentelijke antidiscriminatievoorzieningen' (Wga) (Staatsblad, 2009).

The Municipality has to report yearly before 1 April to the Minister of the Interior and Kingdom Affairs about the activities and possible registered complaints regarding the Wga. There are no requirements for reporting on Wgbh/cz.

#### *2.2.4 Policies and legislation in other countries*

There are many laws and policies regarding Web accessibility in the world. The World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI) Education and Outreach Working Group (EOWG) regularly updates a list that can be used as a starting point for more information. It can be found at <https://www.w3.org/WAI/Policy/>. Most countries have web accessibility covered under some form of equality or anti-discrimination legislation (e.g. Austria, Germany, Ireland, Netherlands, United Kingdom) (Kubitschke et al., 2013). Among the 27 EU Member States, only Spain and Norway seem to include private commercial organizations in their specific accessibility legislation. However, there are examples in Australia, the US, UK and Netherlands, where cases against private and public companies have been successfully brought to court.

Most countries use the Web Content Accessibility Guidelines, sometimes adapted to a different form like Section 508 in the US, EN 301 549 in the European Union or ISO/IEC 40500:2012. Most countries limit their requirements to compliance. They have implemented one or more laws and regulations and require conformance with the standard. Their reporting is mostly limited to the transposition of the law(s) and to monitoring the criteria within the referenced standard.

Like the Netherlands, some countries look further than measuring policy compliance as required by the UN Convention and the EU Directive and require additional measures to be taken that they believe influence the successful implementation of the web accessibility standards.

For example, the Treasury Board of Canada has made a complete suite with guidance on implementing the standard on web accessibility (Treasury Board of Canada, 2013) that requires more than just measuring whether Web pages are technically conformant with the standard and whether organizations comply with regulations and law. The suite targets government officials and provides practical directions for different roles within the organization from senior officials to web specialists. It also includes a general description of responsibilities. The document also distinguishes between management, performance and compliance, where performance is an indicator for the activity and measures taken within the government organization leading to compliance.

### 2.2.5 Fines, lawsuits and settlements

Digital discrimination could have a high cost in some countries, although in most countries the threat is primarily theoretical. In Spain, for example, the sanctions for not complying with the Ley 49/2007 amount to 90,000 Euros (Estado, 2007). This law is not limited to public sector bodies but no case has been reported where actual fines have been imposed.

In Norway, the government agency Difi reviews more than 300 websites per year (Difi, 2015). Although there is discussion about fines, for the moment they share their review results and ask public and private bodies to work on accessibility if they find failures.

In 2017, the Dutch Institute for Human Rights ruled that the Wgbh/cz requires the Rabobank to make its mobile banking application accessible for people with disabilities or to continue access to the older version of the app that was (more) accessible (CRvdM, 2017). In the Netherlands, it is also possible to take public and private organizations to court under article 429q of the Dutch Penal Code (Wetboek van Strafrecht) if they do not provide an accessible website. The fines do not exceed 8,200 Euros or two months in jail. Until now, there have been no cases reported in the Netherlands that involve web accessibility under this article.

The websites [www.ada.gov/enforce\\_current.htm](http://www.ada.gov/enforce_current.htm) and [search.justice.gov](http://search.justice.gov) contain lists of cases in the US that have been filed under ADA title 1 (employment), title 2 (state and local government) and title 3 (public accommodations and commercial facilities). These US court settlements and agreements are interesting because they sometimes require organizations to take additional measures to help them comply with policy requirements. It is also interesting because of the increase in the number of cases in the past few years (referred to as 'drive by lawsuits' by some websites). A growing number of these cases require additional measures regarding websites and mobile applications. Note that many complaints and cases are settled before they go to court and that the agreements and settlements sometimes involve large amounts of money. Companies and government agencies that fail to provide an accessible digital experience not only risk fines but also damage to their reputation. The cases include public and private organizations. There are examples of American cities and counties (e.g. Mc

Lennon county, Rhode Island, Orange County) and companies like Disney, Netflix, Cruise operator Carnival Corp including Holland America Line, Target and Peapod (part of Ahold).

*Peapod, a leading American Internet grocer with more than 23 million orders per year, reached an agreement with the Department of Justice to not only make its website and mobile applications accessible but also to publish their accessibility policy, appoint an accessibility coordinator and an independent web accessibility expert, provide mandatory annual training on website accessibility for website content personnel and to regularly include people with disabilities in the testing of their website (DoJ, 2014).*

A good example of additional measures is visible in the case of Rhode Island. They were required to take the following measures to reach compliance with the law (DoJ, 2012):

- Ensure that all new and modified Web pages and content are accessible
- Post their accessibility policy online
- Make a plan for the existing web content
- Provide a feedback channel
- Inform all employees and contractors about the standards
- Periodically enlist people with disabilities to test pages

Other agreements additionally require an organization to provide training to their employees and management and to appoint an (independent) accessibility compliance officer at executive level (e.g. Carnival, Peapod). The Carnival agreement included a civil penalty of \$55,000 to the United States and \$350,000 in damages to individuals (DoJ, 2015).

*Target, an American retail chain, paid roughly 9 million dollars in damages and legal fees to settle a lawsuit with the National Federation of the Blind. It agreed to make its website accessible for disabled customers.*

## 2.3 A cost-benefit analysis of web accessibility

Governments like to use the web channel for their services because this is more cost-efficient and reduces the amount of time spent on direct interactions with citizens (Ebbers et al., 2008).

In a study commissioned by two Dutch ministries, Velleman and van der Geest studied the potential business case to support the implementation of accessibility standards (van der Geest, Velleman, & Houtepen, 2011; Velleman & van der Geest, 2011). They conclude that there is quite a lot of discussion about cost-benefit on the web, but not much scientific support for the conclusions.

Many authors cite a 2009 conference presentation describing the case of Legal and General (Accessibility Foundation, 2009). They made their website accessible and concluded:

- 30% increase in natural search-engine traffic
- Significant improvement in Google rankings for target keywords
- 75% reduction of time for pages to load
- Elimination of browser-compatibility complaints

- New site is accessible to mobile devices
- Reduced time to manage content (tenfold)
- Savings of £200,000 annually on site maintenance
- 95% increase in visitors getting a life insurance quote
- 90% increase in insurance sales online
- 100% return on investment in less than 12 months

The studies by Velleman and van der Geest were not able to reproduce the conclusions for other organizations. In a questionnaire, 50 organizations reported their views about the cost-benefit of implementing the standards. A further 30 organizations were interviewed and 4 organizations were followed and interviewed before, during and after working on web accessibility. The organizations (private sector) in their study did not even gather a minimum amount of data necessary to reach conclusions about the cost-benefit of implementation of the web accessibility standard. Many organizations have an idea of what they wish to accomplish with their website (conveying information, providing or selling products or services), but they hardly collect the data that is needed to demonstrate or prove if or how they achieve the intended targets or benefits. This lack of data makes it difficult to make the case for either cost or benefit and thus does not support the cost-benefit assumptions. Nevertheless, most of the respondents felt that the benefits outweighed the costs.

### 2.3.1 Cost-benefit of the web accessibility standards

The assumptions about the benefits of applying web accessibility standards mostly originate from the W3C/WAI. They publish an online business case where they present the benefits of applying the accessibility standards (W3C, 2012). Their business case is not based on real business data or clear indicators, but it offers the view of many international experts and members of W3C working in the field of accessibility. It divides the costs and benefits of implementing web accessibility into four factors:

- **Social Factors.** One important reason to implement web accessibility is to provide equal opportunities for people with (temporary) disabilities. Note that web accessibility also benefits people without disabilities, i.e. people using mobile devices, elderly people, low literate, people with low bandwidth connections to the Internet, people using older technologies and new and infrequent web users. It can have a positive effect on the employment of people with disabilities and help people with disabilities and the elderly to live independently for longer. And it can also positively impact morale in the organization, demonstrate the organization's corporate social responsibility (CSR) and increase customer trust and loyalty.
- **Financial Factors.** Implementing web accessibility leads to direct and indirect cost savings and a higher score in search engines (SEO). An accessible website can help save costs for other than online transactions. Also note that building in accessibility standards from the start is more cost-efficient than having to retrofit the website afterwards (Boehm, 1981).
- **Technical Factors.** Implementing web accessibility increases the interoperability and quality of websites and makes websites future-ready. This helps reduce the time (and

thus costs) for site (re)development and maintenance and for adding new (future) features. It can also help reduce the potential server load and increases the efficiency of the website. This quality improvement can also help increase the number of returning visitors.

- **Legal and Policy Factors.** Governments and other organizations can set legal and policy requirements for web accessibility like laws, policies, regulations, standards and guidelines, directives, communications, orders, etc.

Alongside the benefits, the Web Accessibility Initiative indicates that implementing web accessibility will also require (initial) investments to acquire knowledge, hire expertise, purchase testing tools, establish procedures and processes that include accessibility and to develop and test for web accessibility. To keep the cost of implementation lower, they advise using authoring tools that support web accessibility and sharing resources and knowledge. Nevertheless, many authors agree that including accessibility early in the design, development or maintenance process will limit the percentage of the overall costs spent on implementing web accessibility.

Most of these assumptions are repeated many times in literature and on the web, mostly without real supporting data or research.

#### *2.3.1.1 Legal requirements and harmonization*

The legal case was discussed in more detail in an earlier section. The UN Convention and the Directive help companies that do business in more than one country. Thanks to the European harmonization of laws and regulations regarding web accessibility, companies do not have to adapt their website to every single country they work in. Until recently, if a company was active in 28 Member States, it would have to adapt its website to national laws and regulations for web accessibility. Imagine if that cost one day per country. At a rate of 400 Euros per day, that would amount to  $28 \times 400 \text{ Euros} = 11,200 \text{ Euros}$  (based on earlier calculations by Technosite (Technosite, 2012)). As it will be difficult to find a consultant who knows all countries, most companies will hire local experts. That would also generate higher costs. Thanks to the European harmonization, this extra cost is no longer required or necessary. The EU is also harmonizing with other countries like the US and other markets. In the case of web accessibility, this is a clear benefit for public and private organizations in all countries of the EU. They can all benefit from harmonized information, training and awareness materials. They can easily exchange information, best practices and tools. They can use toolkits, services and even authoring tools used in other countries. For evaluators, or organizations that are active in evaluating and monitoring web and mobile accessibility, this means that they can use the same standards in the same way in all countries.

#### *2.3.1.2 Development and maintenance*

Experts have calculated that the extra costs of building an accessible website from scratch lie between 1 and 3 percent of the total design costs, while retrofitting for accessibility can easily surpass 10 percent of the total design costs (Boehm, 1981; Hong, Trimi, Kim, & Hyun, 2015; Loiacono & Djamasbi, 2013). Sometimes the high maintenance costs of a website can be explained by problems that could have been prevented during the development phase of the

website (Nielsen, 2008). This explains why the maintenance phase is responsible for about 80 percent of the total cost of ownership of a website. Nielsen argues that testing at an early stage with (disabled) users can render up to 83 percent of return on investment (Loiacono & Djamasbi, 2013; Nielsen, 2008). Bias calculates that organizations can gain 10 USD for every 1 USD they spend on usability (Bias & Mayhew, 2005).

Detecting accessibility (and usability) problems at an early stage can thus save enormous amounts of money. This may be an important reason why the UN Convention requires State Parties to take measures “to promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost.”

Investments in web accessibility mainly consist of personnel costs (van der Geest et al., 2011). Sometimes it is possible to pinpoint specific costs, for example for building and developing specific accessibility modules of a website, for audio-description of videos, for inclusion of people with disabilities or if the CMS is not accessible from the start, for adapting systems and software, etc. especially if they used subcontractors for this work. Mostly, larger organizations feel that they have a better overview of the costs than smaller organizations. But most organizations do not keep track of specific personnel costs relating to web accessibility content creation and content management unless they hire external experts or appoint an internal accessibility officer. Also, these personnel costs are mostly divided over many departments and people, making them even more difficult to track and thus to monetize the cost-benefit for the organization.

### *2.3.1.3 Visitor statistics, customers and search engine optimization*

Some researchers (Hartjes, Leitner, Strauß, & Quirchmayr, 2010; Leitner, Hartjes, & Strauss, 2009; Leitner, Strauss, & Stummer, 2016) observed a single website before and after it was made accessible. They noticed an increase in the number of visits, time on the website, bounce rates, returning visitors, search engine optimization results and even increased sales. Some authors (Heerdt & Strauss, 2004) use the increase in the number of visitors as a benefit that can be attributed to accessibility and even monetized. However, the relationships between the different factors are not always as obvious as it is described. Visitor statistics can be influenced by many factors. For example, web company Qforma created a new webshop for a customer. They attributed the increased traffic to the improved web accessibility. Before, many visitors used the phone to complete orders. With the new website, the number of visitors increased and the number of phone calls dropped. However, at the same time, the developer of the new website indicated that they had stepped up SEO costs and Google Adwords campaigns (Velleman & van der Geest, 2011).

According to the website of Karl Groves (Groves, 2016a), SEO should not be part of the business case for accessibility because only 21 (about 5 percent) of the WCAG Techniques and Failures relate to search engine optimization. Nevertheless, many authors agree that applying them does help improve SEO results and accessibility for the website (Andrés et al., 2009; BSI, 2010; Forrester, 2016; Groves, 2016a; W3C, 2012). It is however important to remember that a SEO optimized website is not automatically accessible and vice versa.

According to 79 percent of organizations in the Forrester study (Forrester, 2016), the implementation of accessible technologies not only improved the overall customer experience, it also boosted (employee) morale and trust. Schmutz (Schmutz, Sonderegger, &

Sauer, 2016) studied 61 non-disabled users and concluded that they performed better on accessible websites (task completion time and task completion rate). He also noticed improved user ratings (e.g. perceived usability and trust). Thus, web accessibility can have substantial user, economic and reputational benefits for organizations.

#### 2.3.1.4 *Decrease of multi-channel costs*

Ebbers et al. (Ebbers et al., 2008) point to research by the Canadian Customs and Revenue Agency. This Agency concludes that on average, electronic services are 20 times less expensive than in-person services. While concluding that there is an increase in the use of digital channels, Ebbers et al. also conclude that citizens still use traditional channels. Janssen argues that transitioning from the web as a communication channel to an interactive channel requires changes in the organizational practices, key value chain activities and partnerships. But perhaps it is even more important to look at the actual behavior of the real users of the websites. Citizens of a municipality do not choose a channel based on value chain activities or financial cost-benefit for the organization. Their choice can depend on many factors (Ebbers et al., 2008) including their age, mood, the time of the day, the approach of the channel, preferences, personality, usability, etc.

One of the respondents in the studies of Velleman and van der Geest (Velleman & van der Geest, 2011), SNS bank, declared that after they made their website accessible, the number of calls to their call center fell by 15 to 30 percent. As they used to receive around 20,000 calls a week, the reduction in cost is estimated at more than 1,755,000 euros a year (the price per call averaged between 7.50 and 12.50 euros). This more than covers the cost they incurred for the implementation. They attributed the savings completely to the improvement of the website and implementing the web accessibility standard. Like the case of Legal and General, there may be more issues influencing this. Nevertheless, we should not ignore the fact that in the cases described, the stakeholders inside the organizations feel that web accessibility was the defining factor.

#### 2.3.2 *Cost-benefit calculation models*

Many organizations and projects have tried to calculate the cost-benefit of implementing web accessibility standards. The EU-commissioned Smart Report (Technosite, 2012) introduces an Excel based Business Case Tool (BCT) to help calculate the extra cost of applying the web accessibility guidelines. The tool concentrates on retrofitting existing websites that do not comply with the web accessibility standards. It does not cover the benefits or the cost of experts. As a basis for the calculation, the tool needs to know the country, the WCAG level (A or AA), whether there is a need for training, what techniques are used on the website, the number of templates and the daily rates for the organizations involved in the process (internal and external). It does not offer the option to choose what happens when a specific CMS is used.

Econometrica (Econometrica, 2017) calculated the cost-benefit impact of applying the web accessibility standards in Section 508 to websites in the US. The calculation model show a negative net benefit when looking only at aspects that can be monetized. When including qualitative costs and benefits into the calculation, they conclude that the benefits justify the

costs. However, these qualitative costs and benefits are not, or not easily measurable (WHO, 2011). For example, efforts to calculate the cost of disability are scarce and fragmented. The WHO World report on disability (WHO, 2011) attributes this to the many different definitions of disability, the numerous ways to collect data, the multiple data formats, the lack of data about the cost of disability and the lack of a harmonized method to estimate the costs. This not only makes it difficult to quantify but also to compare the data and results. Other costs and benefits that are difficult to quantify are:

- Benefits from the increased employee productivity
- Benefits from improved government web accessibility to people with disabilities
- Benefits from a reduction in cost of call centers, mail and in-person visits
- Extra costs for (procurement of accessible) ICT
- Extra costs for website and content development (accessible video, office documents, etc.)
- Increase in employment of people with disabilities
- Higher self-dependence for persons with disabilities. People with disabilities can obtain information and conduct transactions without help
- Benefits from improved civic engagement by persons with disabilities

For the implementation of the EU Directive 2016/2102, the European Commission commissioned an Excel sheet tool to give Member States an impression of the possible cost-benefit of monitoring and the potential business case for evaluation organizations. The tool is not available yet.

## 2.4 Actual web accessibility progress in the last decade(s)

Although governments are working hard to adopt and implement web accessibility standards, in many countries (including the Netherlands) national, regional and local government websites are still failing to achieve web accessibility (Abanumy et al., 2005; Al-Khalifa, 2012; Barricelli, Sciarelli, Valtolina, & Rizzi, 2018; Isa, Suhami, & Safie, 2010; Jaeger, 2006; J. Kuzma, Yen, & Oestreicher, 2009; J. M. Kuzma, 2010; Olalere & Lazar, 2011; Oni, Okunoye, & Mbarika, 2016; Rau, Zhou, Sun, & Zhong, 2016; Youngblood, 2014).

Over the years 2004, 2005, 2008, 2010 and 2011, the Accessibility Foundation (Beenen et al., 2016; Velleman et al., 2011) monitored the accessibility of a sample of municipal and other governmental websites in the Netherlands. In 2008 and 2011, they monitored all municipalities and in 2016 only the websites of the four largest municipalities. This was done using a combination of automated checking tools and expert-based, 'manual' analysis of a sample of Web pages using WCAG. The reports show that during this period, central government websites clearly improved their accessibility. The same reports show that municipalities show fewer errors per guideline and more guidelines that pass the test. However, most municipalities still do not conform with minimum guidelines for accessibility (level A). The number of failed websites was 95% in 2004 and 98% in 2011. In 2016, none of the four tested municipalities were fully conformant with the guidelines. The same can be seen in other countries. For the study on assessing and promoting e-accessibility (Kubitschke et al., 2013), the authors reviewed 9 key public and 3 sectoral websites in all of the EU Member States, Norway, Australia, Canada and the United States. They performed 10 tests using

techniques taken from WCAG2.0. While they see progress on the policy side, they conclude that the actual accessibility of the websites still leaves room for improvement. The average score of the public sector bodies in the Member States was 0.99, while a score of 2.0 reflects full conformance. With a score of 1.1, the Netherlands is just above the EU average.

One reason for a partial increase in the successful implementation of the web accessibility standards may be related to the early development and availability of monitoring tools provided by the Dutch government. This is described earlier in sections 0 and 2.1.6.

#### 2.4.1 Is web accessibility on the agenda

In a study commissioned by the Accessibility Foundation, Market research bureau DUO (Grootheest & Grinsven, 2015) studied the market for accessibility products and services in the Netherlands. They reached out to 385 municipalities, of which 126 answered a short online questionnaire. Some of the answers are interesting because they show the awareness, motivation and plans of the municipalities. The results show that more than 94 percent of the municipalities that answered the questionnaire estimate that their website is more or less accessible for people with a (visual) disability (67 percent partially accessible and 27 percent fully accessible). We asked the municipalities that estimated that their website was partially or not accessible whether they had plans to address that. Among this group, 73 percent indicated that they were now working on making their website accessible. This seems to indicate that 27 percent are not working on accessibility at all, even though they know their website is not accessible. 58 percent of the municipalities who estimated that their website was partially or not accessible expect their website to be accessible in the next two years. About 23 percent indicated that they were not expecting their website to be accessible in the next two years.

While the respondents agree that the subject is important (score 4 out of 5) and 96 percent indicate that accessibility of the website is on their organization's agenda, only 49 percent of the municipalities in the study say they have included web accessibility into formal plans or organizational policy in some way. The reasons given for the importance vary between "it is important that everybody can use the website" and "it is the law" to "never thought about it" and "we never had complaints." Almost 43 percent of the municipalities expect that accessibility will become more important in the near future. 62 percent think it will be the same as now or do not yet know.

When we look at the level of quality assurance, 48 percent of the municipalities used an external auditor or evaluation organization. Others trusted their website developer or CMS provider to check for accessibility (31 percent) or have other ways of testing (18 percent). Of the municipalities that did not audit their website for web accessibility, 18 percent indicate that the most important reason is "no priority" or "never thought about it."

For mobile applications, only 11 percent of the municipalities in the study consider accessibility. Interestingly, in this 2015 study, 62% of the municipalities did not have a mobile application at all.

## 2.4.2 Accessibility Statements

The EU Directive 2016/2102 requires Public Sector Bodies to provide an accessibility statement. Article 7.1 of the Directive describes this as a regularly updated, detailed, comprehensive and clear statement on the compliance of public sector body websites and mobile applications with the Directive. The EU provides a model accessibility statement to the Member States. The statement should include at least:

- Explanation of parts of the content that are not accessible and if applicable, what are the accessible alternatives.
- Feedback mechanism that can be used to notify the organization about any failure to comply with the requirements and to request information in an accessible format.
- Link to an enforcement procedure. The response should be provided within a “reasonable period of time.”

For Dutch public sector bodies, this requirement is not new. It was already part of the requirements set by the ‘Standardization Forum’ in 2008. If public sector bodies used the Webrichtlijnen (now EN 301 549), they were required to provide an accessibility statement on their website. In 2016, Logius made an inventory of the statements (MinBZK, 2016) and concluded that 46 percent of all municipalities had an up-to-date accessibility statement on their website. Still, many statements were very different, not always up to date and also not always accurate. In April 2018, Logius started a test with municipalities to provide a new and more structured statement based on the EU model. The Dutch model is not limited to the compliance information required by the UN Convention and the EU Directive and includes reporting about other relevant measures. To monitor the status of public sector body websites, the Dutch government keeps a list of domain names in the ‘Websiteregister Rijksoverheid’. In this list, they include information like the owner of the domain name, the number of visitors, the status (date) of the accessibility statement, and whether the website applied WCAG yes/no. The list is updated every week.

Besides the model accessibility statement provided by the European Commission for compliance with the Directive, there are many examples of accessibility statements on the web. Probably one of the best known is the Voluntary Product Accessibility Template (VPAT) used in the US (AENOR, 2008; Corvers et al., 2009; ITIC, 2014). This was developed by the US Information Technology Industry Council (ITI) and the GSA to help federal government officials and procurers assess the accessibility of ICT products and services. However, it is used widely in the US (and outside) by public and private organizations to show how well section 508 has been applied to a specific product or service. Companies like Microsoft, Adobe, Apple publish VPATs on their website. The 2018 version of VPAT supports a wide variety of standards including WCAG, ETSI 40500 and the European EN 301 549.

The accessibility statement proposed by BSI (BSI, 2010) is specifically intended to inform persons with a disability and the elderly about the accessibility of a website, but for most other accessibility statements it is not always clear who is the target. They could be any or more users of the website, website owners, developers, procurement officials, government agencies, product and service owners in organizations, researchers, CSR, legal or communication departments, etc.

By the end of 2018, the W3C Education and Outreach Working Group plans to provide a model accessibility statement<sup>6</sup> that should converge with WCAG and the WCAG-EM report tool. A possible accessibility statement generator built on this work may include all the above audiences.

## 2.5 Common website accessibility failures

Many of the authors described earlier who studied the evaluation or monitoring of websites also provide a list of errors or failures that were found on the Web pages. These failures are directly related to the Web Content Accessibility Guidelines and mostly contain references to failures and techniques (see earlier section on WCAG). To understand the problems encountered by people with disabilities on websites, this section summarizes some of the most common website accessibility failures.

In his post called ‘how long does it take to test 25 Billion Web pages’ (Groves, 2016b), Karl Groves provides a list of web accessibility failures found using automated testing of more than 16,000 Web pages in order of the number of occurrences. They are (1) insufficient contrast (level AA), (2) tables without headers, (3) link titles that are identical to the text, (4) images missing a description, (5) the same id used more than once, (6) Faulty table headers, (7) links without text, (8) links with invalid references, (9) forms without labels and (10) using tables for layout instead of for data.

On his website (Groves, 2016a), Karl Groves points to the [webdevdata.org](http://webdevdata.org) collected with an automated tool. The 2016 dataset shows that about 27 percent of images on Web pages do not have a description and 16 percent just leave the description field empty or fill in single letters or something like “graphic.” The data collection consists of more than 120,000 homepages of the most popular websites in the world. It also shows that almost 81 percent of all buttons do not have any useful text description or label. These are serious problems for persons with a visual disability.

Manual evaluation, mostly assisted by tools (e.g. for detailed contrast measurement, checking validity of the code, finding code samples, resizing, etc.) finds similar failures on websites. The Authority for Universal Design of ICT in Norway conducted a manual status survey of 300 public and private websites in Norway (Difi, 2015). They used a subset of 15 WCAG2.0 success criteria. The survey identifies potential “risk areas” where failures were found: (1) coding errors, (2) images missing a description, (3) navigability: insufficient contrast, (4) no visible keyboard navigation focus indicator and (5) forms.

Most of the failures are not new. For example, even with the older WCAG guidelines (before 2008), authors studying the accessibility of public sector body websites found images lacking a description, tables without headers, coding errors, insufficient contrast, no visible keyboard navigation, forms missing descriptive labels and confusing navigation mechanisms (e.g. unclear hyperlinks) (DRC, 2004; Hackett & Parmanto, 2005; P. Jaeger & M. Matteson, 2009; Loiacono & McCoy, 2006; Nomensa, 2006). Most of the authors also found (a few) websites that had successfully implemented the web accessibility standards.

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<sup>6</sup> <https://www.w3.org/WAI/Tools/> (Last viewed: 15 May 2018).

To summarize, the main web accessibility failures found by researchers over the years are:

1. Insufficient contrast
2. Tables without headers
3. Invalid or deprecated code
4. Missing visible keyboard navigation focus indicator
5. Images missing a description
6. Faulty or non-existent table headers
7. Links without text or with invalid references
8. Link titles that are identical to the text
9. Forms without labels
10. Using tables for layout instead of for data.

### 3 PART 3: IMPLEMENTATION MODELS FOR WEB ACCESSIBILITY STANDARDS IN GOVERNMENT ORGANIZATIONS

Part 3 first looks into compliance, conformance and performance and then searches models from the scholarly literature that may help shed light on the international quest for factors that support or resist successful implementation of the new and changing standards for web accessibility in government organizations.

#### 3.1 Compliance, Conformance and Performance

In web accessibility presentations, posters, papers, websites and articles, the terms compliance and conformance are sometimes mixed up.

*In this dissertation, the term compliance describes the level of accordance with legal, policy and other requirements imposed by a regulator.* In practice, this policy mostly requires meeting a certain conformance level for a defined standard (e.g. WCAG, Section 508, EN 301549), but it can also include transposition of legal texts and other requirements.

The term conformance is used to describe the level of accordance with a certain standard. In the case of WCAG, the level of conformance can be A, AA or AAA.

If we study the use, implementation, validity and testing of accessibility standards for the web, we see that some studies focus on the usability and validity of the standards (Giorgio Brajnik et al., 2012; Donnelly & Magennis, 2003; Duchateau, Miesenberger, Klaus, Zagler, & Karshmer, 2010; Kapsi et al., 2009), some on the test quality (G. Brajnik et al., 2010), some on evaluations using the standards (Lazar, Beere, Greenidge, & Nagappa, 2003; Nietzio et al., 2008; Velleman & Abou-Zahra, 2014; E. Velleman, C. Strobbe, J. Koch, C. A. Velasco, & M. Snaprud, 2007) and some are comparative (Li et al., 2012; Vigo et al., 2013).

There are also many studies that measure the actual status of accessibility of websites in certain countries or areas at a certain time. This includes research into the web accessibility of government websites in the UK, Netherlands, Saudi Arabia, Italy, China, Member States of the European Union, etc. (Al-Khalifa, 2012; Beenen et al., 2016; Gambino, Pirrone, & Giorgio, 2016; Kubitschke et al., 2013; J. M. Kuzma, 2010; Laurin et al., 2016; Plasterk, 2012; Rau et al., 2016; Shi, 2007; Velleman et al., 2011).

One common denominator revealed in all these studies is the fact that even after a decade of availability of standards and even in countries where there is clear legislation, not all municipalities have been able to fully implement the web accessibility standards (Ellcessor, 2010; Gambino et al., 2016; Lazar et al., 2004; Youngblood, 2014).

There is not much literature to clarify why, after all the years that the accessibility standards have been available, the majority of municipality websites have not yet successfully implemented them. Some countries, like the Netherlands, US, Canada, Australia, Italy and

Spain, even have policies including legislation in place since more than a decade (MinBZK, 2006; W3C, 2017c).

One possible explanation for this lack of information about the why is that in the EU, web accessibility policies have a compliance approach to policy evaluation that predominantly looks at the conformance of websites and mobile applications with the standards. This approach is mostly limited to conformance with the technical guidelines in the standard. They tell us what is or is not conformant and sometimes why the subject is important and how to repair failures.

For the definition of conformance, we look at the W3C (Caldwell et al., 2008), which defines conformance with specific regard to the web accessibility standards. The standard ISO/IEC 17000:2004 replaced the word conformance by conformity and defines it as “demonstration that specified requirements relating to a product, process, system, person or body are fulfilled” (ISO/IEC, 2004). As the focus of this dissertation is on web accessibility and ‘demonstration’ is not specifically required by W3C, the definition proposed by W3C is used. The definition of conformance in this dissertation is:

*“satisfying all the requirements of a given standard, guideline or specification” (to a certain agreed level).*

Although conformance measuring does show conformance (or non-conformance) with the standard, it gives no information about the reasons for success or failure. Also, in practice, conformance measurements mostly take place after the completion of the development of a website or functionality, i.e. at the end of the process (Laurin et al., 2014). The results are therefore useful for identifying, understanding or repairing web accessibility failures, but less useful for the evaluation of the implementation process itself as they do not include information about other factors than the technical dimension (Rooij, 2014). When looking at e-government success factors in organizations, Gil-Garcia (Gil-Garcia, 2012) concludes that “technological artifacts are only one element of a more complex sociotechnical environment that includes people, physical spaces, organizational structures, institutions, and social relationships.”

Vlerken-Thonen (Vlerken-Thonen, 2012) followed this approach and wrote a report about the assessment model of the web accessibility guidelines for the Dutch government. Based on desk research of available documents, she looked at the then predominant assessment model in the Netherlands and proposed moving from control (conformance assessment) to ‘in control’ (performance assessment). She argues that measuring policy implementation by testing and validating the level of conformance of the website with the web accessibility standard will not help widen the implementation of web accessibility. At the time of her study, most organizations in the Netherlands had their website tested only at the end of the implementation project (the moment when the website would be delivered to the customer) or at the end of a calendar year when it was in fact too late or too expensive to repair any web accessibility failures. Vlerken-Thonen points to the Dutch system of ‘comply or explain’ where a government organization is (under certain preconditions) allowed to be non-conformant with the web accessibility guidelines as long as they explain the measures that have been or will be taken to repair the non-conformity.

In their study about the evaluation of the implementation of strategic plans, Mastop and Faludi (Mastop & Faludi, 1997) already concluded that the statutory system of focus on rules and standards “has failed to deliver the goods” (in their study this is the successful implementation of strategic plans). Measuring policy only by measuring conformance with the rules and standards is not sufficient. In that way, the results of their study of implementation shows similarities with the implementation of web accessibility legislation and standards. The authors state that unsuccessful implementation does not necessarily mean that the organization is not committed to the process and that it has not made choices and undertaken actions to achieve conformance. These choices and actions are part of the performance of the organization and all actors and provide context to the (non-) conformance. In this way, performance is not only an important indicator for the level of commitment in an organization, it may also help understand and solve problems standing in the way of policy goals, in this case regarding the successful implementation of web accessibility standards. Applying Mastop and Faludi to web accessibility implementation means that we need information about the context in which the implementation of the accessibility standards is taking place. In this dissertation, *we define performance as actions, decisions and choices made for the implementation of web accessibility policy, strategy and plans*. It includes the authoring, the adoption and the responsibilities for the policy, strategy and plans. Questions include: did the policy/plan play a role in the actions, decisions and choices?

The combination of conformance-based evaluation with a performance-based approach that also looks at other measures by actors (like in our case the municipal organization) would also better cover the requirements of the EU Directive (European Parliament & Council of the European Union, 2016). The Directive requires “Member States to *ensure* that websites, independently of the device used for access thereto, and mobile applications of public sector bodies meet the accessibility requirements set out in Article 4.” The word ‘ensure’ (and not ‘must’) indicates that more is required than just measuring implementation of the law and conformance with the technical web accessibility standard. And in fact, the EU Directive not only requires Member States to report on implementation of legislation and monitoring activities, but also to report progress on other issues like training and awareness. However, in reality the so-called EU implementing acts are mostly limited to compliance (in this case the level of accordance with the EU Directive).

The Canadian government (Government of Canada, 2013) does provide us with an example where they seem to look beyond compliance and stimulate a more performance-based approach. They have set up a web accessibility (implementation) standard for Canadian government websites and web applications. Although it is not a formal standard, it is obligatory for all Canadian government websites and wants to “ensure a high level of implementation of web accessibility.” The standard is special in that it not only requires measurement of conformance with the guidelines or with implementation of the law, it also proposes requirements for the context. For example, the organization should appoint a person responsible for the different tasks like checking conformance with the requirements, ensuring acquisition of accessible websites and web applications, monitoring, etc. Interestingly, the document also includes a very clear appendix on corrective and disciplinary measures including job termination in case the level of 100% accessibility of websites or web applications is not reached. The deputy head or delegate is made responsible for the

corrective actions. These corrective actions could be regarded as factors that influence the application of the standard. We will come back to them later. They are:

- Develop strategy for achieving 100% compliance score
- Reduce redundant, outdated & trivial Web pages
- Archive Web pages, where applicable
- Implement a Web experience toolkit
- Participate in government-wide collaboration to address common challenges

## 3.2 Adoption and Implementation

Based on what was described earlier in part 2, we presume that municipalities in the Netherlands have already taken the decision to adopt the web accessibility guidelines. They are now working on implementation of policy and standards for web and mobile accessibility. The demarcation between the two varies between authors. Below is an overview of the relevant literature with regard to adoption and implementation that have also been used to describe adoption and/or implementation of web accessibility standards.

### 3.2.1 Adoption

Adoption in the context of web accessibility standards can be related to the actual acceptance and use of a product or technology by its intended users. According to Bouwman et al. (Bouwman et al., 2005), the adoption phase is all about preparing the introduction of a new innovation into the organization. This includes investigation, research, consideration and decision making. They describe implementation as “the phase of internal strategy formation, project definitions and activities in which the adopted application is introduced within the organization, with the aim of removing reservations and stimulating the optimum use of the application.”

As one of the first researchers to look into the adoption process of innovations, Rogers created the model ‘diffusion of innovations’ (Rogers, 1983). The book describing the model was first published in 1962. He describes several phases of the adoption process in the context of innovation and the factors that influence (the individual in) that process. This dissertation uses Roger’s description of the term innovations: *Innovations are “all ideas, practices, or objects that are perceived as new by an individual or other unit of adoption.”* Roger’s focus is primarily on the diffusion of innovations to and by individuals, but as he concludes in his last chapter, many innovations are adopted by organizations where “an individual cannot adopt a new idea until an organization has previously adopted it” (Rogers, 2003).

Many authors have built upon the individual level diffusion model and applied it to organizations by defining equivalents of the characteristics of innovative individuals (e.g. Fichman & Kemerer, 1993; Hovav et al., 2004; Rogers, 1983; Ven & Poole, 1990). Rogers divides the innovation process of organizations into an initiation and an implementation phase. The initiation phase is the process of gathering information, conceptualizing, planning and finally taking the decision to adopt. This process has two stages: agenda setting and

matching. Rogers explains matching as a phase in which the organization tests if the innovation will solve the organization's problem. This includes anticipating potential problems and mismatches

Authors (Andriessen & Roe, 1994; Bouwman et al., 2005; Hovav et al., 2004) took Rogers' model and applied it specifically to ICT systems. For example, Hovav (Hovav, Hemmert, & Kim, 2011; Hovav et al., 2004) applies it to Information and Communication Technology (ICT) in organizations such as characteristics in the context of the adoption of the Internet Protocol version 6 (IPv6) standard. Giannoumis (Giannoumis, 2015) specifically looks into the importance of the WCAG guidelines for other ICT standards. Andriessen & Roe apply it to the development and introduction of new media and telematics innovations (Andriessen & Roe, 1994).

Many researchers (Bouwman et al., 2005; Katherine J. Klein & Knight, 2005) use the basic distinction between adoption and implementation that was proposed by Rogers. This dissertation uses their definition of adoption: *Adoption is the organizational decision process where the outcome is the decision to yes/no implement or use a certain innovation or technology.*

### 3.2.2 Implementation

Once the decision to adopt is taken, the implementation process starts (Katherine J. Klein & Knight, 2005; Rogers, 1983). *The implementation process includes all events, actions, and decisions necessary in the process to actually use the innovation.* Rogers attributes three stages to this process: redefining/restructuring, clarifying, and routinizing. Rogers regards routinization or institutionalization as the end of the implementation stage.

Klein and Sorra (Katherine J Klein & Sorra, 1996) state that implementation is the critical gateway between the decision to adopt the innovation and the routine use of the innovation." Klein and Knight (Katherine J. Klein & Knight, 2005) define (innovation) implementation as "the transition period during which [individuals] ideally become increasingly skillful, consistent, and committed in their use of an innovation." In their review of research on the implementation process, they conclude that organizations and communities often adopt innovations but fail to implement them successfully. In their review: "observers estimate that nearly 50% or more of attempts to implement major technological and administrative changes end in failure." In their and other research, this is attributed to aspects like bad design of the innovation and the 'stabilizing force of organizations' where changes in hierarchy, behaviors and routines are less familiar and often experienced as threatening. This may make implementation deeply problematic and challenging (Ven et al., 2008). Bouwman et al. argue that the implementation phase should have the aim to remove reservations and stimulate use of the application. They make a distinction between the technical (system design) and the organizational implementation of an ICT application. Bouwman's focus for implementation is on changing attitudes (employee behavior, user training, expectations with regard to changes, etc.).

As described above, most adoption and implementation literature seems to view the process as a set of sequential steps where individuals and/or organizations initiate, adopt and implement an innovation (Bouwman et al., 2005; Katherine J. Klein & Knight, 2005; Katherine J Klein & Sorra, 1996; Rogers, 1983; Ven et al., 2008).

In 'the Innovation journey', Van de Ven (Ven et al., 2008) argues that the process is less orderly than traditional innovation and management theories will have us believe. The innovation journey is not a linear but "a repeating cycle of divergent and convergent activities that take place at different levels of analysis, more or less simultaneously." The ideas, the outcomes and the context of the innovation implementation are constantly developing. This is in line with the modern ICT development process where development teams use fewer linear techniques like Agile and Scrum for the development of innovations like websites and mobile applications.

In most models, at a certain moment, the innovation phase stops when routinization takes over (Rogers, 2003; Ven et al., 2008). But specifically in this phase, web accessibility implementation can go wrong. Websites constantly change, and that change is not limited to content and technology. Most websites are regularly renewed, updated or go through changes in the CMS, additions to the functionality and a constant flow of new content. With this in mind, it is not realistic to regard websites and their content and functionality as a finished project where the implementation has stopped and routinization has taken over. We would argue that websites are dynamic, undergoing constant change and innovation. This makes implementation and routinization a recurring factor in their lifecycle which requires support from the organization for the process and the actors in that process. This not only concerns technology, content and functionality, but also changes in the workforce, the organization and external influences.

### 3.3 Accessibility technology innovation implementation models

As concluded earlier, most authors study how far public or private organizations comply with regulations and the required accessibility standards. To study the adoption and implementation of web accessibility standards, they use models like diffusion of innovations (Rogers, 2003), TAM Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989), TRA Theory of Reasoned Action (Fishbein & Ajzen, 1975), TPB Theory of Planned Behavior (Ajzen, 1991), UTAUT Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003) and specific accessibility related models like CLD Casual Loop Diagram (Abdelgawad et al., 2010) and WAIM Web Accessibility Integration Model (Lazar et al., 2004). TAM and its variations (TRA, TPB and UTAUT) were originally developed to assess the reaction and behavior of individual users of a technology. These theories, however, focus on individual preferences. Diffusion of Innovation literature suggests that innovations will be adopted (and implemented) faster if individuals perceive them as having greater relative advantage, compatibility, trialability, observability and less complexity. But, Bouwman, Van den Wijngaert, & De Vos (Bouwman, van de Wijngaert, & de Vos, 2008) studied the Dutch police using TAM and conclude that "the explanatory value of context parameters is higher than that of individual characteristics." Also, it seems like the existing approach has thus far not been able to help successful implementation of web accessibility standards. This makes it interesting to look at other models.

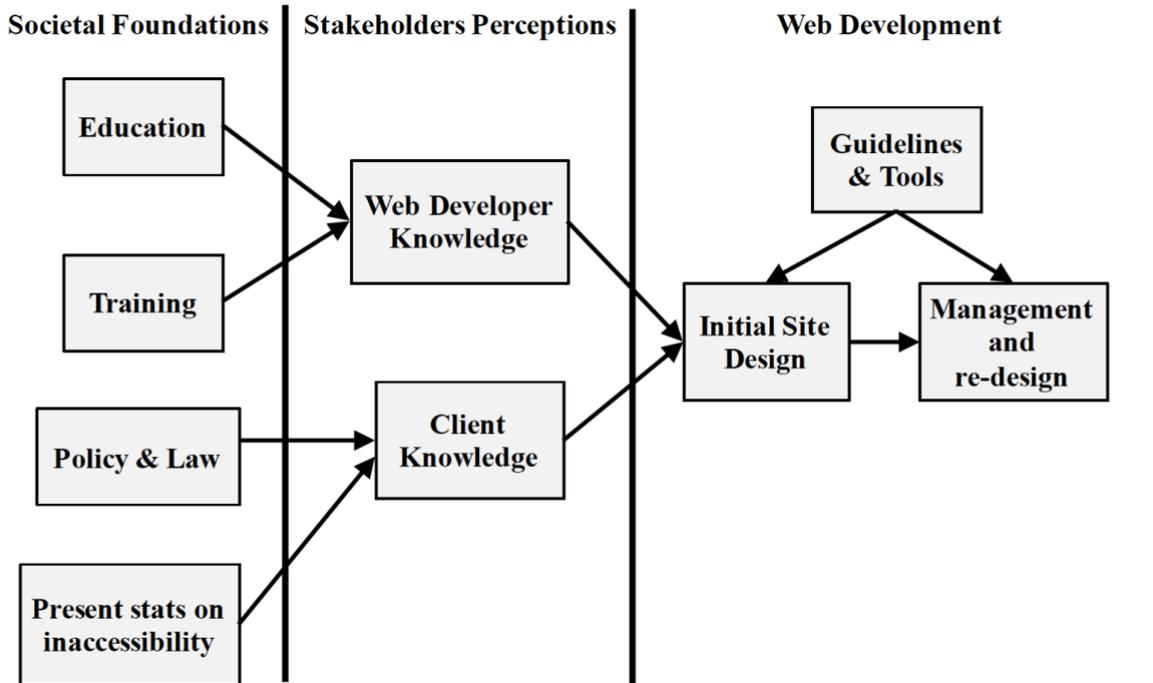


Figure 3.1. Web Accessibility Integration Model by Lazar (2004).

Lazar et al. (Lazar et al., 2004) specifically studied webmaster perceptions with regard to web accessibility. Their study is interesting because it includes contextual variables. They asked webmasters about their accessibility knowledge and their influence on accessibility. Their results are visible in the Web Accessibility Integration Model (WAIM) (Figure 3.1). The model identifies three categories of influences on web accessibility: societal foundations, stakeholder perceptions and web development. Lazar et al. take a first step in understanding why so many websites remain inaccessible. Although a number of respondents answered that they did not think it was important, most webmasters supported the concept of web accessibility, but cited barriers like “lack of time, lack of training, lack of managerial support, lack of client support, inadequate software tools, and confusing accessibility guidelines.”

Bailey and Burd (Bailey & Burd, 2006) also studied perception of web accessibility but by web accessibility specialists from different countries who worked with organizations to improve accessibility. They conclude that perceptions differ but there is generally a positive attitude towards web accessibility. At the same time, their study reveals poor awareness of web accessibility within organizations.

Abdelgawad (Abdelgawad et al., 2010) used a qualitative System Dynamics graphical tool called the Casual Loop Diagram to visualize factors influencing implementation of accessibility to Norwegian municipalities websites. The resulting Casual Loop Diagram (Figure 3.2) is based on literature and interviews with 7 responsible editors and webmasters from different Norwegian municipalities. The authors identify three important factors for organizations that enhance website accessibility implementation by the workforce: (1) increasing the budget devoted to the workforce to improve the experience mix, (2) keeping the development rate at a level lower than the capacity of the available workforce and (3) training the workforce. Their model is not empirically validated but is one of the few models that describe how accessibility can be better integrated into the design process of websites.

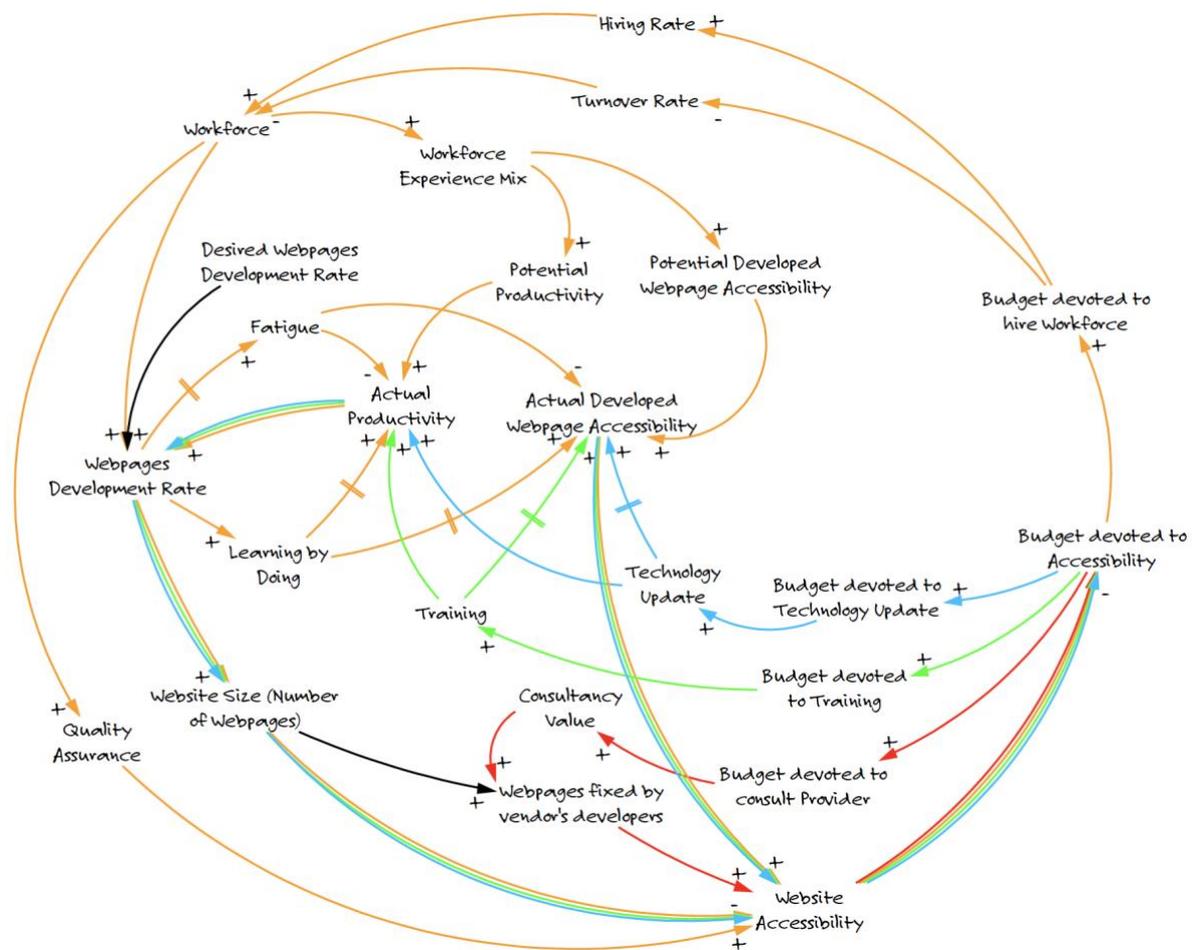


Figure 3.2. Casual Loop Diagram used by Abdelgawad et al (2010).

Accessibility maturity models are practically not mentioned in web accessibility literature, but there are a few on the market that seem to be used by both private and public organizations. Maturity models can help organizations measure where they are in the organizational implementation of (their) web accessibility policy. Some provide Excel sheets that can help calculate the current position of the organization by answering a few questions. Accessibility maturity models measure dimensions such as the status of implementation with regard to governance, risk management, communication, policy and standards, legislation, fiscal management, development lifecycle, monitoring, support and documentation, procurement and training.

Examples include DAMM Digital Accessibility Maturity Model by the SSB Bartgroup, PDAA Policy Driven Adoption for Accessibility Model by NASCIO (NASCIO, 2015) and the BDF-AMM Accessibility Maturity Model by the Business Disability Forum. These models contain metrics that can show the accessibility maturity level of an organization. For example, PDAA has three phases, 'launch', 'integrate' and 'optimize'. When looking at policy implementation, 'launch' means having an ICT accessibility policy, 'integrate' means having appropriate plans in place to implement and maintain the policy and 'optimize' means that the organization has metrics and is tracking the progress towards achieving the policy. DAMM and AMM extend the levels of maturity to 5 levels: Initial (informal), repeatable, defined, managed and optimized.

In his book 'Strategic IT accessibility: enabling the organization', Kline (Kline, 2011) proposes a strategic framework that looks like the maturity models and should enable organizations to become accessible. His focus is on the division of tasks over several stakeholders to make people and even groups of people responsible for certain tasks. The framework is one of the few that looks at the performance of organizations regarding web accessibility implementation describing what organizations should do to support implementation. The framework includes goals, key tasks, priorities, statuses and guidelines for owners and teams.

The British Standard 8878:2010 (BSI, 2010) offers a code of practice for web accessibility implementation within different kinds of organizations. Besides the conformance issues tackled in this document, it also addresses the implementation within the organization by requiring an organizational accessibility policy that includes all roles and responsibilities with regard to accessibility of persons with disabilities within the organization. The Standard is voluntary and aimed at different stakeholders in the process, including senior managers, procurement managers, quality assurance managers and people involved or responsible for web development, web content and web training. It provides an in-depth description of how to embed web accessibility within an organization and offers step-by-step solutions that include aspects like the purpose, the target audience, needs, tasks, etc.

The BS 8878 consumer guide (BSI, 2016) summarizes the standard. The main proposals for organizations are to:

- Appoint a web accessibility champion (a member of staff who is responsible for web accessibility, taking an overview of all web products and developing a web accessibility policy)
- Create a web accessibility policy for each web product as soon as it is first conceived
- 'Reasonably' justify decisions (also if the organization does not opt for an accessible option, for example in case of undue burden)
- Carry out research and testing and involve real people in all stages of development and seek feedback from users
- Publish clear information for consumers (including a web accessibility statement that summarizes the policy in clear, jargon-free language, gives advice on how older and disabled users can best use the website, including any information about how it can be customized, explains how to access the full web accessibility policy and tells users how they can give comments, suggestions and feedback.

The standard also gives an overview of roles within the development process and describes how to address motivation, responsibility, policies and organizational processes within the development of the website and within the team responsible for the process.

In an exploratory study, Velleman et al. (Velleman, Nahuis, & Geest, 2015) identified a list of factors derived from the literature and interviews that influence the adoption and implementation of web accessibility standards (Figure 3.3). The study looked into the importance of factors influencing adoption, factors related to the design process, factors related to the organizational structure, external factors like rules and legislation and personal factors. Semi-structured interviews with 18 key stakeholders added the category personal factors, such as having a person with a disability in the family. The results were not correlated with the actual accessibility of websites of municipalities.

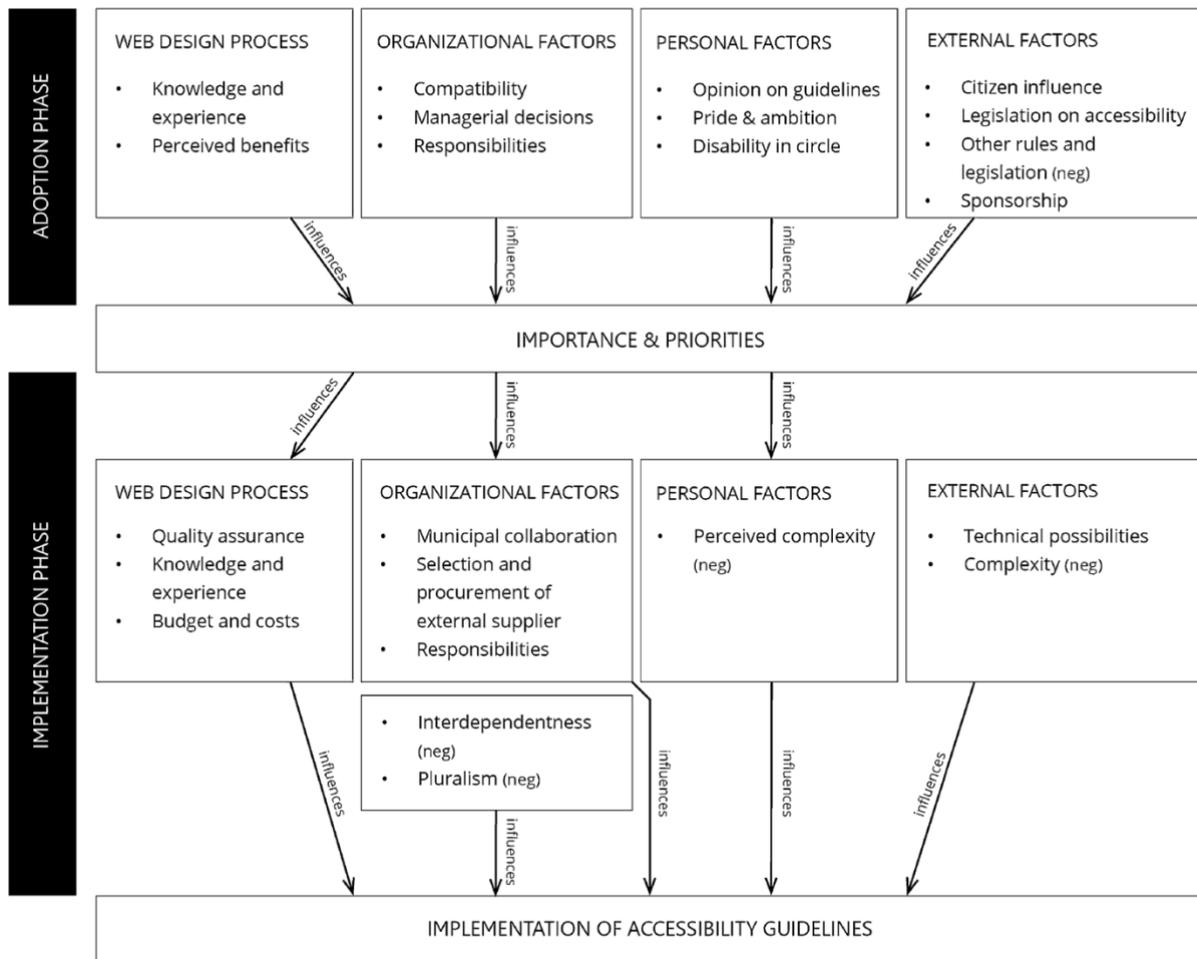


Figure 3.3. Exploratory model of factors influencing adoption and implementation.

The study by Velleman et al. (Velleman et al., 2015) lists a top 10 of factors influencing the implementation process of accessibility standards to websites of municipalities. Examples include selection and procurement, budget and costs and factors like pluralism (conflicting interests within an organization about timing, technology and content) and interdependencies (depending on others to repair failures). The factors are based on the interviews and the literature review:

1. Selection and procurement of external supplier
2. Assign responsibilities
3. Knowledge and experience
4. Quality assurance
5. Perceived complexity
6. Budget and costs
7. Municipal collaboration
8. Technical possibilities
9. Pluralism
10. Interdependencies

Ebbers & van Dijk (Ebbers & van Dijk, 2007) propose a model that does not focus on compliance, but on identifying organizational processes of resistance and support to e-government innovations (Figure 3.4). The model contains many of the innovation-related elements of the above models and frameworks but instead of being focused on the individuals

within organizations, or extending such models to include organizational aspects, this model describes organizational processes that support or resist the initiation and implementation of innovations within e-government organizations. The full name of their model is the 'model of the initiation and implementation of innovations related to electronic government services in contemporary government organizations'. The model of Ebbers & van Dijk provides a number of indicators for resistance (constraining) and support (enabling). The focus on the organization versus the individual within the organization and the proposition of processes with indicators of resistance and support fit well with the goal of this dissertation.

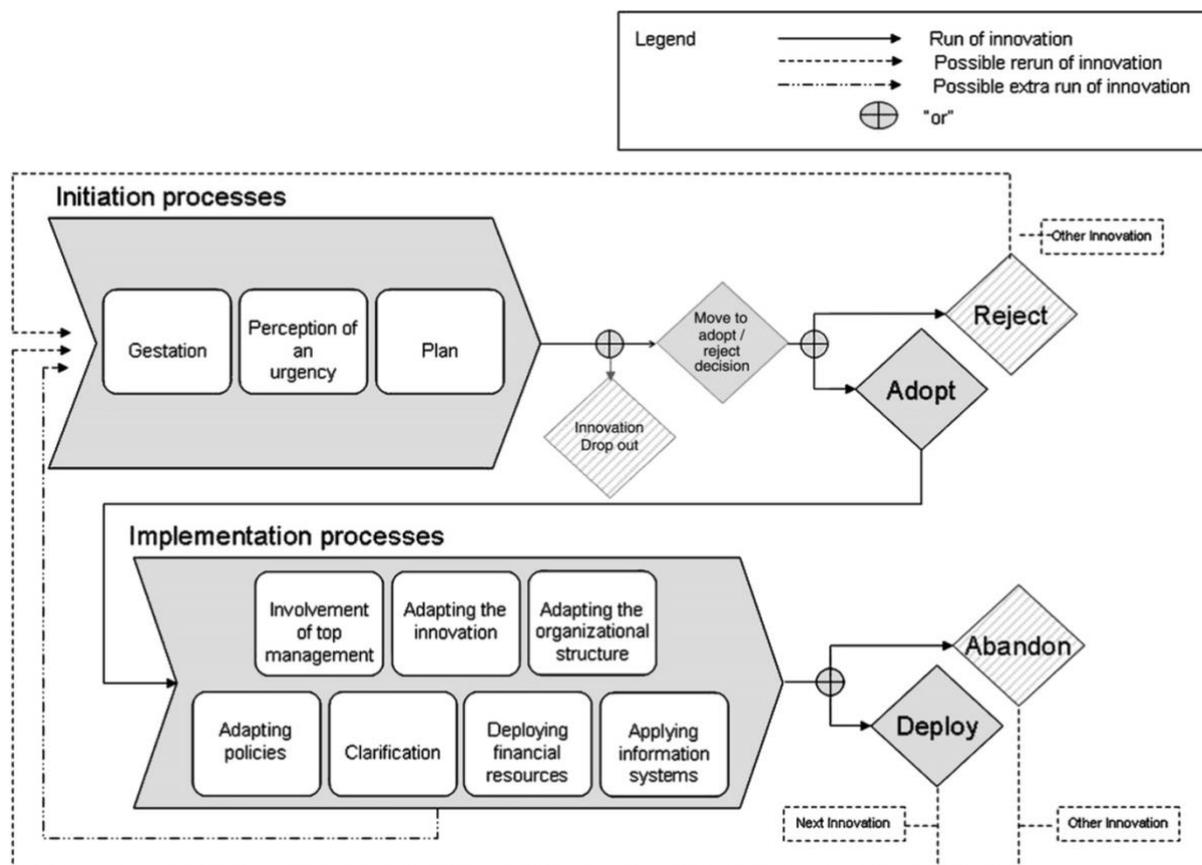


Figure 3.4. Model of the initiation and implementation of innovations.

First, the model proposed by Ebbers & van Dijk is based on the MIRP Innovation Pathway model and is interesting to use for the subject of web accessibility because it addresses both initiation and implementation processes. The emphasis is on the implementation part of innovation.

Next, it is not focused on policy compliance measurements. Ebbers & van Dijk identify indicators of resistance and support for every process of innovation in their model.

Furthermore, their focus is not so much on the individual municipal employee but on the process and the role of the organization. What can the *organization* do to support adoption and implementation within the innovation processes.

Also their model views implementation as a continuous activity that is not completed after the end of a project. This reflects the reality of implementing accessibility standards to websites and mobile applications.

Ebbers and van Dijk (Ebbers & van Dijk, 2007) have a number of issues with the MIRP pathway that lead them to produce their model. First, even though the MIRP Innovation Pathway is described as a non-linear model, it still consists of three periods that seem to follow each other in a very linear way: the initiation, the development and the implementation period. This is not how implementation, specifically with regard to web (accessibility) development works today. In their model, Ebbers and van Dijk merge the development and the implementation period as directly following the moment of adoption. They also map events without linearity. In the new model, there are lines both back and forward. This non-linearity is visible in the lifecycle of websites. Websites are constantly changing. This means that (in most cases) the process of development and implementation is never a project that is finished except once the website is archived. The changes in the lifecycle are mostly caused by new and changing (dynamic) content, new functionality, new technologies, interaction, but also changes in the organization, changes in policy and legislation, changes in the product and services, etc. These changes have a constant influence on conformance with web accessibility standards and involve new development (innovation) and implementation with regard to web accessibility.

Ebbers & van Dijk argue that most problems arise during the implementation period. As concluded earlier, some observers estimate nearly 50% of all implementations of major technological and administrative changes end in failure making the implementation period challenging (Katherine J. Klein & Knight, 2005; Katherine J Klein & Sorra, 1996; Ven et al., 2008). In the case of web accessibility, we see that even though municipalities have adopted and applied web accessibility policies and standards in the Netherlands, their websites are still not fully conformant with the standards. Some websites have such serious accessibility problems that it may be easier to build a new website or a new component than to repair the current web accessibility failures.

The new model considers modern frameworks like Agile and development methods such as Scrum, Lean, Kanban etc. where users are involved and participate in the design, development and implementation of websites and mobile applications. Ebbers & van Dijk specify the moment of adoption as the exact demarcation between the initiation and implementation period, but in the model they offer the cyclical possibility to include adoption of new innovations at all times.

For every process of implementation in their model, Ebbers and van Dijk provide an operational definition and identify indicators of resistance and support. They propose seven processes of implementation.

As argued earlier, their model seems an appropriate basis to map web accessibility if we look at the indicators provided in literature that will be further explored in section 3.4. For this dissertation, the processes can be applied to web accessibility implementation and operationalized to questions about web accessibility implementation. The clarification process in the model of Ebbers and van Dijk is renamed to developing awareness and knowledge, terms used more often in studies related to web accessibility related. It includes clarification as described by Ebbers and van Dijk (more detail can be found in section 3.4.1). There are some additional moderators like the number of citizens (size of the municipality) that will be discussed in section 3.5.

Because of the importance of monitoring and reporting in literature, this has been added to the model as a separate process.

The 8 processes of innovation implementation that are the object of the exploratory model for web accessibility processes used in this dissertation are then:

1. Developing awareness and knowledge
2. Involvement of (top) management
3. Adaptation of the innovation
4. Adaptation of the organizational structure
5. Monitoring and reporting
6. Adaptation of policies and standards
7. Deploying financial resources
8. Applying information systems

The processes are visible in the following model for web accessibility implementation (Figure 3.5).

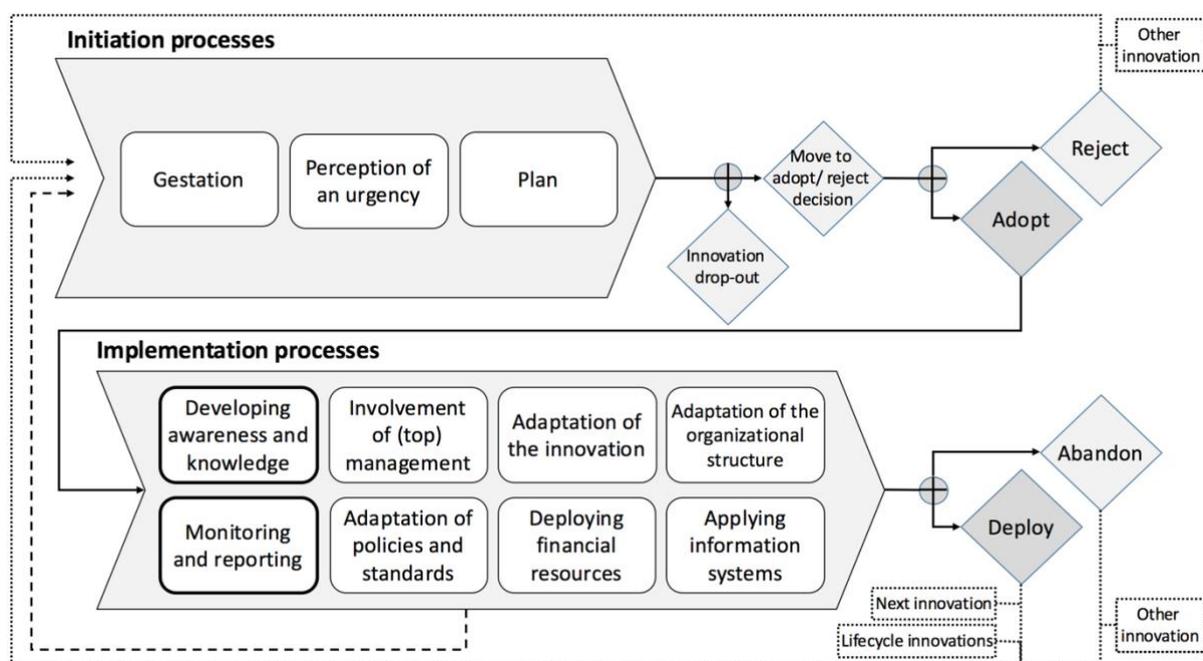


Figure 3.5 Web accessibility innovations initiation and implementation model. The model replaces clarification by 'developing awareness and knowledge' and adds 'monitoring and reporting'.

The model of Ebbers and van Dijk also describes three initiation processes. These initiation processes may also influence the application of web accessibility:

- Gestation: events preceding the implementation that cause a municipality to see the need for change and to be aware of the advantages of applying standards (e.g. applying the web accessibility standards to web and mobile applications (Ebbers & van Dijk, 2007).
- Perception of urgency: organizations only embark on implementing a specific innovation if they perceive it as urgent. This urgency can be caused by a gap between the expected performance of a government service and the actual performance of that service that needs to be fixed. The gap could be caused by accessibility failures. The

urgency could be caused by bug reports, but also by ongoing (negative) press attention or network externalities, meaning that organizations are more eager to adopt a standard when other (similar) organizations have already adopted the standard (Ebbers & van Dijk, 2007; Hovav et al., 2011; Hovav et al., 2004).

- Plan: a plan covering activities, personnel and budget for activities necessary to start the implement processes for the innovation.

The three initiation processes could influence the implementation processes in the model. For example, if none of the stakeholders have any knowledge of web accessibility standards, this could also be due to the absence of a plan that includes training and awareness activities. The gestation period, the quality of the plan and the level of urgency can influence the attribution of budget, personnel, etc.

This dissertation's focus is on implementation. As described earlier, Dutch municipalities have widely decided to adopt the web accessibility standards and many are working on implementation.

### 3.4 Implementation processes

This section explores the processes of implementation (Figure 3.5) in more detail to both link the processes in the model to the specific domain that is the subject of this dissertation and to find indices and items that are related to the subject of this dissertation. Using literature, every process is operationalized into indicators for resistance and support and indices and items that describe what to look for to find the indicators. The concepts of resistance and support are explained and defined in more detail in section 1.5. Note that 'resistance' sounds strong but in this dissertation also includes barriers to implementation such as lack of support or passivity of the organization regarding the implementation. As implementation of web accessibility standards is obligatory, the definition of resistance in this dissertation is broad and includes taking no action. The following sections explore the processes of implementation.

#### 3.4.1 Developing awareness and knowledge

Many authors specifically identify knowledge of web technologies as a critical success factor in the process, specifically during the design and implementation phase (Abdelgawad et al., 2010; Cerf, 2012; Hong et al., 2015; Kline, 2011; Nambisan & Wang, 2000; Umble, Haft, & Umble, 2003).

Nambisan and Wang (Nambisan & Wang, 2000) differentiate between awareness (having factual information about the innovation) and how-to knowledge (knowing how to apply the innovation in a specific context). Both are influenced by the fast changing technologies on the web and by the (lack of) web development and content skills available in the organization.

Knowledge includes the organizational awareness of requirements imposed by internal and external rules and regulations (Loiacono & McCoy, 2006; Yu, 2002). According to some authors, the availability of rules and legislation, as in the case of this dissertation the EU

Directive, is already a factor that influences adoption and implementation (J. Kuzma et al., 2009). However, this would require stakeholders to be aware of those rules and regulations.

Knowledge also includes actual familiarity with the web accessibility standards and with measures to promote accessibility, monitoring, etc. (Abdelgawad et al., 2010; Hong et al., 2015; Katsanos, Tselios, Tsakoumis, & Avouris, 2012; Kline, 2011; Law, Jacko, & Edwards, 2005; Nambisan & Wang, 2000; Rogers, 1983). Some authors describe the perceived complexity of the standard as a factor that influences adoption and implementation (Hong et al., 2015; Rogers, 1983). Knowledge could influence that perception in a positive or negative way.

Organizations should organize continuous improvement (Wahid & Corner, 2009). One way of doing this is by providing or organizing ongoing training for the web team. This will keep them updated and skilled, in our case about web accessibility. Examples include a training plan with updates on legal developments, customer needs and web developments. In the context of adaptation of the organization, organizations should also include providing structural internal communication to all stakeholders about the organizational strategy, program and plans with regard to web accessibility. Monitoring and reporting is described in section 3.4.5.

Nambisan and Wang (Nambisan & Wang, 2000) studied the effect of knowledge barriers on the adoption time of web technology. They conclude that a lack of relevant knowledge of web technologies delays the adoption time of web technology even if they are potentially profitable to web development organizations. They argue that resolving knowledge barriers involves extensive organizational learning beyond just transferring knowledge from foreign contexts. This means that for successful implementation, the organization must allocate sufficient time and resources to knowledge. Although implementation of web technology has become much more commonplace since their study, the implementation of web accessibility standards still seems very new to many web developers and content editors.

Umble (Umble et al., 2003) studied Enterprise Resource Planning Systems (ERP) implementation and concluded that if employees do not understand a process, they invent their own. If this is true for implementation of ERP, it could also impact web accessibility implementation and make knowledge (including education and training) a critical success factor. Umble suggests that reserving 10-15 percent of the implementation budget for knowledge (enabling people to solve problems within the framework of the system) will increase the chance of success to 80 percent and warns that during the full lifecycle there should be post-implementation and periodic training and exchange of knowledge.

Lack of knowledge is an important inhibitor of persistent misconceptions about web accessibility. Hong (Hong et al., 2015) discovered that many developers and designers think that to comply with policy requirements they have to develop a separate website for persons with disabilities. This misconception can lead to unnecessary costs and the results will probably not make anybody happy. To remove some of the most important misconceptions about web accessibility:

- Accessibility does not stand in the way of dynamic, colorful and modern websites. One of the requirements for the standard to be accepted within W3C is the availability of implementation examples and there are many dynamic, colorful and modern examples available online.

- The standards are not too complex to apply. They are used and successfully applied to websites by public sector bodies, but also by (multinational) companies which depend on the sale of products and services from these websites. However, it is true that the standards may not be the best leisure reading material.
- It is not necessary to make separate websites for people with disabilities.
- Accessibility is not only for people with disabilities. Every website has users with disabilities. Section 1.2.1.2 shows the numbers of people who may be excluded if a website is not accessible. Moreover, the standards are not limited to accessibility for people with disabilities. Accessible websites are more accessible to all people.
- Security is not a good reason to skip accessibility. There are many examples of banks and online shops that have accessible websites.
- Making accessible websites is not more expensive. Making websites accessible from the start involves only minor extra costs (see section 2.3). Retrofitting websites (repairing accessibility failures once the website is developed) can be much more expensive.

It is important that stakeholders inside and outside the organization have all the information they need to adopt or implement the standard (Hovav et al., 2011; Hovav et al., 2004). This can come from literature, books, websites and training about the standards and all related information (e.g. about legislation, people with disabilities, etc.). It can also come from feedback by users. This feedback could be collected using a simple online feedback mechanism like a form on the website.

With regard to awareness and knowledge, authors also address indicators like perceived benefits, cost-benefit, network externalities and observability. Many authors address the 'perceived benefits' of an innovation as an indicator for success (Abdelgawad et al., 2010; Martínez, De Andrés, & García, 2014; Miller, Hickson, & Wilson, 2008; Nambisan & Wang, 2000; Rowley, 2011; Velleman et al., 2015; Velleman & van der Geest, 2011). Regarding web accessibility implementation, this means that the organization should make sure that stakeholders are aware of the benefits of implementing the standards as opposed to not implementing them. Benefits could include perception of cost reduction, increased efficiency, fewer (expensive) phone calls, questions at the counter, etc.

In their research into the costs and benefits of applying accessibility standards, Velleman and van der Geest (van der Geest et al., 2011; Velleman & van der Geest, 2011) categorize the possible benefits of applying accessibility standards into four categories: financial, social, technical and legal/policy factors. All categories provide potential benefits (Nambisan & Wang, 2000; Velleman et al., 2015).

Regarding cost benefits: if a website is not built in conformance with accessibility standards, they can be built in later. This is called retrofitting. As argued in section 2.3.1.2, retrofitting accessibility standards at the end of the process is always more expensive than building it in from the start. Boehm (Boehm, 1981) already noticed this. He describes the increasing costs when making changes at a later stage in the lifecycle of a project and shows that the cost of retrofitting can be as much as ten times higher. For that reason, it is important to include conformance from the start. It is important that organizations are (made) aware of this and have sufficient knowledge. This includes activities like setting requirements for CMS systems, checking the skills of outsourced parties (Lazar et al., 2003; Lazar et al., 2004) and providing

training to improve skills within the organization (Abdelgawad et al., 2010; Katsanos et al., 2012; Kline, 2011; Loiacono, Romano, & McCoy, 2009; Nambisan & Wang, 2000; Rogers, 1983).

Network externalities address the effect that organizations seem to be more eager to adopt a standard when other (similar) organizations have already adopted the standard (Hovav, 2004, 2011; Leavitt, 2011). This does however require municipalities to be aware of those network externalities.

Finally, the effort and costs of building and promoting awareness and knowledge can be shared through municipal collaboration. Municipalities, working together with other municipalities can exchange information and even share a web team or experts. For small municipalities with limited budgets and employees, this can facilitate the buildup of awareness and knowledge that would otherwise not have been possible.

The standards themselves can also influence implementation. Kapsi et al. conclude that the tests in WCAG “create several usability problems that may prevent, especially novice designers, from applying them and consequently pose barriers to the accessibility of the web” (Kapsi et al., 2009). Bouwman et al. (Bouwman et al., 2005) supports this (although they are not referring to web accessibility), but using the example of UNIX, states that although a technology may be difficult for novice users, it may be perfectly accessible to an experienced user. They argue that it is “not the level of user-friendliness itself that is important, but rather the right match between the user’s experience and the complexity of the system.” In this case with the complexity of the standards.

Awareness of all these aspects of web accessibility, including the user’s experience and the misconceptions, are important for successful implementation and the organization has an important role to play in raising and promoting awareness and knowledge. It is therefore argued that promoting the availability of awareness and knowledge by the organization is an indicator for support and the absence is an indicator for resistance (read explanation of resistance in sections 1.5 and 3.4). A summary of indicators and indices of support and resistance is available in Table 3.1.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=items)
<b>Developing awareness and knowledge</b>	Presence of awareness and knowledge	of	Absence of awareness and knowledge	of	+ Availability of (activities to raise and promote) awareness and knowledge of the usage and effects of the implementation of web accessibility standards. - The absence of (activities to raise and promote) awareness and knowledge. I Stakeholder knowledge; Awareness and knowledge of current situation; Awareness of rules and regulations; Familiarity with standards; Measures to promote awareness and knowledge; What benefits do respondents see for the organization (perceived benefits); Training of skills; Availability of supporting information and tools; Perceived complexity; Municipal collaboration.

Table 3.1: Awareness and knowledge. Summary of indicators of support and resistance.

### 3.4.2 Involvement of (top) management

Most studies about e-government refer to involvement of top management or the support of management as a critical force for the success or failure of ICT projects (Al-Khalifa, 2012; Bouwman et al., 2005; Chin, Poon, & Pun, 2000; Gichoya, 2005; Gies, 2018; Hong et al., 2015; Katherine J. Klein & Knight, 2005; Magd, 2008; Montequin et al., 2014; Umble et al., 2003; Velleman et al., 2015; Ven et al., 2008; Wahid & Corner, 2009).

If we compare the implementation and maintenance of web accessibility standards to the implementation maintenance of other standards, literature hands us some clues about the relationship between the involvement of top management and the success and failure of implementation. Wahid and Corner (Wahid & Corner, 2009) studied critical success factors and problems in ISO 9000 maintenance. They compared literature on the subject and identified 8 factors, whereby top management commitment and employee involvement are the most critical success factors. Besides studying literature, Chin et al. (Chin et al., 2000) also interviewed 12 representative ISO 9000 registered electronics manufacturing companies that had quality directors and quality assurance managers. They concluded that management commitment was a crucial support indicator and absence of management commitment was the most important indicator for failure. Without top management commitment, quality management systems seem to receive lower priority (Magd, 2008). Klein & Knight (Katherine J. Klein & Knight, 2005) even conclude that management involvement and support for innovation is crucial.

The W3C online pages about “Developing Organizational Policies on Web Accessibility” (W3C, 2016a) support the critical role of management by adding management as a topic in the development of policies for creating, managing and delivering accessible websites. They propose a specific chapter on “Managing Web Accessibility” to learn about how such policies form part of a broader approach to implementing accessibility.” (W3C/WAI: <https://www.w3.org/WAI/impl/pol>).

This is supported by Hong and Leitner (Hong et al., 2015; Leitner et al., 2016). They studied implementation of accessibility standards and explored factors that hinder web accessibility with a group of 30 professional website developers. They also conclude that a lack of top management support or interest is one of the main factors hindering web accessibility. Even with knowledge, expertise and policy in place, it is still the case that “when management speaks, employees listen” (Gies, 2018).

For this same reason, W3C proposes nominating a champion within the organization to increase commitment by top management and raise awareness and support from within the organization. The champion should be a “highly respected, executive-level project champion” (Umble et al., 2003). Umble proceeds to describe the requirements of the top-level executive who should be committed to the process. Although Umble is writing about Enterprise Resource Planning (ERP), if we collate his proposal to accessibility, this person or committee would be committed to accessibility integration, understand the standards, fully support the necessary costs, require payback and champion the process. Umble indicates that management should constantly communicate with the team, but should also enable empowered, rapid decision-making. Gies (Gies, 2018) even argues that one person is not

enough to reach the goal. In a short article, he looks back at the implementation of accessibility standards to the website of ScienceDirect and concludes that it took multiple champions inside Elsevier to get the wheels turning. He agrees with the necessity of a champion, but concludes that “no one person can own accessibility to drive an effective programme.”

Concluding this section, it seems evident from literature that if top management is not committed to implementation (e.g. through solving problems, actions, influence, decisions), the process may not be successful. Besides studies based on theory, lessons-learned and experiences from various scholars and cases, we have not yet found any studies that look into the relationship between this indicator and the actual implementation of accessibility standards to websites.

The proposition for this dissertation is therefore that lack of commitment by top management is an indicator of resistance and implementation of accessibility standards to websites is not successful or delayed. The presence of top management commitment is proposed as an indicator for organizational support. A summary of indicators and indices of support and resistance is available in Table 3.2.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
<b>Involvement of (top) management</b>	Presence of (top) management involvement	of	Absence of (top) management involvement	of	+ The commitment of (top) management and their activities supporting the implementation of web accessibility standards. - No and/or negative (top) management involvement. I Appointment of (top) manager with focus on web accessibility; Plan written by management that includes web accessibility implementation; Perceived sense of urgency with management and other departments.

Table 3.2: Involvement of (top) management. Summary of indicators of support and resistance.

### 3.4.3 Adaptation of the innovation

According to Ebbers & van Dijk (Ebbers & van Dijk, 2007), during the implementation process of electronic government services, these services can be modified to suit the needs of future users. In their article, future users include citizens, public and private organizations and the government’s own employees. In their model, the modifications are summarized under “adaptation of the innovation”. However, in the case of standards, making changes involves participation in (international) standardization activities. These activities that can take a long time (sometimes many years) and involve many stakeholders. It would require municipalities and/or their umbrella organizations to spend time and budget on standardization. The outcome could however benefit the implementation by municipalities.

The success of a website and of the implementation of accessibility standards may not only depend on the characteristics of the website (i.e. content, functionalities, style) but also on how well the innovation can or may be adapted to the users. Users do not only include citizens of the municipality, but also its employees. According to Aizpurua, Harper and Vigo (Amaia

Aizpurua, Harper, & Vigo, 2016) the perception of a website by the different users is an important success factor and accessibility standards play an important role in this. Compliance with a standard may not always lead to an optimal user experience (A. Aizpurua, Arrue, & Vigo, 2015; DRC, 2004) and the standards themselves can be difficult to use or understand, thus creating a barrier to the implementation (Kapsi et al., 2009). By becoming directly or indirectly involved in the standardization process, municipalities may influence this. Their umbrella organization or the central government could help organize this participation.

A quick glance at the WCAG2.0 and WCAG2.1 participants list (Caldwell et al., 2008; Kirkpatrick, O'Connor, Campbell, & Cooper, 2018) shows that Dutch municipalities or umbrella organizations like VNG (Association of Netherlands Municipalities/Vereniging van Nederlandse Gemeenten) are not (currently) participating in the W3C Accessibility Guidelines Working Group (August 2018). One individual from the Dutch government, is named in the WCAG acknowledgements and Logius is involved as W3C Member organization but they are not currently participating in the Accessibility Guidelines Working Group.

The participants of the Accessibility Guidelines Working Group include representatives from national governments, institutes for the disabled, universities, publishers, accessibility expert organizations, software suppliers, persons with disabilities, etc. In total, there are 134 participants and 27 invited experts involved in the Group.

As municipalities or their umbrella organizations are not directly involved in the adaptation of the standards to the requirements of (future) users (e.g. the organization, employees, designers, developers etc.) with and without disabilities, this process is not further proposed as an indicator of organizational support or resistance. Changes to the interpretation and to the actual implementation will be further presented in section 3.4.6 (Adaptation of policies and standards).

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
<b>Adaptation of the innovation</b>	Presence of adaptations of the innovation	of	Absence of adaptations of the innovation	of	+ Changes to the innovation as a result of needs and demands of (future) users, systems integrations and organizational processes with regard to web accessibility standards. - The absence of these changes. I Involvement in standardization activities

Table 3.3: Adaptation of the innovation. This process is not further researched because currently municipalities are not directly or indirectly involved in adaptation of the innovation.

### 3.4.4 Adaptation of the organizational structure

The implementation of innovations includes re-definition / restructuring (Rogers, 2003). On the one hand, this means that when implementing web accessibility, the innovation is adapted to the situation of the organization (see section 3.4.3); on the other hand, it also involves adaptation of organizational structures to the innovation. (BSI, 2010; Ebbers & van Dijk, 2007; Gichoya, 2005; Loiacono et al., 2009; Rogers, 2003; Ven et al., 2008). For web accessibility,

this involves changes to organizational structures that support the implementation, changes to roles and responsibilities, clarity within the organization (about tasks, responsibilities and delegation), involving internal and external stakeholders and even setting requirements for performance evaluation of individual team members.

In the case of implementation of web accessibility, adaptation of the organizational structure may include many variables. One variable is about assigning and delegating roles and responsibilities to a central team or teams working on web development and content production (from product owners and developers to content editors) (BSI, 2010; Gies, 2018).

Folmer and Punter (Folmer & Punter, 2011) studied the implementation of open standards in the Netherlands and confirm the importance of assigning responsibilities, but also of having a committed problem owner (could be multiple teams or departments). They argue that a dominant party or dominant process can greatly encourage adoption.

The organization should not only test websites, but also actively seek feedback from different users of the website (BSI, 2010). According to the British standard BS 8878, this combination helps to ensure that websites remain accessible as technology and standards develop further. Bouwman (Bouwman et al., 2005) indicates that users should be involved in both the technical implementation (to formulate user requirements) and the organizational implementation (“employee behavior, user training, expectations with regard to changes, hierarchies and organizational change occurring as a result of ICT systems and applications”). User requirements should have an important role in the implementation of the web accessibility standards and thus be given a place in the organization. Diversity of users is an important aspect. The size of the project and the diversity of the users or organizations involved are two important factors in IT initiatives (Gil-Garcia, 2012). This means including people with disabilities, both from inside and outside the organization (Hong et al., 2015). Hong argues that failure to specifically include participation by users with disabilities is an important factor for the failure of accessibility implementation.

Khan (Khan, 2015) observes that the Netherlands has already incorporated social media and mobile technologies into the e-government infrastructure and that the citizens are not merely consumers of information but becoming participants in e-government. The role of the user is changing now that websites include social media and crowd sourced information and services. For organizations this means they have to organize and control this. They have to arrange a mechanism to cope with this new role. To reach conformance it means organizing continuous control and repair. On his website 200ok, Jules Ernst scraped the Dutch municipality websites in 2017 and 2018 and based on links on their homepage concluded that 33% of them use WhatsApp for communication with their citizens (was 18% in 2017), 99% uses Twitter, 85% uses Facebook, 29% uses YouTube, 24% uses LinkedIn and 19% uses Instagram (Figure 3.6).

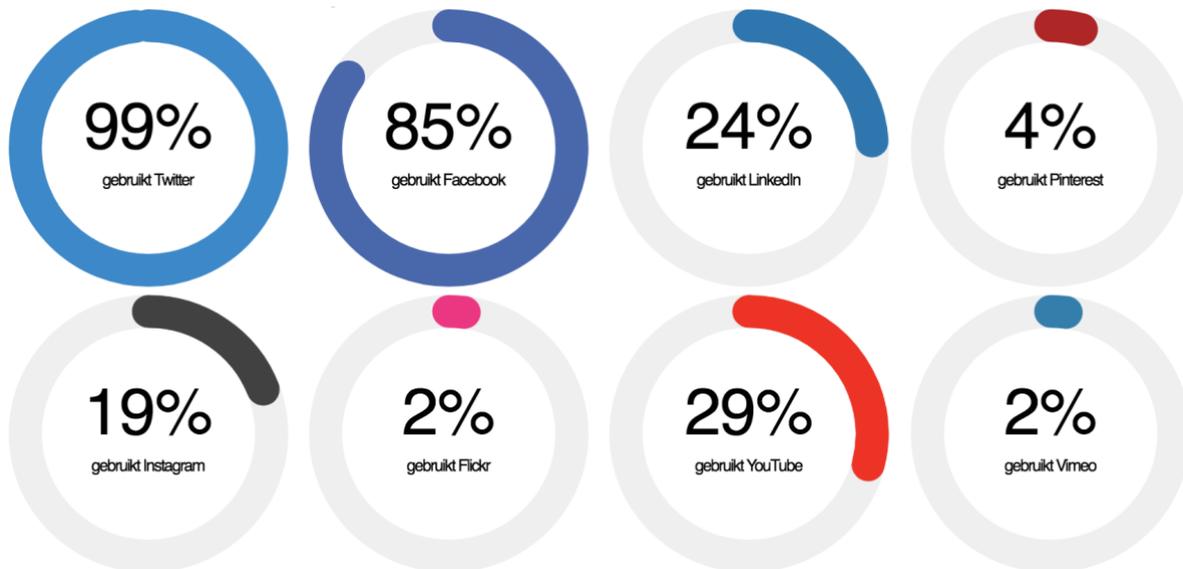


Figure 3.6: Use of Social Media by Dutch Municipalities. Source: <https://www.200ok.nl/gemeente-waar-sta-je/> (Last viewed: 8 August 2018).

Gies (Gies, 2018) describes his experience at ScienceDirect where they log all inquiries by customers and share them with decision makers. At ScienceDirect, the implementation of the web accessibility standards is influenced by tracking customer demands before and during implementation. He concludes that “customer data speak the business case in a clear language”, thus making the case for ongoing user involvement in the implementation of web accessibility standards. Organizing this could also be beneficial for municipalities.

Most implementation processes for accessibility standards include multiple organizations working together. This could cause problems when it comes to decision making or actual implementation. Heuvelhof and de Bruijn (Bruijn & Heuvelhof, 2007) show that involvement of network organizations can be a factor that considerably slows down decision-making. They mention three risks of involvement of networks that are relevant for the process of implementation of web accessibility standards (when assigning responsibilities). First, networks have a variety of actors with different characteristics, knowledge and interests. This can cause confusion during implementation. Networks can also be very closed, not letting in advice or comments from other external stakeholders. Finally, people in networks tend to be dependent on each other. This means that people in the network sometimes have to wait for others in the network to provide advice, approval, etc. before a decision can be taken. Municipalities work together in different ways. They share employees for content, work together with internal and external departments, work with external parties on the development and maintenance of the website, they work together with other municipalities and their CMS supplier or even develop their own CMS together. Some municipalities share the same platform for their website including the persons working on the platform.

Many people do not see the complex organizational network behind the content of a website (Gil-Garcia, 2012). In municipalities, as in companies, products, services and content may come from many different departments. They function as portals into the organization. What happens if other departments/people also have access to the Content Management System or if they provide content (like video, documents, text)? Has the organization organized

training for those other departments/people to make sure the content is accessible from the start? If many departments/people have access, the implementation of web accessibility will require more inter-organizational collaboration. In many cases, the organization has to adapt to support this.

Organizations can help web accessibility by structurally providing support for cooperation between internal and external teams and by supporting implementation by (external) expertise and coaching to all stakeholders in their process (Abdullah, Abdul Razak, Hanizun Hanafi, & Jaafar, 2013; Bailey & Burd, 2006; Gies, 2018; Jaeger, 2006).

Organizations can also help by making web accessibility part of recruitment. Organizations should write a plan for capacity management to guarantee availability of sufficient and skilled people (Abdelgawad et al., 2010; Loiacono & Djamasbi, 2013; Treasury Board of Canada, 2013; University, 2016) and attach individual consequences to ongoing (non) conformance or (non) compliance that may extend to measures like wage increase or reduction (Treasury Board of Canada, 2013; Umble et al., 2003; Wahid & Corner, 2009).

Some authors write about the influence of ‘political cycles’. In the Netherlands, municipal elections are held every four years. Change in political direction can also change policy goals and priorities (Heeks, 2006). Abdullah et al. describes the impact of a new council president/mayor for the implementation of ISO9000 in Malaysia and concludes that it has an impact there (Abdullah et al., 2013). So far, we have not found any literature supporting this for Europe (and specifically web accessibility).

Adaptation of the organizational structure is proposed as an indicator of organizational support and its absence as an indicator of organizational resistance. A summary of indicators and indices of support and resistance and is available in Table 3.4.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
<b>Adaptation of the organizational structure</b>	Presence of adaptations of the organizational structure	of	Absence of adaptations of the organizational structure	of	+ Changes to the organizational structure, strategy, roles and responsibilities with regard to the implementation of web accessibility standards. - The absence of such changes. I Related to web accessibility implementation: Responsibilities and task delegation; Performance evaluation; Drafting of plans; Use of rules and procedures; Influence and involvement of employees and other stakeholders (internal and external) of the municipality; Network and collaboration.

Table 3.4: Adaptation of the organizational structure. Summary of indicators for support and resistance.

### 3.4.5 Monitoring and reporting

To support continuous improvement, organizations should structurally embed monitoring and reporting of the status of web accessibility (G3ICT, 2013; Jaeger, 2006; P. T. Jaeger & M. Matteson, 2009; Loiacono & Djamasbi, 2013). The organization can support this by promoting

availability of tools (Bouwman et al., 2005). This can be extended by including the feedback provided by users/public (if available) (Jaeger, 2006). Note that monitoring conformance and feedback is more helpful if it leads to actual repair of web accessibility failures. Besides monitoring and collecting feedback from users, organizations should also plan corresponding changes (for example through a change request process). Otherwise, the process risks being too ad hoc to be helpful. There are policy requirements with regard to monitoring and reporting set by the EU Directive. Besides monitoring and reporting, the EU Directive also requires public sector bodies to provide an accessibility statement. The European Commission provides templates for monitoring, reporting and for the accessibility statement. The Dutch government has made its own version closely following the proposed EU template. It also provides an online template generator. Municipalities can already use this service to publish their obligatory accessibility statement (see section 2.4.2).

By monitoring we mean monitoring of compliance with legal and standards requirements. Have laws been implemented and what is the status of the implementation of the web accessibility standards? The outcome consists of a report and an accessibility template.

Monitoring and reporting can prevent implementation problems at an early stage. If they are undertaken from the start of the process, they can save expensive repairs later on (Boehm, 1981).

Monitoring and reporting is proposed as an indicator of organizational support and the absence of monitoring and reporting as an indicator of organizational resistance. A summary of indicators and indices of support and resistance is available in Table 3.5.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
Monitoring and reporting	Presence of monitoring and reporting	of	Absence of monitoring and reporting	of	+ Measures to (regularly and actively) test the conformance of the website with the standard and audit the transposition of legislation - The absence of such measures I Monitoring and testing activities (incl. monitoring new content and user feedback); Quality Assurance internal and external; Plans (to repair failures).

Table 3.5: Monitoring and reporting. Summary of indicators for support and resistance.

### 3.4.6 Adaptation of policies and standards

The web accessibility code of practice (BSI, 2010) advises organizations to start adapting policy with an analysis of the situation. Elements of this analysis, supported by accessibility maturity models like DAMM and PDAA, include: legal and other regulatory duties, business benefits, procurement, possibility to incorporate it into existing policy for accessibility (e.g. built environment), organization of tasks and responsibilities, awareness and communication and compliance measurement.

In most cases, the legal and policy framework for information technologies in government agencies is provided by an external agent (Gil-Garcia, 2004). With regard to web accessibility

standards implementation, important examples include the EU Directive and the UN Convention, both signed by the Dutch government in 2016 (see section 2.2.1 and 2.2.2) and anti-discrimination laws and regulations (Kubitschke et al., 2013). The Directive requires Member States to take measures to promote and facilitate implementation. An example of the transposition of the UN Convention is the change made on national level to WGBH/cz that requires web accessibility since 1 January of 2017. This directly impacts municipalities. The transposition at national level also requires a transposition at local level. For example, regarding web accessibility in municipalities, the transposition includes changing rules for procurement, the standard to be used (EN 301 549) and the level of conformance (level AA). Also, the new standard broadens the earlier agreements and now includes mobile applications, hardware, software, documents, intranets and extranets.

Because the standard is included in the list of the Dutch 'Standardisation Forum', municipalities are required to report on conformance every year in their annual report (if they use the standard). As a result of the EU Directive, public sector bodies (in this case municipalities) are also required to provide and regularly update an accessibility statement (see section 2.4.2). This statement must also include detailed results of the monitoring). In the Netherlands, complaints about barriers to web accessibility can be filed with the Netherlands Institute for Human Rights.

National and international laws and regulations thus mandate municipalities to adapt and implement web accessibility into their local policy. Many indicate that this is an important driver for implementation (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016; Geest, Kolk, & Velleman, 2016; Gil-Garcia & Pardo, 2005; P. Jaeger & M. Matteson, 2009; Lazar et al., 2004; Loiacono & Djasmasbi, 2013; Loiacono et al., 2009).

Gies (Gies, 2018) also describes the importance of having an organizational policy in place. He presents the case of a new product manager who was initially reluctant to implement web accessibility but then started to prioritize accessibility fixes, citing the company policy. However, König and Mader (König & Mäder, 2014) argue that higher authorities need to follow up on non-compliance because otherwise the pressure on policy implementation could be lower. Using monitoring of policy compliance by the European Union with the Directives as an example, they conclude that compliance outcomes significantly depend on the probability of enforcement success and the potential sanctioning costs. This can also be seen in the Netherlands where the monitoring of policy compliance is low. On the one hand, that leads to a lower level of urgency in municipalities. On the other hand, it makes the central government reluctant to take measures against municipalities.

The National Association of State Chief Information Officers (NASCIO, 2015) argues that web accessibility should be included in the procurement policy of organizations so it becomes an integral part of the organizations procurement process. This includes testing suppliers before signing the contract. Research shows that trusting suppliers for web accessibility is not always rewarded with a fully conformant website. This is partly covered by the recently amended European Procurement Directives that require conformance with (web) accessibility but only above a certain financial threshold. It is up to the municipality to broaden this policy to include all procurements related to web accessibility (modules, content, updates, etc.).

Variables include the actual transposition of legislation, regulations, requirements, procedures, processes and plans for monitoring and reporting about compliance. The regulatory process could include variables like user participation, procurement, coordination within the organization and coordination with other organizations, feedback, complaints and dispute resolution, etc. Organizations can further support the implementation by formulating an overall vision and plan for the implementation of web accessibility, identifying standards and goals like the level of conformance and the timing (if not yet set by other (inter)(national) laws and regulations). Authors note that coordination with other departments or with other organizations (for content, development, maintenance, etc.) can cause serious delays but can also be very beneficial (shared resources). It is however important to properly organize this.

Where legislation requires 100% compliance, the availability of time, sufficient capacity and ready-for-use technical solutions may still influence the implementation causing adaptations to the innovation or to the level of implementation. Adaptation of the level of implementation is difficult to explain when local, regional, national or international compliance requirements (see section 2.2) do not support non-conformant audit outcomes.

There may be different reasons for adaptation of the level of implementation of the standards, some of which are supported by the standards or by legislation. To help developers and owners of websites, WCAG-EM includes a number of solutions that can be applied for example in case of partial conformance, the use of a specific accessibility support baselines and the use of new technologies that have not yet been covered in the WCAG Techniques Notes (see section 2.1.1.1). Some examples are described below. But there are also legal measures that provide exceptions to the standards. For example, the EU Directive 2016/2102 provides a number of exclusions (see section 2.2.2).

One example of adaptation of the level of implementation of the standard is related to the changing role of the user. Boughzala et al. (Boughzala, Janssen, & Assar, 2015) show that the role of the user is changing with the growth of social media and crowd sourcing of information and services. They describe characteristics of e-government 2.0 and refer to the growing inclusion of interactive emerging social platforms and social media in e-government websites. The changing role of the user can influence the implementation of the web accessibility standards. Specifically, because the standards originated at a time when crowd sourced content was not yet common practice.

Some websites offer citizens an opportunity to add comments to articles or blogposts, view personalized messages or upload their own content. Or they offer dynamic content from other sources like social media, advertisements, etc. Municipalities can make a statement of partial conformance if they cannot know or control what the content of a page will be after they publish their original post. If they control and repair the possible failures within two business days, they can however claim conformance even though there may be content that is non-conformant.

In addition to the changing role of the use, software provides virtually unlimited variation possibilities and (web) interfaces can take any form including other modalities like speech, gestures, mouse and touch (Cerf, 2012). Besides developers who invent new technologies, applications and assistive solutions all the time, also users with disabilities can provide an unlimited variation of assistive technology uses that have to be addressed by (implementing)

standards. Section 2.1.4 describes the possibilities and limitation of applying an accessibility baseline as described in WCAG-EM (step 1.c). This offers the website owner or developer an opportunity to define the web browsers, assistive technologies and other user agents for which features provided on the website are to be accessibility supported. In case of an intranet or an organization providing computers to their employees, this can limit the application width of the standards to a more limited set of browsers and assistive technologies. The reason being that the organization knows exactly what software, equipment and assistive technology is used on their computers and network. This is an adaptation of the level of implementation of the standard where the website may be non-conformant to other configurations.

Another example influencing the level of implementation of the standard is the use of new technologies. As described in section 2.1.1, WCAG provides support for new web technologies through a number of 'Notes'. The Notes may not cover the unlimited variation possibilities and (web) interfaces thus requiring developers and website owners to (at least temporarily) apply their own interpretation of the standards to these new technologies.

Municipalities may also decide to adapt the level of implementation of the web accessibility standards because they are planning implementation over a longer period of time. This would mean they accept a temporary state of non-compliance but have a plan to repair the existing non-conformance over time.

Adaptation of policies to support the implementation of web accessibility standards is proposed as an indicator of organizational support and the absence of adaptation of these policies as an indicator of organizational resistance. A summary of indicators and indices of support and resistance and is available Table 3.6.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
<b>Adaptation of policies and standards</b>	Presence of adaptation of policies and standards	of	Absence of adaptation of policies and standards	of	+ Policy adapted in relation to implementation of web accessibility standards - Absence of such adaptations I Changes to legislation and regulations; requirements in formal plans and policy; priority for full application of the web accessibility standards; identification and use of (process) standards; Availability of Accessibility Statement; Availability of time and capacity; Continuous control and repair; Influence of software and ready-to-use solutions.

Table 3.6: Adaptation of policies and standards. Summary of indicators for support and resistance.

### 3.4.7 Deploying financial resources

Many authors indicate the importance of funding to support the implementation of web accessibility (Velleman et al., 2015)(@more authors). This is also an outcome of e-government implementation literature (Angelopoulos, Kitsios, Kofakis, & Papadopoulos, 2010). It seems rather straightforward, but sometimes organizations seem to forget this aspect and count the availability of staff and other resources without considering their cost (Velleman & van der Geest, 2011). UNESCO (UNESCO, 2014) studied the implementation of the inclusive ICT in

education policy and concluded that, to be successful, it must be underpinned by a coherent and effective financing mechanism. However, deploying financial resources may not automatically lead to successful implementation of web accessibility standards. The Dutch government sponsored an extensive support program for municipalities in 2013 (KING, 2013), consisting of training, awareness raising and support for repairing web accessibility failures. This approach helped many municipalities improve their level of implementation of the web accessibility standards, but it is not sure if the effect was lasting.

The revenue of the organization could have an effect on the budget for web accessibility implementation. If the municipality has more budget (from State, taxes, other), it may be willing to spend more on web accessibility (Loiacono & Djamasbi, 2013).

The financial resources are necessary to cover staff resources (internal staff, experts and contractors), costs for tools, creating and maintaining regular monitoring and reporting, training staff, hiring external experts and consultants, involving people with disabilities, drafting and designing new policy (including strategy and plans) (G3ICT, 2013).

Deploying financial resources to support the implementation of web accessibility standards is proposed as an indicator of organizational support and the absence of financial resources is considered an indicator of organizational resistance. A summary of indicators and indices of support and resistance and is available in Table 3.7.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
<b>Deploying financial resources</b>	Sufficient deployment of financial resources	of	Insufficient deployment of financial resources	of	+ Deployment of financial resources specifically for web accessibility implementation - Low or absent budget allocation for web accessibility implementation I Budget and cost (for training, tools, awareness, external experts); Percentage of total IT costs for the website; Current infrastructure and sunk cost of already existing infrastructure; Municipal collaboration.

Table 3.7: Deploying financial resources. Summary of indicators for support and resistance.

### 3.4.8 Applying information systems

According to Martinez et al. (Martínez et al., 2014), web accessibility is a technological innovation which can improve the relationship between an organization and all its stakeholders, not just those with disabilities.

Applying information systems should help improve the effectiveness and efficiency of an organization. Accessibility extends this to all users. This sounds logical, but in practice many government ICT projects fail. Wang ascribes this to the production of custom solutions (Wang & Hou, 2010). They studied e-government implementation and concluded that the risk of failure of implementation of Information Systems can be reduced by using standard software rather than customized ICT solutions. The application of common commercial practice proves

more successful, although this may mean that it is necessary to adapt organizational processes. An example of such software is the CMS used by many municipalities.

The success of applying information systems depends on variables like the capabilities of the information system, characteristics of the organization, other technical systems, available technology, people and policy requirements (Hevner, March, Park, & Ram, 2004). For example, not all technical systems are compatible with others or can implement the same standards (Bouwman et al., 2005). Older systems or systems that are already being used by organizations (legacy systems) can seriously impede compatibility with new systems layers and therefore slow down web accessibility implementation.

Although technology is important, it is in fact an enabler of many organizational processes and services to users (inside and outside the organization) (Bouwman et al., 2005). It is important that all users are aware of the possibilities of the information systems. Training is an important factor to support this awareness and the proper use of information systems. Information systems are primary enablers of the modern municipality (Heeks, 2006). Modern information systems are networked systems that use the Internet. Ebbers & van Dijk (Ebbers & van Dijk, 2007) quote Wieringa to describe three different service layers: an application systems layer, an implementation platform layer and a physical network layer. Web accessibility is applicable to the services of an organization and usually concerns the application systems layer. Most older implementation platforms and physical networks provide sufficient support for traditional websites and web services in the application systems layer. However, websites are increasingly becoming interactive dynamic networked service solutions that can make their own decisions sometimes using machine learning and even artificial intelligence. This sets higher requirements. Examples include dynamic and complex interactive software behind the websites (e.g. for login, security, privacy, but also for word processing, conversions etc.), interactive media and streaming audio and video services. More and more municipalities live-stream their meetings. To be accessible, these live-streams may have to provide captions for the deaf and hearing impaired and audio descriptions for the blind.

Sometimes accessibility depends on external suppliers for the CMS or for other modules (forms and login features). In the Netherlands, the four most popular Content Management Systems are SIMsite, TYPO3, GreenValleyCMS and Drupal. In 2017, they were responsible for 77.3% of Dutch municipality websites (Ernst, 2017). This means that these providers play an important role in the implementation of web accessibility of Dutch municipalities. However, web accessibility involves much more than merely producing accessible template pages and CMS functionality (Bailey & Burd, 2006). Even if the CMS is accessible, web teams still have to add content correctly.

Web accessibility can also depend on external suppliers and third parties for content and functionality. Examples include Twitter streams, banner ads, embedded video and user-generated content as well as elements that are obligatory for municipalities to use like Digid (providing a secure login for Dutch citizens). In the past Digid was not accessible, causing municipalities to fail a number of the web accessibility standards. This was so demotivating for some municipalities that it was temporarily out-scoped from the audits for the drempelvrij quality mark in the Netherlands.

Procurement may be the best way to require web accessibility standards support for external content and information systems. This may not always be possible, for example if there is no accessible version of a specific technology on the market or if a specific service is only provided by one company and they have not yet worked with the accessibility requirements. Besides looking at the product or service, it is important to also test the actual skills and expertise of suppliers before contracting them (Lazar et al., 2004). It may also not be possible because there is no accessible choice.

Gies (Gies, 2018) argues that if procurement requirements do not work, organizations could also cooperate with external suppliers to work together on accessibility. To support the organization in checking the accessibility of content and information systems, they may also need tools. Tools that support accessible development and testing of accessibility can be found on the website of W3C/WAI (W3C, 2016b).

Finally, applying information systems can include sharing infrastructure and people with other organizations (e.g. web team, experts, human resources, payrolling, project leads, etc.). For example, for authentication, maintenance or content. This may also involve exchanging data. Data may not always be compatible or in the same format. Accessibility statements are an example of that. Many municipalities have online accessibility statements, but they are very different. It would be good to have a harmonized data model or data format (Geest et al., 2016).

Applying information systems to support the implementation of web accessibility standards is proposed as an indicator of organizational support and the absence of applying information systems to support the implementation of web accessibility standards is considered as an indicator of organizational resistance. A summary of indicators and indices of support and resistance and is available in Table 3.8.

Process	Indicator of support	of	Indicator of resistance	of	Indices (+=support, -=resistance, I=Items)
<b>Applying information systems</b>	Applying information systems to support the implementation of web accessibility standards	to	Absence of applying information systems to support the implementation of web accessibility standards	the	+ Applying activities and measures that support and improve the accessibility of information systems. - Absence of the application of such measures and activities. I Accessibility of CMS; Techniques/elements in Web pages (interdependencies); Legacy (within current infrastructure and sunk cost of already existing infrastructure); Compatibility; Availability of testing- / other tools for accessibility; Quality of procurement; (including checking skills of outsourced party and testing before launch).

Table 3.8: Applying information systems. Summary of indicators for support and resistance.

### 3.5 Moderators

Municipalities are very different in both number of citizens and staff. Also their sites are very different in size (number of Web pages) and level of conformance. Dahl and Hansen (Dahl &

Hansen, 2006) indicate that on the one hand, the size of municipalities is a significant factor when it comes to the implementation of standards and that on the other hand, the adoption of the guidelines can be influenced by the more complex organizational structure of a large municipality. For this reason, it is good to choose small, medium and large websites with different levels of accessibility standards conformance when studying web accessibility of municipalities. Lorca (Lorca, Andrés, & Martínez, 2012) studied the adoption of innovations and CSR commitment of large companies and found a correlation with size and national legislation.

Another moderator is the size of the organization. If an organization is smaller, the number of IT professionals on a project may also be smaller (Loiacono & Djamasbi, 2013). This is usually related to the budget and may influence web accessibility standards implementation.



## 4 PART 4: AN EMPIRICAL INVESTIGATION OF THE IMPLEMENTATION OF WEB ACCESSIBILITY STANDARDS IN DUTCH MUNICIPALITIES

Part 4 describes how the model in part 3 has been operationalized in the conformance measurement, the questionnaire and interviews. The empirical investigation starts with literature research (Parts 1, 2 and 3). A questionnaire was tested and designed using interviews with 5 municipalities. Municipalities were then selected based on a randomized set of lists (number of inhabitants and pre-estimation of the website's conformance level) and the questionnaire was sent out to participating municipalities. As soon as possible after completion of a questionnaire, the corresponding website was audited by an expert. After all questionnaires had been completed, the results were exported from the survey tool. They were then analyzed to find possible correlations with the audit results. During the analysis phase, 10 additional interviews were held to deepen the understanding of the answers and address possible remaining questions for clarification.

### 4.1 Research design

This dissertation studies the implementation of web accessibility innovations to websites of municipalities in the Netherlands. The research objective of this study is to formulate *recommendations* to Dutch municipality organizations to improve the level of implementation of web accessibility standards. This section describes the design of the questionnaire, the selection of the municipalities and the analysis conducted to correlate the processes with the actual implementation of accessibility standards of municipality websites. The research design includes municipalities with different size (number of inhabitants) and level of conformance.

#### 4.1.1 Selecting municipalities

The research is based on a convenience sample with systematic quota and random techniques. Because there was only limited budget for auditing, the total sample could not exceed 70 municipalities. To make sure the sample would contain different size municipalities with different levels of web accessibility, there were two selection criteria: (1) size of the municipality and (2) pre-estimated level of accessibility.

**Size of the municipality:** Based on the figures provided by Statistics Netherlands, the total number of municipalities (388 municipalities in January 2018) was divided into four quota following examples by Statistics Netherlands. The quota are based on the number of inhabitants in the municipalities:

1. **Small:** municipalities with 0-20,000 inhabitants (118).
2. **Medium:** municipalities with 20,001-50,000 inhabitants (191).
3. **Large:** municipalities with 50,001-250,000 inhabitants (75).

4. **G4:** municipalities with more than 250,001 inhabitants (4).

The goal was to collect data from a minimum number of 20 participating municipalities per quatum (small, medium and large plus the G4). This makes it possible to look for differences in web accessibility implementation based on the size of the municipality.

**Pre-estimated level of accessibility:** As described in section 2.4, earlier monitoring showed that only a very small percentage of municipality websites was fully accessible. To make sure that the final sample would include websites with different levels of implementation of the web accessibility standards the lists of small, medium and large municipalities were each stratified into three lists with pre-estimated levels of conformance. To do this, all Dutch municipality websites were studied and divided into three accessibility levels based on the declaration made by the municipalities themselves in their online accessibility statement or by external reviewers or audit parties:

1. **Accessible:** is the website mentioned on the Accessibility<sup>7</sup> or Drempelvrij list as being conformant with the standards. For Drempelvrij, that means that the website has received a one star logo (level A), two star logo (level AA) or a three star logo (former full Webguidelines until introduction of EN 301 549). The website may also have a statement including a link to an audit report declaring the website conformant with the accessibility standards (Webguidelines, WCAG2.0 or EN 301 549).
2. **Statement:** if the website is not audited, does the website have an online accessibility statement declaring that their website is not fully conformant with the accessibility standards (Webguidelines, WCAG2.0 or EN 301 549). The statement should include the Success Criteria that are not conformant.
3. **Unknown:** the website does not have an accessibility statement in October 2017 and is not included on the Drempelvrij or Accessibility lists. Please note that the website might be accessible, but there was no way of concluding that without a scan.

Including the G4, this leads to 10 lists (quota). One for the G4 and three for every one of the other quota (small, medium and large). These stratified lists were then randomized using a Python randomization script.

There was a list of contact persons, emails and phone numbers with regard to web accessibility collected by the Dutch government, but this list was not made available for this study. Because it was expected that sending an email to the info address of a municipality would not lead to participation, the decision was taken to call the municipalities following the 10 lists and collect names and emails of persons in the organization with a responsibility for the website (accessibility).

To reach the desired total of 21 municipalities for every quatum (small, medium, large) and a good balance between the pre-estimated levels, three persons called the municipalities by telephone between November 2017 and February 2018. Starting at the top of the 10 randomized lists and then moving down. The quatum of the G4 consisted of only the G4 largest municipalities in the Netherlands. In total they called 230 municipalities before the desired number of participants was reached.

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<sup>7</sup> <https://www.accessibility.nl/ondersteuning/deelnemers> (Last viewed: 8 August 2018)

The reason to call the next municipality on the list depended on a number of preset criteria:

1. There may not be enough websites with different levels within the quota (small, medium, large). Section 2.4 shows conformance with the standards is still low. Table 4.1 shows that there are not enough websites that are pre-estimated to be accessible (2 for small, 4 for medium and 6 for large municipalities).
2. A municipality may not be reachable (even after two or three calls).
3. A municipality may not be able or want to participate in the research.
4. A municipality may indicate that they are planning to renew their website within the next 3 months. Websites that would be renewed within 3 to 6 months were intentionally omitted because time was needed to audit the website after the questionnaire (to prevent the old website no longer being available).

4.1.1.1 Response

Of the 230 municipalities that received a phone call, 150 were sent more information and a link to the questionnaire. In some cases, contact information was found on the web and the information and link were sent there without being able to reach the specific person by telephone.

Table 4.1 shows the response rates per quatum and level. For the municipalities that received an email with information and a link to the questionnaire, the response rate was 46 percent.

Categories and quota	Total	Email invitations	Participated	Response Rate
Small municipalities total	120	55	21	38%
List 1: Accessible	2	2	2	100%
List 2: Statement	76	25	8	32%
List 3: Unknown	42	28	11	39%
Medium municipalities total	189	50	21	42%
List 4: Accessible	4	4	1	25%
List 5: Statement	99	20	9	45%
List 6: Unknown	86	26	11	42%
Large municipalities total	75	41	23	56%
List 7: Accessible	6	6	5	83%
List 8: Statement	45	22	11	50%
List 9: Unknown	24	13	7	54%
G4 total (list 10)	4	4	4	100%
	388	150	69	46%

Table 4.1: Overview of municipalities, the lists (quota) with a pre-estimation of the accessibility level, the number of email invitations sent, the number of municipalities that participated and the response rate.

Table 4.2 provides a breakdown of the reasons why municipalities did not receive information and a link to the questionnaire. Interestingly, a large number of municipalities (16 percent of the 230 called) were very difficult to reach by phone. Also 21 municipalities planned to

develop a new website within 3 months of the call making it difficult to make sure there was enough time to audit the website and to go back in case of questions. In some cases, the same persons answered the phone for different municipalities or the same email was given. Nine municipalities indicated they had no time, capacity or interest in the study. Two of them reported that their colleague had the flu and nobody else knew about the website. This leaves 150 municipalities.

<b>Reason for not receiving information and link to questionnaire</b>	<b>Number</b>
Total number of calls	230
No contact (phone was not answered or no such person was known)	- 37
New website is planned in the next 3-6 months	- 21
Same team behind more than one website	- 8
Municipality stops to exist	- 5
Not interested to participate	- 5
No time or capacity to participate or other	- 4
Resulting municipalities that will receive link to questionnaire	150

*Table 4.2: Breakdown of reasons why not all of the 230 municipalities called by telephone have received information and a link to participate in the questionnaire. See*

*Table 4.3 for a breakdown of the resulting 150 municipalities who received information and a link to the questionnaire.*

Table 4.3 provides a breakdown of the 150 municipalities that received information and a link to the questionnaire. Many of the persons and their contact information have been provided by the reception of the municipality. In total, 42 of them could not be reached at all. They did not answer the phone or email. Eight could not participate due to planning of a new website or working together on multiple websites.

Fifteen used the link in the mail to opt-out. Twelve municipalities indicated they had no time, capacity or interest. This leaves 69 municipalities that completed the questionnaire.

<b>Reason for non-participation</b>	<b>Number</b>	<b>Percentage</b>
Total number of municipalities sent information and link to questionnaire	150	
No more contact or reaction (phone was not answered or persons or contact provided by the organization was not reachable or no answers received)	- 27	18%
No answers to the questions	- 21	14%
Opt-out using the link in the mail	- 15	10%
Called: No time	- 4	4%
Called: No capacity	- 3	3%
Called: Same team behind more than one website	- 2	2%
Called: Not interested	- 2	1%
Called: New website is planned in next 3-6 months	- 1	1%
Incomplete	- 6	1%
<b>Total</b>		54%

*Table 4.3: Breakdown of the 54 percent of municipalities who have been sent information and a link, but who have not participated in the questionnaire.*

Where Table 4.1 shows the 46 percent respondents who completed the questionnaire. Table 4.3 provides a breakdown of the 54 percent municipalities that did not participate and the possible reasons. This may help explain the response rate in table 4.1. The overall distribution of the municipalities in the final sample is well balanced (21 small, 21 medium, 23 large and all G4 municipalities) over the quota.

*In the description above, the response rate is 46 percent based on the number of emails sent out with an invitation link. Note that*

Table 4.3 shows that after sending the link to the 150 persons / addresses (received in the calls with the municipalities):

- 27 did not answer or react to the emails sent to them or to further phone calls
- 6 did not complete their questionnaire, their data were discarded
- 2 were the same person as in another team (for the sample the first in the list was then chosen)
- 1 announced a new website

This leaves 114 municipalities out of the 150 that received a link of which 69 respondents answered all the questions of the questionnaire (which would be a 61 percent response).

#### 4.1.2 Contacting the municipalities

The main barrier for participation was the amount of time needed to answer the 54 questions in the questionnaire. The average time to complete the questions was expected to be 45 minutes. It was expected that municipalities would be willing to invest that time because they would receive the results of the research (if requested) and a free audit of their website. This audit, performed by the Accessibility Foundation, would normally cost them more than 800 euros.

The team asked to speak to the person in the municipality responsible for their website/web team at managerial level. This person was then given a short explanation of the research and told that if they were willing participate, they could not only receive the results (the dissertation) but also a free audit of their current website (once they had finished the questionnaire). Willing participants were asked to provide their email address and then sent an invitation from the survey tool. A brief explanation and a call for participants was also published on the Logius website [digitoegankelijk.nl](http://digitoegankelijk.nl).

Like for the interviews, it was indicated to the interviewees that names of people and municipalities in the study would be anonymized. This is the reason that the names of municipalities and respondents are not visible in the results section.

#### 4.1.3 Design of the questionnaire

Based on the literature research and the goals of the dissertation, a list of questions was developed. A total of 54 questions were developed that address the processes, indicators and indices found in section 3.

#### *4.1.3.1 Interviews*

To fine-tune the questionnaire, 5 web team employees from different sized municipalities with varying conformance levels 'went through' the questionnaire together with the interviewer during a semi-structured interview. All 5 interviews targeted people with management level responsibility for the web team and for the implementation of web accessibility. Interviewees were informed beforehand (by e-mail or telephone) about the interview's topic. It was indicated to the interviewees that names of people and municipalities in the study would be anonymized. This is the reason that the names of municipalities and respondents are not visible in the results section.

The interviews lasted between 60 and 90 minutes. The participants were asked to use the interviewer's laptop with a Word document containing the questions.

After a short introduction to the goal of the dissertation, they were told that the questions would be for colleagues like them in other municipalities and they were asked to assess for every question whether the question was (1) clear enough and (2) if it might be interpreted in other ways. The participants were asked to read the question and the answer(s) aloud and then answer the question. The goal was not to collect answers to the questions but to collect remarks and suggestions to improve the questionnaire. These were noted in a separate document by the interviewer. Based on these interviews, the questionnaire was re-designed to its final form.

#### *4.1.3.2 Online questionnaire*

The final questions (see appendix 1) were then entered into a survey tool called SurveyMonkey after which the questionnaire was technically tested to make sure the answers were logged correctly by the system.

The questionnaire was also tested for accessibility, leading to some minor adaptations of the layout and color scheme. The SurveyMonkey tool was chosen because it supports Section508 conformance.

From the SurveyMonkey tool, it is possible to send specific questionnaires to people who have indicated they want to participate. SurveyMonkey's option for people to return to their questionnaire and continue at a later time was on. This meant that people could work on their questionnaire with a colleague but also that they could return to the questionnaire at a later stage if they needed more time to search for an answer. The system tracks the progress and offers the possibility to send out targeted reminders if the questionnaire has not yet been completed after one or more weeks.

In total there are 54 questions. The first 6 questions are mainly administrative:

1. What is the name of the municipality you work for?
2. What is your job (title)?
3. How long have you been involved with the website?
4. Are you filling out the questionnaire alone or with a colleague?

5. What is the URL of the municipality homepage?
6. If you wish to receive the results of the questionnaire, please provide: name, email, phone number.

The other 48 questions address the processes, indicators and indices found in literature that may be related to the implementation of web accessibility of municipality websites. They have been described in more detail in section 3.4.

#### 4.1.4 Audits of the websites

As soon as possible after completion of the questionnaire, the corresponding website was audited. In total, 69 municipality websites were audited. To establish the conformance level, the auditor used the Website Accessibility Conformance Evaluation Methodology (WCAG-EM) 1.0 Working Group Note as a basis (Velleman & Abou-Zahra, 2014) together with the Web Content Accessibility Guidelines 2.0 (Caldwell et al., 2008). The evaluation consisted of a full WCAG2.0 level AA manual evaluation of the websites by a senior expert of the Accessibility Foundation, an ISO 9001 accredited inspection organization for accessibility in the Netherlands. The costs of the audits were covered by the Vereniging Bartiméus Sonneheerdt in the Netherlands. All audits were performed by the same senior web accessibility auditing expert to ensure that there would be consistency in the audit results. The auditor has been auditing websites for accessibility for more than 9 years, participates in European projects related to web accessibility and is a technical web accessibility lead at the Accessibility Foundation. The audit sample was set to 5 pages containing all technologies of the website (if possible and available). The sample usually included the homepage, a Web page with a form, a Web page with video, a pdf document and a Web page with search result. The final score for the correlations was calculated by counting the number of failed Success Criteria for every website.

For the audits, a special reporting model was produced in the form of an excel sheet. This excel sheet lowered the average time necessary for a full audit. Municipalities that participated and completed the online questionnaire were promised a level AA audit report (the level required by the UN Convention and the EU Directive described earlier). The reports were generated from the Excel sheet and edited by hand (for conclusion and specific results) and sent to the specific municipalities in March 2018.

#### 4.1.5 Data analysis

As the sample size of the data in this research is small (only 69 participating municipalities), it is not suitable for validity tests like exploratory factor analysis (recommended sample size at least 100) or confirmatory factor analysis (recommended sample size at least 150) (Hair, Black, Babin, Anderson, & Tatham, 1998; Pearson, 2008). As such, in this study, a reliability test using the Cronbach's alpha coefficient was used to determine the consistency between the variables used to determine correlation.

The data of the audits and the questionnaire were correlated using Pearson's (Product-Moment) correlation and if necessary Spearman's (Rank-Order) correlation to determine the

strength and direction of possible relations between variables. Depending on the data, the analysis also used Point-Biserial if one of the variables was dichotomous and the other interval. Rank Biserial was used if one variable was dichotomous and the other ordinal. Welsh Anova was used where there are normally distributed data that violate the assumption of homogeneity of variance and Pearson's Chi-Square was used to find correlations between two categorical variable groups.

#### 4.1.6 Design of the post research interviews

After the completion of the questionnaires and the audit of the websites, 10 interviews were conducted with people responsible for the website and web team in different municipalities within the sample of 69. The interviews were anonymized because respondents would otherwise not participate. The goal of the interviews was to find quotes that would further explain, support and deepen the understanding of the answers received in the questionnaire and address any remaining questions for clarification after the analysis. The interviews had an open character and were semi-structured with open-ended questions. Open-ended questions are useful for exploring complex issues that do not have a finite set of answers. The respondents thus have the freedom to answer the question in the way they want. The answers were used to deepen the understanding of the answers and to add more personal notes and quotes from the respondents.

## 5 PART 5: RESULTS

In total 230 of the 388 Dutch municipalities received a phone call based on the number of inhabitants and a pre-estimation of the accessibility level of their website. The aim was to reach people responsible for the website or web team and to ask them to complete a questionnaire on behalf of their municipality. They did not necessarily have to be knowledgeable about the technical side of the web accessibility standards.

The questionnaire is based on the model described in section 3.3 Figure 3.5 and on the operationalization of the processes, indicators and indices described in section 3.4. In total, 150 municipalities received more information and a link to the questionnaire. Of these, 69 (46 percent) completed the questionnaire in full (see section 4.1.1.1). The 69 websites were manually audited by a senior web accessibility auditing expert (see section 4.1.4). The two results were then correlated.

### 5.1 Audits

A total of 69 municipality websites were manually audited for WCAG2.0 level AA conformance. Only websites for which the questionnaire was completed in full were included into the sample. The final list contains websites of municipalities based on the number of inhabitants and the pre-estimated level of accessibility of their websites (based on online documents like audit reports and certification logos).

To answer the research question it was necessary to include websites with a wide range of accessibility scores. Because earlier monitoring showed that only a very small percentage of municipality websites was fully accessible (see section 2.4), before the study started, the websites of all Dutch municipalities were searched to see if they had any declarations about their web accessibility status (see section 4.1.1).

A third party declaration of conformance was found for 8 websites. This might be a declaration by an independent audit organization or a logo of the Drempeelvrij quality mark for WCAG level AA (or Webrichtlijnen 2). If this was found, the website was expected (pre-estimated) to be accessible.

From the total of 69 websites that ended up in the sample, 30 had an accessibility statement. Note that these statement can also declare the they do not yet fully conform with the standard. Most accessibility statements in this category included some sort of documentation of the accessibility failures but sometimes it is not much more than a paragraph on the website saying they have a button to enlarge the text and change the contrast and a text to speech reading tool that can read the page to you.

Finally, there were 31 websites where no information about the status of web accessibility conformance could be found prior to the audits.

Larger municipalities more often published information about their web accessibility status than smaller municipalities (0-50,000 inhabitants: 44 percent has some sort of statement or

paragraph about web accessibility versus 73 percent of municipalities larger than 50,000 inhabitants).

The manual audit included a minimum of 5 pages containing the largest possible spread of technologies on the website. The sample usually included the homepage, a Web page with a form, a Web page with video, a pdf document and a Web page with search result. The website auditor (see section 4.1.4) spent about one hour searching the website to collect Web pages for the sample. The 69 websites checked totaled more than 3.5 million Web pages (simple Google search for pages on the websites without a combination of letters like “asdfghz”). The search gave an initial impression of the content of the website that was then used to search further for specific use of technologies and techniques to be included in the sample. The samples were stored in an Excel sheet.

In total the website auditor performed 2,622 manual tests following WCAG2.0 level AA Success Criteria (Level AA has 38 Success Criteria) (see section 2.1.1). The audits took 3 months to complete. The total amount of time spent auditing and reporting was around 8 hours per website, including the sampling, audit, rendering of the audit report and sending of the audit report to the municipality. This leads to a total of approx. 552 hours.

Although the estimation prior to the audits would lead to expect a number of conformant websites, the audits showed that none of the websites audited by the expert passed all tests. This means that none of the websites is fully conformant. Not even the websites that had a full external audit report dating back only 4 months and declaring WCAG2.0 AA conformance although that website did score much lower on failures. Looking at the bright side, the average percentage of passed Success Criteria for all websites is higher than the average percentage of failed Success Criteria. Table 5.1 shows the results for the 38 WCAG2.0 Success Criteria (level AA).

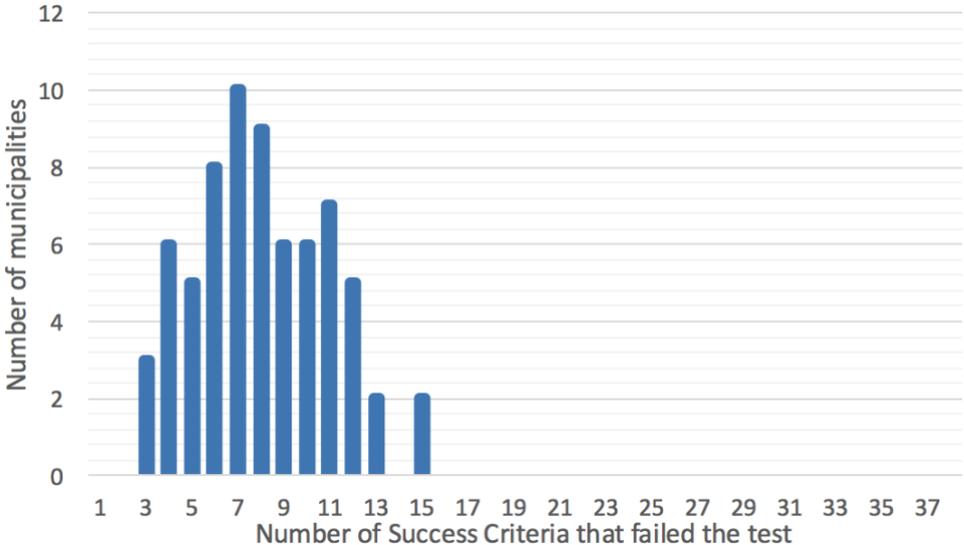


Figure 5.1: Number and frequency of failed Success Criteria (SC) for 69 websites (In total there are 38 SC).  $M = 8.04$ ,  $SD = 0.351$ ; Median = 8.00;  $SD = 2.918$ ; Skewness = 0.278, std err 0.289; Kurtosis = -0.506, std err 0.570; Shapiro-Wilk = 0.971,  $p = 0.106$ . These tests suggest a normal distribution of the data.

Figure 5.1 shows the frequency of the number of Success Criteria that failed the test(s). There are 38 Success Criteria in WCAG2.0 AA. As can be seen in the figure, none of the websites fail for more than 15 Success Criteria. The 3 best scoring websites fail for only 3 Success Criteria. The Mean is 8.04 failures per website.

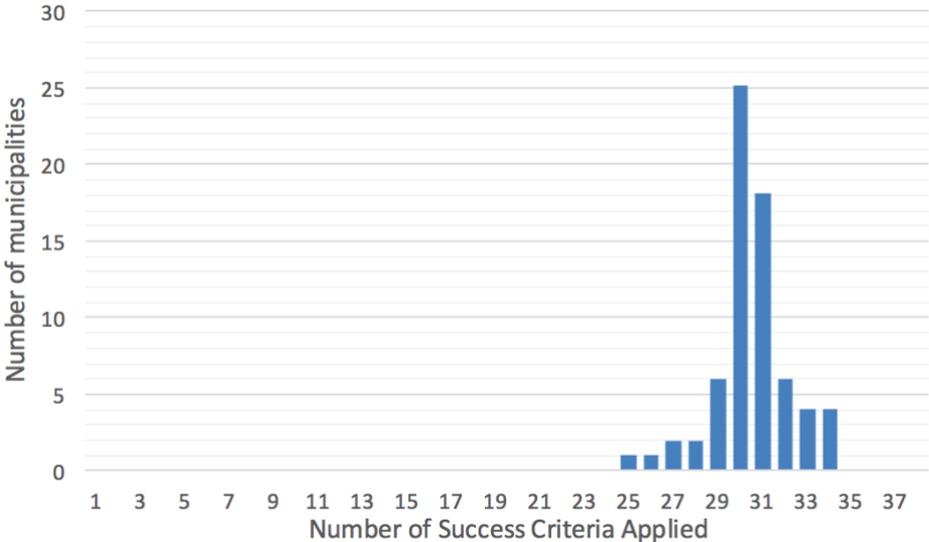


Figure 5.2: : Overview of the number of applicable Success Criteria (x-axis) on the websites of the 69 municipalities (y-axis). In total there are 38 Success Criteria. The minimum amount of applicable SC found on a website was 25 (1 website), the maximum 34 (on 4 websites).

Figure 5.2 provides an overview of the websites and how many applicable Success Criteria (SC) were found on them during the audit. Applicable means that one or more of the techniques in the SC can be found on the website and thus audited. For example, if a website has a video, the corresponding SC for video would be applicable. If there is no video on the website, the SC would be not-applicable (n/a). It is therefore not likely that a website would score the full 38 SC here.

There is not a statistical correlation (Spearman,  $r_s = 0.132$ ,  $p = 0.280$ ) between the audit results and municipalities with some sort of accessibility statement or a third party declaration prior to the audits. Having concluded that, websites that were pre-estimated to be accessible have less failures (14 percent) than websites in the other two categories. Category statement has 22 percent failures and category unknown has 23 percent failures (See section 4.1.1). As stated earlier, none of the websites are actually conformant with all the Success Criteria. The difference in the average percentage of passed and failed Success Criteria for the pre-estimated categories Statement and Unknown is minimal although the category Statement scores just a little bit better on both. One possible explanation for this minimal difference is the fact that many Accessibility Statements on municipality websites do not claim conformance but provide an overview of non-conformant Success Criteria and in some cases even specific measures and deadlines for their repair. This explains the failures. The fact that a municipality has an Accessibility Statement could indicate that they are more aware of web accessibility than municipalities where no information about web accessibility was found, but this is not visible in the audit results.

The audit results in Table 5.1 provide an overview of the websites in the sample (n=69) that passed or failed a certain WCAG2.0 level AA Success Criterion or where it was not applicable.

Success Criterion	Pass	N/a	Fail
1.1.1 Non-text content	26		43
1.2.1 Audio-only and Video-only (Prerecorded)	1	67	1
1.2.2 Captions (Prerecorded)	3	57	9
1.2.3 Audio Description or Media Alternative (Prerecorded):	2	58	9
1.2.4 Captions (Live)	0	69	0
1.2.5 Audio Description (Prerecorded)	1	58	10
1.3.1 Info and Relationships	1		68
1.3.2 Meaningful Sequence	51		18
1.3.3 Sensory Characteristics	69		0
1.4.1 Use of Color (Prerecorded):	56		12
1.4.2 Audio Control	1	68	0
1.4.3 Contrast (Minimum)	36		33
1.4.4 Resize text	40		29
1.4.5 Images of Text	63		5
2.1.1 Keyboard	46		23
2.1.2 No Keyboard Trap(Prerecorded):	69		0
2.2.1 Timing Adjustable	43	14	12
2.2.2 Pause, Stop, Hide	21	45	3
2.3.1 Three Flashes or Below Threshold	69		0
2.4.1 Bypass Blocks	43		26
2.4.2 Page Titled	8		61
2.4.3 Focus Order	48		21
2.4.4 Link Purpose (In Context)	58		11
2.4.5 Multiple Ways	69		0
2.4.6 Headings and Labels	66		3
2.4.7 Focus Visible	44		25
3.1.1 Language of Page(Prerecorded):	38		31
3.1.2 Language of Parts	3	60	6
3.2.1 On Focus	69		0
3.2.2 On Input	63		6
3.2.3 Consistent Navigation	69		0
3.2.4 Consistent Identification	69		0
3.3.1 Error Identification	48	4	17
3.3.2 Labels or Instructions	67	2	0
3.3.3 Error Suggestion	56	10	3
3.3.4 Error Prevention (Legal, Financial, Data)	64	5	0
4.1.1 Parsing	53		16
4.1.2 Name, Role, Value	15		54

Table 5.1: Overview of audit results per Success Criterion (level A and level AA) for all websites (n=69).

There are no significant differences between the audit outcomes of small, medium, large and G4 municipalities when it comes to web accessibility (Table 5.2). For example, on average, small municipalities (0-20,000 inhabitants) pass 59 percent of the 38 WCAG2.0 level AA Success Criteria and fail for 20 percent. On average, 21 percent of the Success Criteria are not applicable, meaning that the technology is not used on the website and can therefore not be

tested. For instance, if a website does not have video, the Success Criteria for video will be marked as not applicable (N/a).

Municipalities (total in sample)	Average percentage of passed SC	Average percentage of failed SC	Average percentage of N/a SC
0 - 20.000 inhabitants (21)	59%	20%	21%
20.001 - 50.000 inhabitants (22)	60%	20%	20%
50.001 - 250.000 inhabitants (22)	58%	22%	20%
> 250.000 inhabitants (4)	59%	28%	13%

Table 5.2: Average percentage of Success Criteria (SC) that passed, failed or were not-applicable for the four sizes of municipalities.

Only the four largest municipalities show lower scores for N/a and slightly higher fail scores. The audits show that 87 percent of the level AA Success Criteria can be applied to the G4 municipality websites. These include Success Criteria were most other websites score N/a e.g. video, auto-updating information, timing/time-out adjustable for user. This explains the lower score for N/a and the higher failure score. Even though video is booming on the web, the number of videos on websites in the audits is still low. Only 12 of the 69 audited websites had a video file, only 1 passed the tests and provided captions and audio description where necessary.

Probably the easiest way to improve the accessibility of a website is to look for quick wins. This means Success Criteria that fail on many websites and may be easy to repair. When looking at Table 5.1, it is easy to recognize the Success Criteria that fail most. Table 5.3 ranks them by the percentage of websites that fail for a specific Success Criterion. Note: Success Criteria that have not failed on any of the websites (see Table 5.1) have not been added to the list.

Table 5.3 shows that 98,6 percent of websites could improve the conformance with the standards if they would correctly apply Success Criterion 1.3.1, etc.

WCAG2.0 Success Criterion (SC)	Percentage of the 69 Websites that failed this SC	SC reported in literature (section 2.5)
1.3.1 Info and relationships (A)	98.6 %	X
2.4.2 Page Title (A)	88.4 %	
4.1.2 Name, Role, Value (A)	78.3 %	X
1.1.1 Non-text content (A)	62.3 %	X
1.4.3 Contrast (AA)	47.8 %	X
3.1.1 Language of page (A)	44.9 %	
1.4.4 Resize text (AA)	42.0 %	
2.4.1 Bypass blocks (A)	37.7 %	
2.4.7 Focus visible (AA)	36.2 %	X
2.1.1 Keyboard (A)	33.3 %	
2.4.3 Focus order (A)	30.4 %	
1.3.2 Meaningful sequence (A)	26.1 %	X
3.3.1 Error identification (A)	24.6 %	X
4.1.1 Parsing (A)	23.2 %	X
1.4.1 Use of color (A)	17.4 %	

2.2.1 Timing Adjustable (A)	17.4 %	
2.4.4 Link purpose (A)	15.9 %	X
1.2.5 Audio description (Prerecorded) (AA)	14.5 %	
1.2.3 Audio description (A)	13.0 %	
3.1.2 Language of parts (AA)	8.7 %	
3.2.2 On input (A)	8.7 %	
1.4.5 Images of text (AA)	7.2 %	
3.3.3 Error suggestion (AA)	4.3 %	
2.4.6 Headings and Labels (AA)	4.3 %	
2.2.2 Pause, Stop, Hide (A)	4.3 %	
1.2.1 Audio-only and Video-only (Prerecorded) (A)	1.4 %	

*Table 5.3: WCAG2.0 Web accessibility failures found on one or more websites. Success Criteria marked as level A (A) are minimally required for web accessibility for persons with disabilities. Last column shows failures that were reported in literature (see section 2.5).*

Most of the failures that were found in literature (section 2.5) are also found on the municipality websites by the auditor, however the order may be different and there are some additions (Table 5.3). For instance, missing page titles were not a problem reported in literature while they generate a failure on 88 percent of the audited municipality websites. Another example is the adjustability of timing. On 12 of the audited websites, there are forms that automatically log-off users after a certain time without telling them. Table 5.3 shows that all but one website (99 percent) had one or more pages that failed for Success Criterion 1.3.1 Info and relationships.

Note that most Success Criteria are containers for many different techniques (see section 2.1.1). For example, Success Criterion 1.3.1 (Info and relationships) has more than 60 recommended techniques. Depending on the situation, the techniques can or cannot be relevant in different situations. Additionally, there are many solutions that are not included in the list of recommended techniques. Also, the techniques are constantly changing along with the technologies used on the web. The changes are also the reason why they are not part of the standard, but kept in what the W3C calls a 'Note'.

Because of the impact on web accessibility, the ten highest scoring Success Criteria in Table 5.3 will be explained in more detail with their outcome. Please note that the explanations are not exhaustive but meant to explain the failures found on the websites. Complete explanations, examples, sufficient- and advisory techniques and failures for these 10 and for the other Success Criteria can be found on the W3C website (see section 2.1.1):

1. **Info and relationships (Level A):** This Success Criterion functions as a container for many different issues related to accessibility. In short it means that when assistive technology presents the content of a Web page to a disabled person (in braille, speech, zoomed in, etc.), the person should still be able to perceive all visual and auditory formatting information like for example: is this a bulleted list?; is this a heading (H1, H2, H3, etc.)?; is this part of a new form or is it still part of the previous form?; this form field has no label, what does it want (name, address, other?); what is the column header of this table cell?; are there different voices speaking in this audio or video?; is this a quote (does it have different font size or color)?; is this a data table or is it used for layout? etc.

Only 1 website passed this test, the rest failed (99 percent). The failures include:

- using text formatting for headings (making text bold and larger instead of using a H1, H2, etc.) and
- lists (some content editors do not use the list-element of their CMS when they make a list).
- The audit results also show tables without table headers. Generally speaking, a table header is the 'title/header' at the top of a column or at the start of a row.

If a table has table headers, assistive technology can combine the information and read the content of the heading and then of the cell to a blind person. This makes reading tables easier as you do not have to remember what the column and row headings were.

Most websites (97 percent) have PDF documents that are not accessible. Only two websites were found with accessible ('tagged') PDF documents.

2. **Page title (Level A):** When a page has a descriptive title, this helps people with disabilities identify the page without having to read it first.

In a browser window, the page title is mostly visible in the title bar at the top of the active window. Page titles can be easily read by assistive technology.

For blind people the page title saves them from first navigating through to the content to identify what the page or document is about or even if they managed to go from one page to another. Page title was not specifically named in literature as a barrier.

This Success Criterion did not fail on the Web pages but on the PDF documents that also fall under the WCAG2.0 Standards. The audit found that 88,4 percent of the tested PDF documents missed a descriptive page title. Eight websites had correct descriptive page titles in both Web pages and documents.

3. **Name, Role, Value (Level A):** Assistive technology needs information about elements in a Web page to recognize things like user interface controls (buttons, links, checkboxes, form fields etc.) and their status (is a checkbox or radio button selected? Is a list expanded or collapsed?). Developers do not have to worry about this as it is already built into the html standard. However, if a developer creates custom controls or changes the standard role and function of controls, then assistive technology will need extra information to be able to provide the intended functionality to the user with disabilities.

78 percent of all websites did not successfully pass this test. This was caused by missing labels for input fields and by the hamburger menu. The hamburger menu is recognizable as an icon, mostly found on responsive websites (in their mobile state), consisting of three lines to open a menu. If the user clicks on the icon, it opens a menu. In most cases the status of the hamburger menu (open/closed) was not available (36 websites). There are accessible solutions for this kind of menu but most websites in the sample do not use them. Besides the hamburger menu, 20 websites also had missing labels for edit fields.

4. **Non-text content (Level A):** This is information that is not provided to the user in text, like photos, charts, diagrams, audio, video, pictures, and animations.

A text alternative can make this information available in another form or modality that may be more perceivable for people with certain disabilities. For instance, for blind people the text alternative for an image, graph or photo can be converted to braille or speech. For people with auditory disabilities, the text may be used for closed captions with video.

Because of missing or incorrect descriptions of images, 62 percent of the websites did not pass this Success Criterion.

5. **Contrast (Level AA):** By providing enough contrast between text (and images of text) and background, content is better perceivable. The required contrast ratio for normal sized text is 4,5:1. For large text the required contrast ration is 3:1. Logos and brand names are excluded.

Most websites (52 percent) passed this test without problems. However, 48 percent of the municipality websites had text with insufficient contrast. The failures include low contrast of error messages, low contrast of placeholder text (like in the search field), low contrast of the page footer and in one case the button to increase the contrast of the page did not have enough contrast itself.

6. **Language of page (Level A):** If content developers provide information about the language of a page, then assistive technologies can read content using the correct pronunciation rules. This does not only help persons with a visual disability but may also help a group of low literate and persons with certain cognitive or language disabilities who use text to speech tools to read content.

Most websites have this Success Criterion covered (only 6 websites fail for this SC). However, many of the PDF documents audited failed for this Success Criterion (41 percent of municipalities).

7. **Resize text (Level AA):** Users should be able to resize text, labels, text in edit fields etc. on a Web page up to 200 percent without using assistive technology. Most user agents (like browsers and pdf viewers) already support that. The author of the Web page should make sure this is not prevented.

Although this seems to be a rather standard solution, 42 percent of websites have one or more pages with failures for this Success Criterion. This is mostly caused by the fact that when resizing, parts of the Web page seem to fall off the screen. On 13 websites, one of the submenus is no longer visible when resizing and on other websites, parts of the functionality falls outside the reach of the user (no scrollbars appear).

8. **Bypass blocks (Level A):** This Success Criterion allows users to jump over blocks of content that are repeated on multiple pages. For example, if a visually impaired person uses a screenreader to read aloud the text of a Web page, the screenreader will also

read blocks of content like navigation menus, advertising frames, etc. On some websites, visually impaired users need to tab over (and listen to) more than 33 links before they reach the main content.

This Success Criterion also helps persons who can only use the keyboard to use less keystrokes when navigating websites with repeating blocks. This so-called 'skip-link' should be the first interactive item of the Web page. Note that it is not always visible. On most Web pages it only shows if a user uses the tab key.

A total of 43 municipalities in the sample already use skip-links correctly. Of the websites that fail for this Success Criterion, 18 have more than one skip-link (e.g. to content, to search, to navigation bar, etc.) but use the wrong order (the content link should be the first) and 8 do not offer a possibility to bypass blocks.

9. **Focus visible (Level AA):** Thanks to this Success Criterion a person can see which element on a page has the keyboard focus. Mostly this means that there is a visible border around the element that has the focus. In case of a text field, the text in the field is highlighted to indicate that it can be overwritten.

For persons who depend on the keyboard to operate a Web page or pdf document this helps them to see where they are on the page. In many municipality websites, this is a problem that is caused by a Stylesheet or a script on the website that overrides the default standard.

In total, 36 percent of the websites in the sample had instances where the focus was not visible ranging from complete pages to form fields or buttons.

10. **Keyboard (Level A):** If a Web page can be operated using a keyboard or an alternative keyboard interface, this makes the Web page more accessible for persons who cannot see or for any other reason cannot use a mouse. They can then navigate a Web page using their keyboard. The failures for this Success Criterion found on the websites in the sample are in many cases related to the hamburger menu.

In total, 34 websites are conformant with this Success Criterion. On 23 websites, one or more pages fail for this Success Criterion (33 percent). Of those, 12 websites have problems with the keyboard accessibility of their hamburger menu.

The audits also found 10 websites that actually have multiple links on their homepage saying 'click here' (Dutch: 'klik hier' or 'lees verder') (SC 2.4.4). This failure was also reported in literature.

Forms were also found where error identification is not conformant. Error identification in forms (SC 3.3.1) failed on 17 of the 69 websites. On most websites, the forms do not indicate to the user that an error has occurred and where it can be found. Re-displaying the form with an asterix in front of the fields that have an error is not enough. This would require a person who cannot see to read through the entire form again. Note that textual error indication can be combined with color and other indications like an asterix. Literature also reports problems with id's that are used more than once (SC 4.1.1). This is found on 14 of the audited websites.

## 5.2 Questionnaire

### 5.2.1 Participants

More than 69 municipalities completed the questionnaire. Six more were not fully completed and were discarded. One of the G4 municipalities which had almost fully completed the questionnaire was asked to provide the missing answers after the deadline. These were received by email and manually added to the results before the start of the analysis. On average, the participants spent 34 minutes answering the questionnaire.

Interestingly, the final 69 participants use very different job titles. Although many of them do the same work, we counted 48 different job titles for 69 people; only webmaster and web content editor were used more than twice. Also during the preparatory interviews to fine-tune the questionnaire, respondents were not always sure about their job title. This was generally because they have more than one job when it comes to the website or communication and information channel. So it seems as if the job title depends on the moment of asking and thus the activity in which they are involved at that moment.

When contacting the municipalities, we asked people with managerial responsibility to answer the questionnaire. Table 5.4 shows the many different job titles that were received along with the results.

Job title summary		Job titles (Dutch)
Digital communication / media advisor	21	Communicatie-adviseur (2x); Beleidsmedewerker Communicatie; Adviseur Digitale Dienstverlening (2x); Adviseur digitale communicatie; Adviseur digitale media (3x); Adviseur online communicatie en dienstverlening (2x); Communicatieadviseur digitale media; Communicatieadviseur (2x); Adviseur Publiekscommunicatie; Communicatieadviseur online media; Online communicatieadviseur; Adviseur online dienstverlening; Internetadviseur; Web adviseur; Marketingcommunicatieadviseur;
Functional application manager	9	Functioneel Applicatiebeheer; Applicatiebeheerder; Webbeheerder (2x); Webredacteur en functioneel beheerder; Beheerder digitale dienstverlening; Webmanager (2x); Sr. functioneel beheerder;
Webmaster	7	Webmaster (7x);
Website coordinator	7	Coördinator website; Webcoördinator (2x); Coördinator webredactie; webcoördinator (2x); coördinator en procesregisseur
Web content editor	5	Webredacteur (4x); Eindredacteur
(Quality) Manager services	5	Kwaliteitsmedewerker Dienstverlening; Beleidsmedewerker Dienstverlening; Teamleider KCC/Manager webteam; Coördinator elektronische dienstverlening; CISO
Strategic advisor online/digital media	4	Strategisch Adviseur online media; Adviseur & Regievoerder ICT; Adviseur processen en informatie; Beleidsadviseur e-dienstverlening
Information/channel manager	3	Informatiemanager; Channelmanager; Beleidsmedewerker OOV;
Communication employee	3	Online communicatiemedewerker (2x); Consulent communicatie
Information specialist	2	Informatiespecialist; Specialist Online Communicatie
Content manager	2	Contentmanager (2x);
ICT architect	1	ICT Architect;

Table 5.4: Variety of job titles provided by participants (in Dutch and clustered in English titles).

Of the 69 respondents, 20 filled out the questionnaire with a colleague. Altogether, the respondents estimate that their websites receive around 2.2 million unique visitors per month (ranging between 1,100 and more than 500 thousand unique visitors per month).

## 5.2.2 Website accessibility self-estimation

Figure 5.3 shows that 88 percent of respondents expect people with a disability (visual, auditory or motor) to be able to use their website. Only 1.47 percent thinks their website is not accessible for people with disabilities. As concluded in the previous section, this does not correspond to the outcome of the audits. They show that not one of the websites is fully conformant with the web accessibility standards.

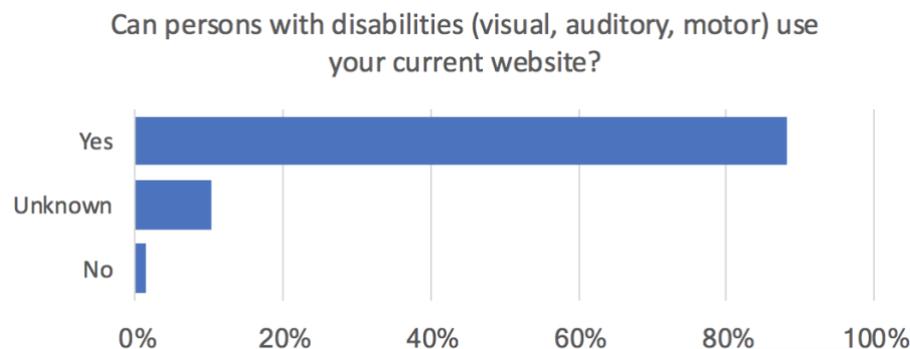


Figure 5.3: Can persons with disabilities use your current website? (Q8).

The disparity may be explained by the comments added to the questionnaire by some of the respondents. Some respondents think that a website needs a special tool to be accessible. Because they use this tool on their website, they may think that they have covered accessibility. As explained earlier in section 2.1.1, special tools on the website are not necessary for accessibility:

*“We have ReadSpeaker on our website and we looked at contrast”*

*“We do not have ReadSpeaker yet”*

Nearly 41 percent of respondents indicate that they use BrowseAloud or ReadSpeaker on their website. Generally speaking, ReadSpeaker ([readspeaker.com](http://readspeaker.com)) and BrowseAloud ([browsealoud.nl](http://browsealoud.nl)) are tools that can add a speech button to a Web page. If the button is clicked, the text of the page is read aloud. The websites of both companies clarify that their tool is good for newcomers, elderly and people with reading problems (e.g. low literate, dyslexia, etc.).

A positive side effect of using these tools on a website is that they require correct markup to work. Correct markup is also a WCAG requirement because it supports the proper working of assistive technology. But it is important to note that people using assistive technology do not need them. Thus, while the use of text to speech tools on a website is not necessary for web accessibility, some municipalities even (unnecessarily) apologize for not having such a tool on their website.

Others try hard to become more accessible, point to their accessibility statement or even explain what is still on their to-do list:

*“We try to make our website inclusive, but sadly this is not always 100% successful. In many cases we depend on external suppliers to make the changes”*  
*e-coordinator large municipality*

Other comments added in the questionnaire:

*“Our PDF documents are not yet accessible for people with disabilities”*

*“Geo information is not always operable with a keyboard instead of the mouse”*

*“We have a link to an accessibility statement”*

## 5.3 Implementation processes

This section describes the outcomes and whether correlations were found between the answers to the questionnaire and the audit results. The results follow the order used in the model (Figure 3.5) and described in more detail in section 3.4. The statistic calculations used are described in section 4.1.5.

### 5.3.1 Developing awareness and knowledge

If awareness is the consciousness or perception of the subject of (web) accessibility, then knowledge is about the familiarity and understanding of the subject. Awareness can be triggered by an emotional event, by seeing a person with a disability use the web, etc. Knowledge includes the availability of information and skills and is mostly acquired through education, training and/or experience.

The proposition for this dissertation based on the literature was that promoting the availability of awareness and knowledge by the organization is an indicator for support and the absence of this promotion of awareness and knowledge is an indicator of resistance. The concepts of support and resistance are explained in more detail in section 1.5. Resistance includes barriers to implementation like lack of support or passivity of the organization. As implementation of web accessibility standards is obligatory, taking no action is also regarded as a form of resistance.

The items of this proposition were described in more detail in section 3.4.1. They mostly originate from literature and articles and have been measured using the related questions (Table 5.5). An overview of the questions (in Dutch) can be found in appendix 1.

Process	Items	Questions
<b>Developing awareness and knowledge</b>	Awareness of rules and regulations	Q25; Q26
	Familiarity with standards	Q24
	Stakeholder knowledge	Q20g/l
	Availability of supporting information and tools	Q28; Q49
	Training of skills	Q30; Q53

Awareness of current web accessibility situation	Q8; Q36b/h
Measures to promote knowledge and awareness	Q36c/f
What benefits do respondents see for the organization (perceived benefits)	Q9; Q15
Municipal collaboration	Q33
Perceived complexity	Q20o; Q41; Q14

Table 5.5: Developing awareness and knowledge. Items and questions in the questionnaire.

When asking to choose from a list of possible obstacles in their organization for the implementation of web accessibility, 26 percent of the respondents confirm a lack of knowledge about accessibility in their web team (Q20g/l). Some indicate that they think the guidelines are too complicated to apply (28 Percent) or that their external supplier does not have enough knowledge to implement them (25 percent).

### 5.3.1.1 Awareness of rules and regulations and familiarity with standards

Most respondents have heard about one or other of the standards for web accessibility (Figure 5.4). More than 97 percent indicate that they know the Dutch government Webguidelines (explanation in section 2.2.3) and 75 percent know the Web Content Accessibility Guidelines 2.0.

At the time of the questionnaire, the Webguidelines standard had already been replaced by the EN 301 549 standard by the Dutch Standardisation Forum. However, only a much smaller percentage of the respondents have heard of the EN standard (21 percent).

Only 3 respondents know the authoring tool accessibility guidelines (that can be relevant for their CMS system, where people have to author content) and none know the user agent accessibility guidelines (e.g. for browsers that show the CMS). None report knowing the User Agent Accessibility Guidelines.

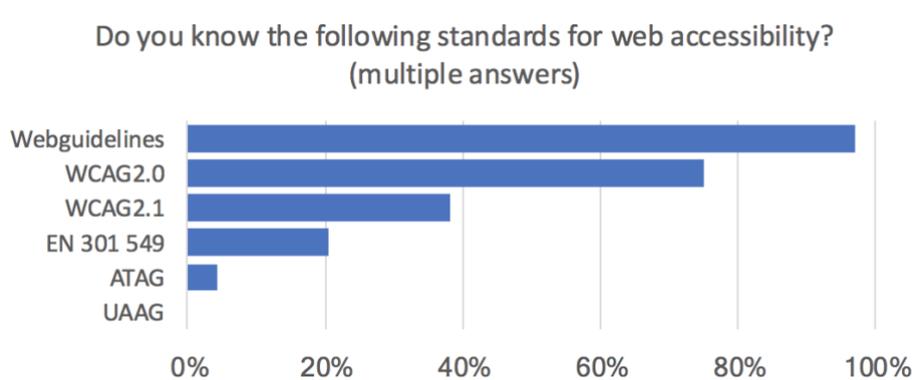


Figure 5.4: Knowledge of the standards for web accessibility (Q24)

If we relate knowledge of the standards to the audit results using Point-Biserial (explanation in section 4.1.5), there is a statistical correlation with knowing WCAG2.0 (Figure 5.5) and also with knowing the Webguidelines. There is also a correlation between the lack of knowledge of ATAG and the audit results.

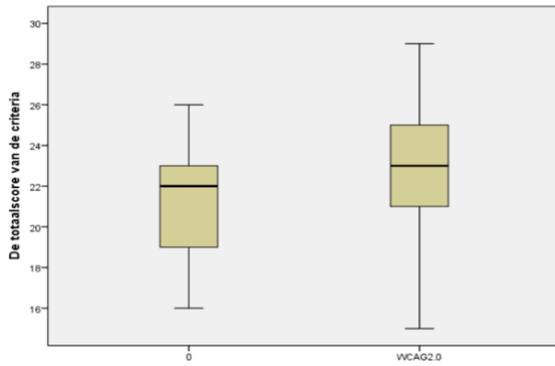


Figure 5.5: Correlation between knowing WCAG2.0 and the audit results.  $r_{pb} = 0.262$ ,  $p = 0.030$  (Q24a).

Point-biserial ( $r_{pb}$ ) was used to calculate correlation because one of the variables is continuous (audit result score) and one is dichotomous, such as in knowing or not knowing WCAG2.0 in Figure 5.5. Normal distribution was checked using the Shapiro Wilk test and Levene’s test was used for equality of variances. The descriptions of the figures include the final Point-biserial value and significance.

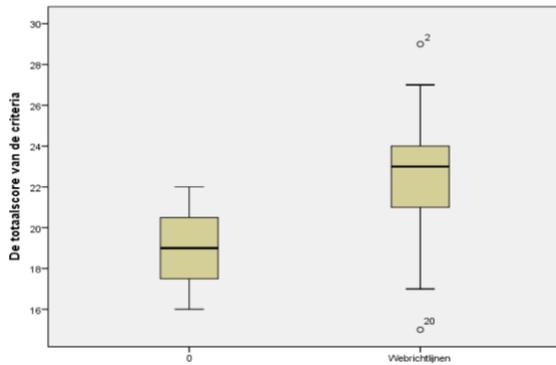


Figure 5.6: Correlation between knowing the Webguidelines and audit results.  $r_{pb} = 0.266$ ,  $p = 0.027$  (Q24d).

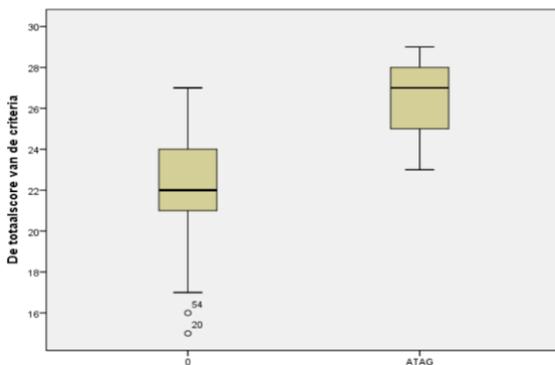


Figure 5.7: Correlation between lack of knowledge of ATAG and audit results.  $r_{pb} = 0.302$ ,  $p = 0.012$  (Q24e/f).

Besides knowledge about the standards, it is also interesting to know whether respondents are familiar with and aware of the legal and regulatory framework and documents. Figure 5.8 shows the knowledge of rules and regulations as indicated by the respondents. For more information about the rules and regulations, please read section 2.2.3.

82 percent of the respondents know the ‘comply or explain’ requirements of the Dutch Standardisation Forum. This may not be surprising because they are related to the Webguidelines that have been obligatory for many years.

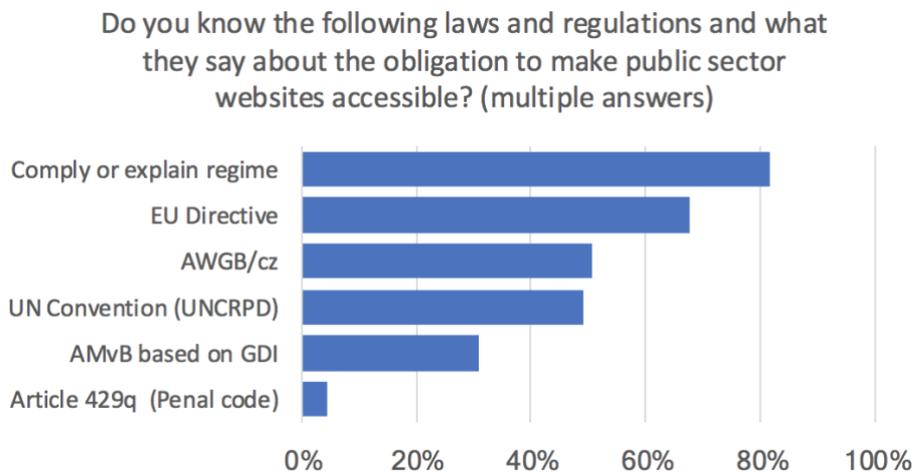


Figure 5.8: Knowledge of laws and regulations (q26).

The WGBH/cz is one of the most important laws in the Netherlands with regard to people with disabilities and it extends much further than just digital accessibility (see section 2.2.3.1). Nevertheless, the number of respondents that know the WGBH/cz (51 percent) and the UN Convention (49 percent) is lower than the percentage that know the EU Directive. The EU directive, responsible for the change of the standard from Webguidelines to EN 301 549 is familiar to 68 percent. At the time of the questionnaire, already 31 percent of respondents knew the upcoming Dutch legislation (AMvB) required by the EU to implement the EU Directive.

Only 5 percent know the article in the Penal Code that makes it an offense to not apply the web accessibility standard (if this is done on purpose).

There are correlations between the knowledge of rules and regulations and the audit results. Figure 5.9, Figure 5.10 and Figure 5.11 show boxplots of the Point-biserial correlations with the audit results. If we relate the knowledge of all the proposed legal and regulatory documents with the audit results using Point-biserial, there is a correlation ( $r_{pb} = 0,242$ ,  $p = 0.045$ ). There is also a statistical correlation between the audit results and knowing the European Directive ( $p = 0.006$ ) and with knowing WGBH/cz ( $p = 0.005$ ).

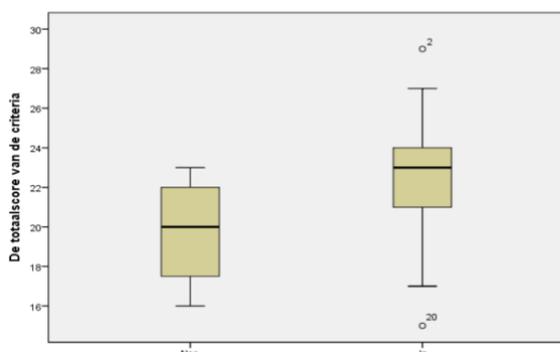


Figure 5.9: Correlation between knowledge of all documents (including Article 429q)(Q26) and the audit results.  $r_{pb} = 0.242$ ,  $p = 0.045$ .

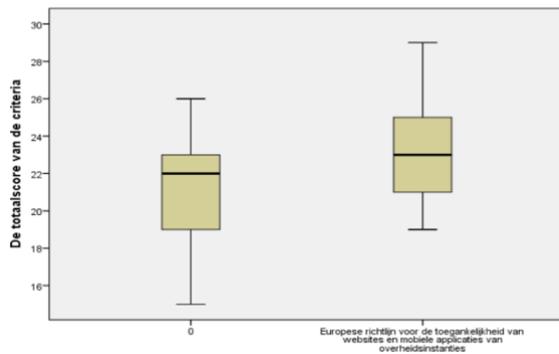


Figure 5.10: Correlation between knowledge of the EU Directive (Q26b) and the audit results.  $r_{pb} = 0.327$ ,  $p = 0.006$ .

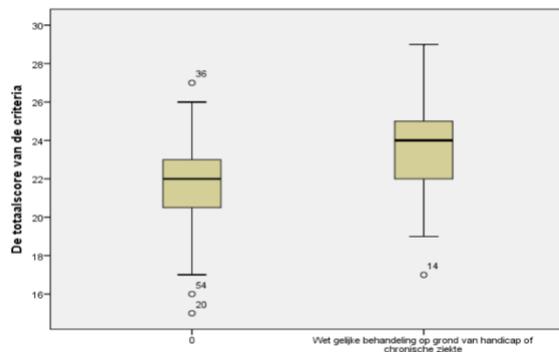


Figure 5.11: Correlation between knowledge of the WGBH/cz (Q26c) and the audit results.  $r_{pb} = 0.334$ ,  $p = 0.005$ .

The results do not show a correlation between the audit results and knowledge of the UN convention or the AMvB. The explanation could be that the former is more related to so-called State Parties and the latter was still in development during the time the questionnaire was open for input.

### 5.3.1.2 Stakeholder knowledge and training of skills

We know from literature that lack of knowledge delays the implementation process (section 3.4.1). According to 58 percent of the respondents, their organization and external suppliers have sufficient books, articles and other information to make their website accessible (Q28). However, respondents conclude that both their own web team (26 percent) and their external suppliers (25 percent) lack the necessary knowledge about web accessibility (Q20g/l). We know from literature that resolving knowledge barriers means extensive organizational learning that is not limited to just transferring knowledge from foreign contexts or from the availability of books and articles.

*“We have an internal training program that teaches how to write for a larger audience. No matter if it is our newsletter, mail, Web page or other media, they should be understandable for everyone. We are trying to get all employees to do this.”*

*Web team coordinator of medium sized municipality*

*“We train everyone, but that does not always lead to the desired effect.”*

*Chief content editor of a large municipality*

*“Our CMS has possibilities for web accessibility, but I don’t think we know them all yet”  
Digital communication advisor of medium sized municipality*

A possible explanation for the lack of knowledge could be the amount of training in the organization. When asked about budget for web accessibility awareness and training, 55 percent of the respondents indicate that their organization spends budget on informing their web team about web accessibility and 47 percent spends budget on training the web team about web accessibility (Q53). However, when looking at the number of people who have been trained (Figure 5.12), the percentages are much lower. Respondents indicate that only 22 percent of the municipalities train between 81 and 100 percent of the people who have the right to publish on their website. Figure 5.12 shows that most municipalities (approx. 62 percent) train less than half of the staff that can publish content on the website. A large percentage of the respondents (42 percent) indicate that in their organization, less than 1 in 10 people receives training in web accessibility.

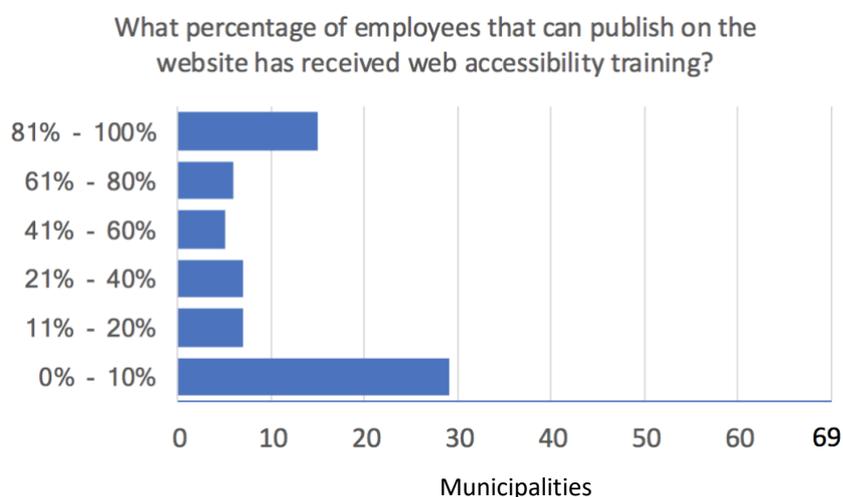


Figure 5.12: Respondents of municipalities (x-axis) estimation of the percentages of trained content publishers in their municipality (y-axis) (Q30).

Umble (Umble et al., 2003) indicates that it would be best to spend between 10 and 15 percent of the implementation budget for ICT implementation on learning. Only 5 percent of all respondents actually spend this percentage of the total budget for implementation on web accessibility (and learning may only have been a small part of that). Most spent less than 10 percent of their implementation budget on web accessibility (83 percent), some spent more (13 percent) (Q49). If we follow the theory of Umble, this would mean that, for the majority of the municipalities, the chances of successful implementation are not high.

### 5.3.1.3 Awareness of the current situation

The answers to the questionnaire also give an indication of the knowledge and awareness of the respondents concerning status, progress and other activities relating to web accessibility within their own organization. The most important indicator is the 88 percent of respondents

(Q8) who think that people with disabilities (visual, auditory and motor) can use their website despite the audit showing that the best websites in the sample have at least 3 accessibility failures. This shows that the level of knowledge but also the level of monitoring is still low. Another indicator is that 20 percent of the respondents say that they do not know whether their own organization has made changes to policy, procedures, rules, regulations, strategy or plans (Q25). Another example is the answer to the question “Is web accessibility for persons with disabilities part of a formal policy plan in your municipality?” 12 percent of the respondents do not know.

5.3.1.4 *Novice or expert users*

Literature differentiates between novice and expert users of the standards, arguing more or less that the presence of novice users might explain a lower score in the audit results. The standards are perceived as complex by 28 percent of the respondents (Q20o). However, most of the respondents are not new to the subject (Q3). Figure 5.13 shows that 90 percent of respondents have 3 or more years of experience with the website of their municipality and 61 percent 6 years or more. Only 10 percent of all respondents have been involved with the website less than 3 years. But even if they are not novice users, do they know about the possibilities provided by the standards and other regulatory requirements like ‘comply or explain’ to adapt the level of implementation to the (future) users (e.g. organization, employees, designers, developers, software, etc.)?

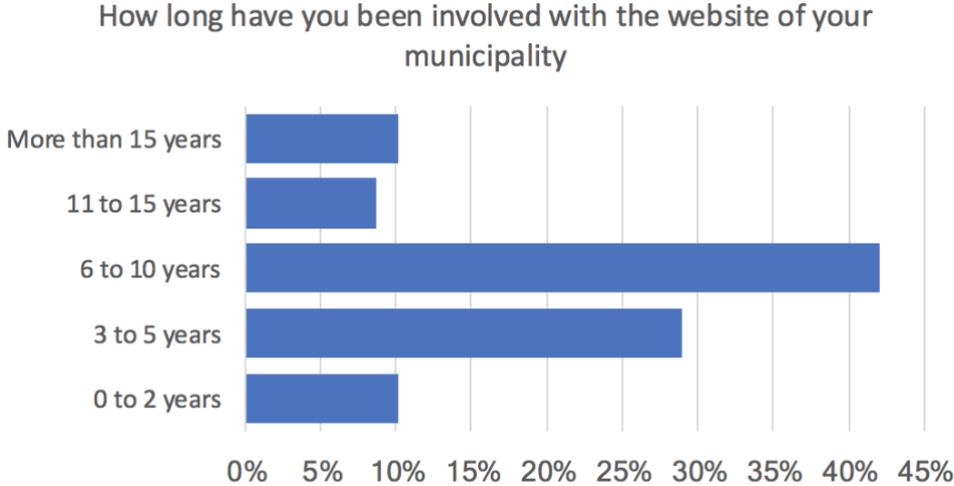


Figure 5.13: How long have people responsible for the municipal website been involved with the website? (Q3)

5.3.1.5 *Perceived complexity*

*“Instead of codes like 1.1.1 is may be a good idea to explain the problem in a more understandable way. And not like in WCAG or the Webguidelines, because nobody understands that, at least if you are not technical”*

*Digital media advisor of large municipality*

According to 28 percent of the respondents (Q20o), the web accessibility standards are too complex and this complexity impedes the successful implementation. This coincides with the opinion of management as reflected by the respondents (Q14) where 26 percent (strongly)

disagree with the statement “management of your municipal organization finds implementation of web accessibility standards easy” (Q14) (Figure 5.14), 18 percent agree with the statement and 56 percent answered ‘neutral’. None of the respondents selected the option ‘strongly agree’.

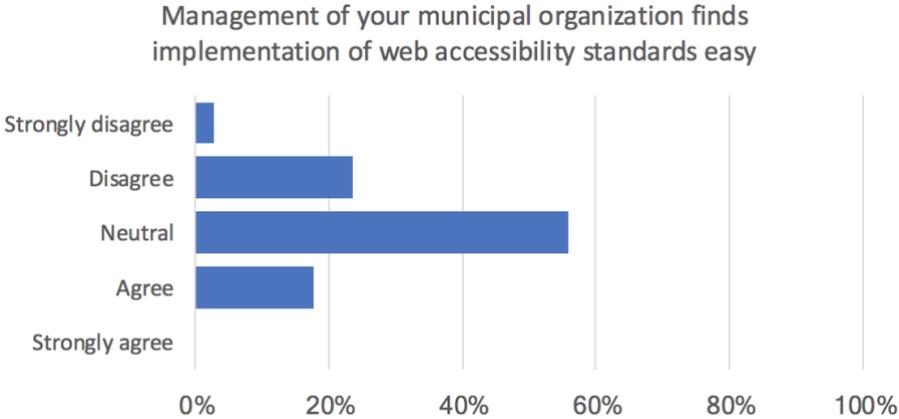


Figure 5.14: Respondents: Perceived ease of implementation by management (Q14).

The same statement was proposed for the content editors (web team): “The editors (web team) of your municipal organization find implementation of web accessibility standards easy.” The reactions are more pronounced. Figure 5.15 shows the distribution of the answers. Now only 29 percent is neutral or does not know. 12 percent completely disagrees and 38 percent disagree with the statement. This is almost half (49 percent). The results do not show a statistical correlation between the perceived ease of implementation by the web team (Q14) and the audit results (See appendix 2, question 14). For this calculation, the results of disagree and neutral were combined to disagree and agree and strongly agree were combined to agree.

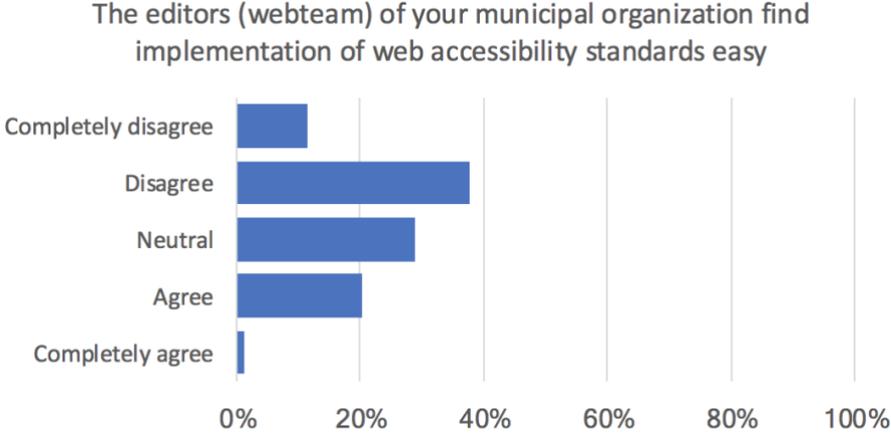


Figure 5.15: Respondents: Perceived ease of implementation by web team.

5.3.1.6 Measures to promote awareness and knowledge

What do municipalities do to raise the level of awareness and knowledge? First, besides training, some hire an external expert for web accessibility (13 percent) to help them with implementation (Q36f). To know whether their website is accessible, more than

forty percent of the organizations hire an external organization or expert for a yearly check of their website (41 percent) (Q36c).

Some (also) use free (38 percent) or paid (49 percent) external tools for support. Examples include tools like SiteImprove and other tools (Q36b). Only 12 percent do not use any other instruments than the Content Management System (CMS). Some respondents wrongly assume that their CMS will automatically address web accessibility:

*“While we are filling out this questionnaire, we get the feeling that we could have done more about accessibility. Until now, we thought our CMS had this covered, but we are starting to doubt that now”*

Some organizations regularly ask a citizen’s panel (13 percent) to know more about the accessibility of the website, but it is not clear whether that involves persons with disabilities (Q36h). Not many report the use of their feedback form for accessibility related feedback.

Section 3.4.1 describes a number of misconceptions about web accessibility and argues that if knowledge levels are low, misconceptions tend to surface. This may explain some remarks by respondents about tools and the web accessibility standards. As concluded earlier, 41 percent of the respondents use BrowseAloud or ReadSpeaker and in many cases directly associate that with web accessibility, although this is not necessary for conformance with the standards. Some respondents seem to think that web accessibility is only about contrast and text to speech.

*“I think contrast is good, but we do not have a text to speech engine on our website”*

*“Accessibility is OK for visually disabled; we don’t know about the others”*

#### *5.3.1.7 Municipal collaboration*

Municipalities also exchange knowledge with each other. A total of 49 percent of municipalities indicate that they exchange experiences and knowledge with other municipalities (Q33). This exchange is organized within inter municipal networks like Cascadis (an association of online public sector professionals), the CMS organizations, combinations of municipalities, and during seminars and meetings.

*“Yes (we exchange information with other municipalities), that is, if municipalities ask us.”*

*“There is no structural exchange, but it is often part of discussions with suppliers and at workshops about the website or deliberations with neighboring municipalities.”*

#### *5.3.1.8 Awareness and knowledge of benefits for the organization*

Respondents’ organizations are clearly aware of the various benefits of web accessibility, both for the organization and for users with disabilities. Figure 5.16 provides an overview of the

perceived benefits of an accessible website. In total, 93 percent of the respondents indicate that their organization sees benefits for greater independence of people with disabilities. This is directly followed by improved quality of the website (81 percent) and better findability in search engines (59 percent).

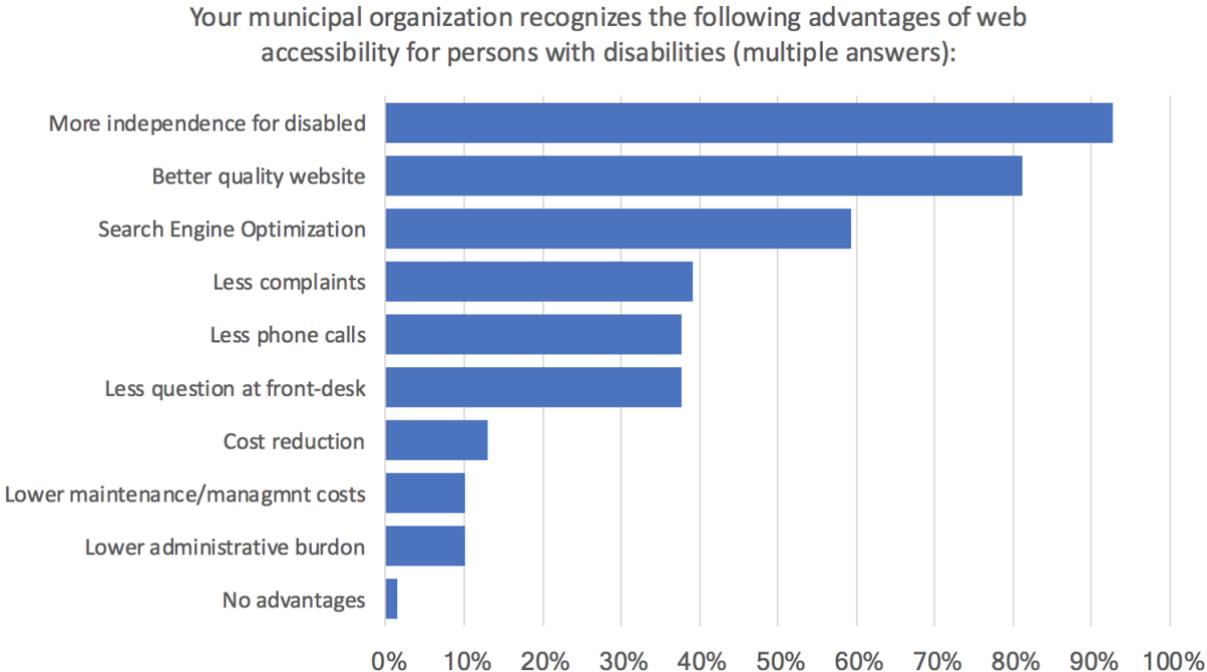


Figure 5.16: Respondents about advantages of web accessibility for municipalities (Q9).

Organizations are also aware of other benefits, such as those related to cost efficiency (13 percent) and reduction of administrative load (10 percent). Besides perceiving a general reduction of the cost (reported by 13 percent), 10 percent perceive specific savings on maintenance costs. Benefits related to the organizational load include fewer complaints (reported by 39 percent), reduced numbers of telephone calls (reported by 38 percent) and fewer questions at the counter (reported by 38 percent). When we focus on management of the website and web team (Q15), we see that 58 percent of respondents indicate that their management sees benefits in making the website accessible. Still, respondents indicate that 13 percent of managers (completely) disagree and do not see the benefits of implementing the web accessibility standards. More about those results can be found in section 5.3.2.

*Correlations between the audit results and the questionnaire were found with awareness of rules and regulations and with familiarity with the standards. This means that developing awareness and knowledge seem to help the implementation of web accessibility and is reflected in the audit results.*

### 5.3.2 Involvement of (top) management

The proposition for this dissertation based on the literature was that if top management is not committed, this is an indicator of organizational resistance. The presence of top management commitment was proposed as an indicator for organizational support.

The items of this proposition were described in more detail in section 3.4.2. They were measured using the related questions (Table 5.6).

Process	Items	Questions
Involvement of (top) management	Appointment of (top) manager with focus on web accessibility	Q17
	Plan written by management that includes web accessibility implementation	Q18; Q19
	Perceived sense of urgency with management and other departments	Q15; Q16; Q20bcd

Table 5.6. Involvement of (top) management. Items and questions in the questionnaire.

5.3.2.1 Appointment of a (top) management level person

The respondents were asked if there is a (top) management person who is making the case for web accessibility in their municipality. Figure 5.17 shows that compared to the importance in literature described earlier, this sort of (top) management involvement is still rather low when it comes to web accessibility (22 percent).

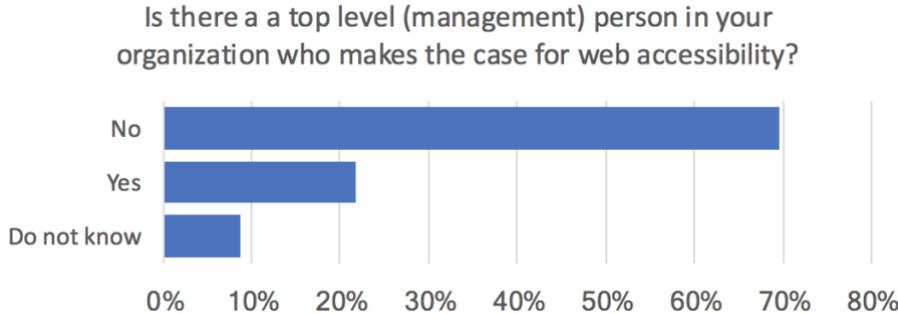


Figure 5.17: Active involvement of (top) management level person (Q17).

According to respondents, 70 percent of the municipalities do not have such a (top) management level person. Including the score for respondents who answered “I do not know”, the total percentage of municipalities that do not have such a person could be as much as to 78 percent.

Although the percentages are very pronounced, there is no correlation (Point-Biserial) with the audit results of the websites (see appendix 2: Question 17).

*“You need someone to control this, an ambassador with a mandate and a budget to implement web accessibility. Someone who can make a plan and can tell people what to do like “now we will use an accessible template for documents and add descriptions to images.” Nobody will do that for fun, so it requires control, checks and good examples”*

*Web manager of a large municipality*

### 5.3.2.2 Plan written by management

If top management is involved, they could help the implementation of web accessibility by providing a clear plan with deadlines. The respondents were therefore given the statement: “Management has made a plan to implement and maintain web accessibility” (Figure 5.18). 10 municipalities agree with that statement (2 of which strongly agree) (14 percent), 48 do not agree and 11 are neutral.

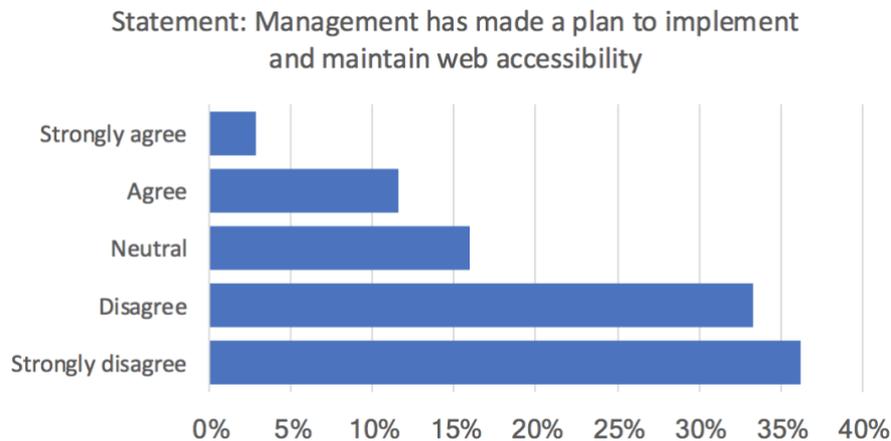


Figure 5.18: Has management made a plan for implementation? (Q18). The answers of question 18 have a right skew of .804. Dividing the skewness by the standard error (.289) gives a ratio of 2.78, thus indicating a non-normal distribution (>1.96). The non-normal distribution was confirmed by a Shapiro-Wilk test (.843,  $p = .000$ ). Therefore, a non-parametric statistic (Rank-Biserial) was used to determine whether there is a correlation.

There is no direct statistical correlation between management making a plan (Q18) and the audit results. However, the results do show that municipalities that have appointed a (top) management person for web accessibility (Q17) also more often have a plan written by management to implement and maintain web accessibility (Q18). This correlation was calculated using Rank-Biserial (see explanation in section 4.1.5). The results show a clear correlation ( $r_{rb} = 0.422$ ,  $p = 0.001$ ) (Figure 5.18).

There is also a correlation between the appointment of a (top) management person (Q17) and the respondent indicating that web accessibility for persons with disabilities is included in a formal policy plan of the municipality (Q19) using Point-Biserial ( $r_{pb} = 0.401$ ,  $p = 0.002$ ).

### 5.3.2.3 Sense of urgency

Respondents indicate that a low sense of urgency from management is a barrier to the successful implementation of the web accessibility standards in their municipality (Figure 5.19). And that low sense of urgency is not limited to (top) management. If they are asked about barriers that make it more complex or even impossible to successfully implement the web accessibility standards in their organization, 26 percent point to low urgency with policy makers, 31 percent with communication departments and 40 percent with management.

Although these percentages are all very pronounced, there is no correlation (Point-Biserial) with the audit results of the websites (see appendix 2: Question 20bcd).

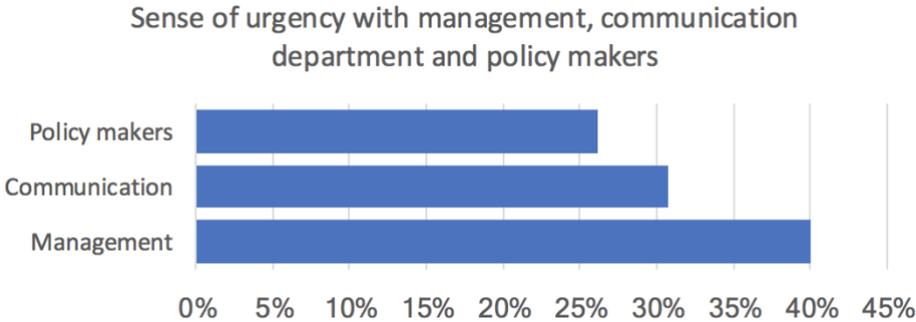


Figure 5.19. Respondents perception of urgency with management, communication department and policy makers (Q20b/c/d).

There is however a correlation between the appointment of a (top) management person (Q17) and the low urgency with policy makers (Q20b) using Point-Biserial ( $r_{pb} = 0.340, p = 0.006$ ). The urgency with policy makers is statistically lower if the municipality has not appointed a (top) level management person to make the case for web accessibility.

There is also a correlation between the appointment of a (top) management person (Q17) and the low urgency with management (Q20c) using Point-Biserial ( $r_{pb} = 0.340, p = 0.006$ ). As with policy makers, the urgency is also statistically lower with management if the municipality has not appointed a (top) level management person to make the case for web accessibility.

The respondents were asked whether they think their management sees benefits in implementing accessibility (Q15). Figure 5.20 shows that 58 percent of respondents indicate that their management sees benefits in making the website accessible (counting both agree and strongly agree). Adding up the scores for disagree and neutral, respondents assume that more than forty percent (42 percent) of all managers in municipalities do not (yet) see the benefits or are not aware of them.

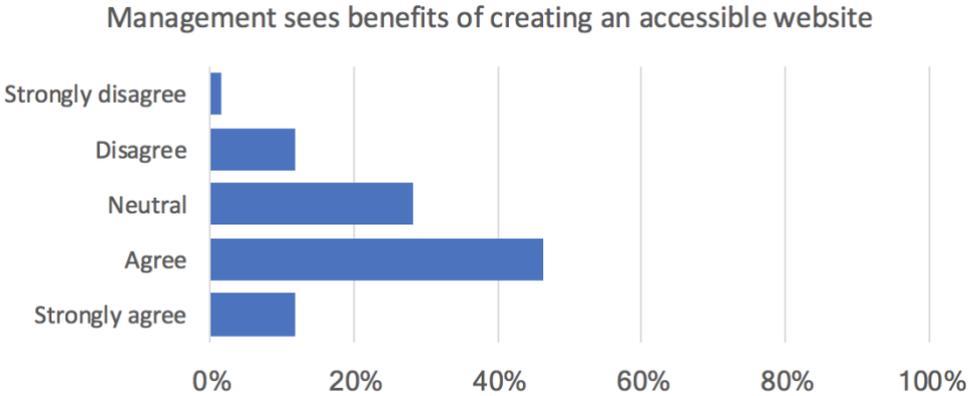


Figure 5.20. Does management see benefits in creating an accessible website? (Q15).

There is no correlation (Point-Biserial) between the audit results of the websites and the results shown in Figure 5.20 (see appendix 2: Question 15).

Literature regards top management commitment as an indicator of organizational support and the lack of top management commitment as an indicator of resistance.

The results of the questionnaires lead to actual correlations regarding the items studied within this process (involvement of (top) management) but not with the audit results. Correlations were found with items like sense of urgency, management writing plans and availability of a municipal policy plan specifically including web accessibility. This means that involvement of (top) management seems to cause a positive change in the actions of municipalities with regard to web accessibility but that the results are not reflected in the audit results. No correlations were found with the outcome of the audits.

### 5.3.3 Adaptation of the innovation

As municipalities or their umbrella organizations are not directly involved in the adaptation of the standards to the requirements of (future) users (e.g. the organization, employees, designers, developers etc.) with and without disabilities, this process is not further proposed as an indicator of organizational support or resistance. Changes to the interpretation and to the actual level of implementation of the standards can be found in section 5.3.6 (Adaptation of policies and standards).

The items of this proposition have been described in more detail in section 3.4.3.

### 5.3.4 Adaptation of the organizational structure

Based on the literature, in this dissertation adaptation of the organizational structure is proposed as an indicator of organizational support and the absence as an indicator of organizational resistance.

The items of this proposition have been described in more detail in 3.4.4. They were measured using the related questions visible in Table 5.7

Process	Items	Questions
<b>Adaptation of the organizational structure</b>	Responsibilities and task delegation	Q17; Q27h; Q35
	Performance evaluation	Q37
	Drafting of plans	Q18; Q19
	Use of rules and procedures	Q21; Q27defg; Q42; Q44
	Influence and involvement of web team and other stakeholders (internal and external) of the municipality	Q46; Q47b; Q10a/b; Q36i; Q47a; Q10d; Q36h/j
	Network and collaboration (including the variety of actors; Closedness; Dependencies)	Q10; Q11a; Q20; Q22; Q33; Q34; Q47; Q48; Q50; Q53

Table 5.7: Adaptation of the organizational structure. Items and questions in the questionnaire.

#### 5.3.4.1 Responsibilities and task delegation

Out of a list of 10 statements, the statement “in your municipal organization, web accessibility is part of the job description of employees” was selected by 28 percent of the municipalities

(Q27h). Although this constitutes more than a quarter of the respondents, there is no correlation between this number and the actual audit data (see Appendix 2, question Q27h).

Even though accessibility is reported to be part of the job description of employees in a quarter of the municipalities, respondents indicate that 48 percent of municipalities have someone whose specific task is to continuously monitor web accessibility (Q35). This would indicate that web accessibility is part of that person’s job description or at least part of some sort of implicit task description. The boxplot in Figure 5.21 shows the statistical correlation between the audit results and appointing a person within the municipal organization to continuously monitor the accessibility of the website. Municipalities of respondents who report such a person have higher scores in the audit results. In the questionnaire, 52 percent of respondents report that their municipality has not appointed a person in that role.

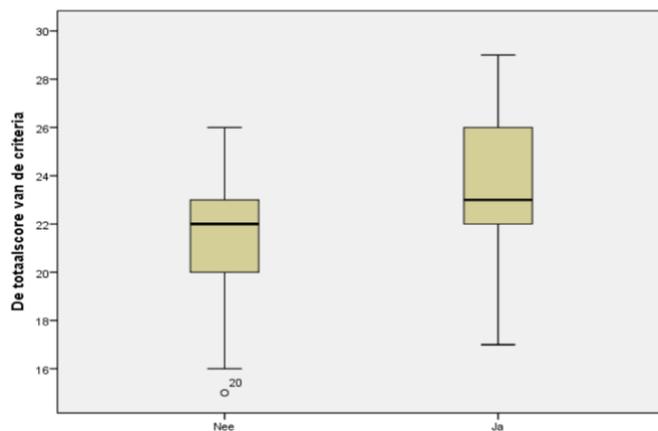


Figure 5.21: Correlation with person appointed to continuously monitor web accessibility (Q35). ( $r_{pb} = 0.397, p = 0.001$ ).

#### 5.3.4.2 Performance evaluation

Besides appointing a person to continuously monitor web accessibility, many municipalities divide the work of checking or repairing web accessibility among the members of the web team. But what happens if a member of the web team does not apply the standards correctly, causing the website to remain non-conformant? Are they addressed personally? Although there is no correlation with the audit results (see appendix 2, question 37), according to the respondents, 54 percent of municipal organizations personally address employees in the case of non-compliance (Figure 5.22). 41 percent do not address employees in the case of non-compliance and 4 percent of the respondents do not know.



Figure 5.22: Does the organization personally address employees in the case of non-compliance (Q37).

Personally addressing employees in the case of non-compliance is reported more by respondents from larger municipalities than from smaller. Figure 5.23 shows the correlation between the size of the municipality (number of inhabitants) and personally addressing employees in the case of non-compliance. As concluded earlier, this is not reflected in the audit results by a statistical correlation.

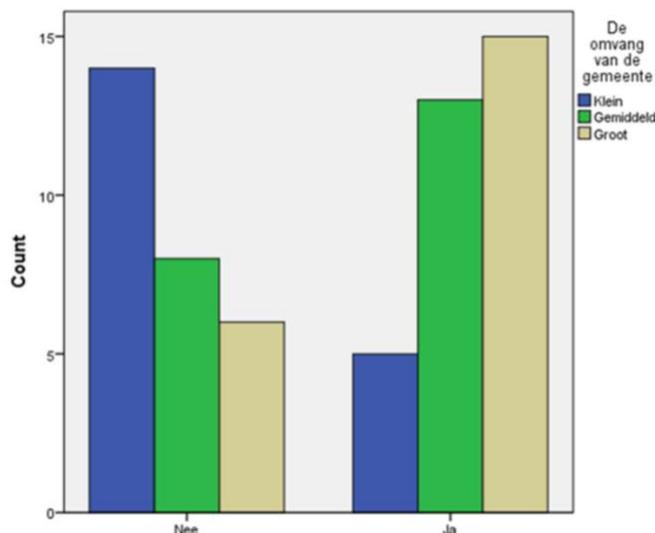


Figure 5.23: Correlation between “Are persons in the organization addressed personally in the case of non-compliance with the web accessibility guidelines?” and the size of the municipality (number of inhabitants) (Q37). Using Pearson’s Chi-Square ( $\chi^2(2) = 8.961, p = 0.011$ ).

### 5.3.4.3 Drafting of plans and policies

As part of the adaptation of the organizational structure, literature indicates the importance of applying strategies and plans for implementation and maintenance of web accessibility. As we saw in section 0, respondents claim that in only 14 percent of municipalities, management has written a plan that includes web accessibility (Q18). Some respondents report having a plan but it is not yet implemented or waiting for outside pressure:

*“We still haven’t given it a formal place in our organization, but we are planning to.”*  
*Communication advisor small municipality*

*“Our head of department feels responsible for this, but depends on signals from outside saying the municipality has a problem.”*  
*Communication advisor small municipality*

There was a statistical correlation between the availability of top level management commitment (Q17) for web accessibility and the existence of a plan that includes web accessibility (Q18). There was also a correlation between the availability of top level management commitment (Q17) for web accessibility and of a formal policy plan (Q19). Note that out of the 69 participating municipalities, 22 percent have top level management commitment for web accessibility (Q17).

Besides a plan written by management (14 percent of municipalities), 42 percent of the respondents estimate that their municipality has a formal policy plan that includes web accessibility. The existence of a plan written by management or a formal policy plan does not correlate with the audit results.

#### 5.3.4.4 Existence and use of rules and procedures

Another aspect of adaptation of the organizational structure is the application of rules and procedures for quality assurance of web accessibility in the municipal organization.

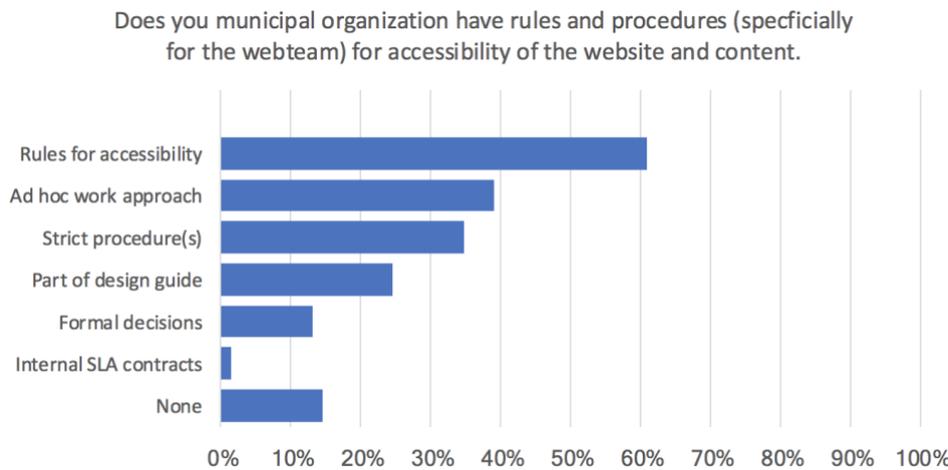


Figure 5.24: Existence of rules and procedures for web accessibility in organization (Q21).

Figure 5.24 shows that 35 percent of the respondents indicate that their municipality has strict procedures for the web team that include web accessibility requirements. Although many web teams in municipalities do not seem to have a strict approach to web accessibility (39 percent report an ad hoc approach), some have incorporated the web standards in procedures (35 percent), their website design guide (25 percent), formal decisions (13 percent) or internal Service Level Agreements (1 percent). According to 14 percent of the respondents, web teams in their municipalities do not use a specific process (or procedure) for the implementation of web accessibility.

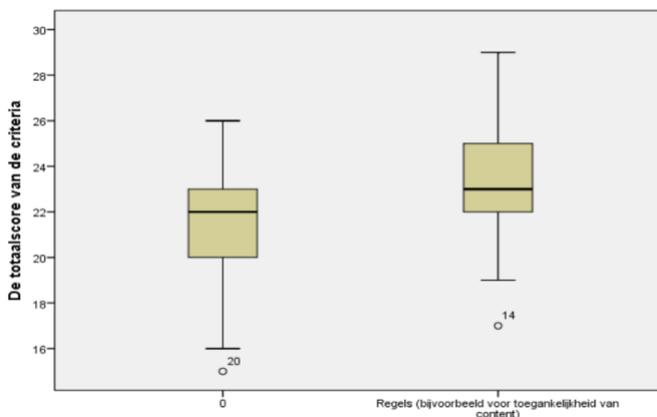


Figure 5.25: Correlation between use of rules in the organization and the audit results ( $r_{pb} = 0.342$ ,  $p = 0.004$ ).

Only one of the municipalities (a large municipality but not one of the G4) is reported to use internal service level agreements in their processes (1 percent). In total, 61 percent indicate that they use rules for web accessibility like WCAG, web guidelines, etc. in their website processes. Using Point-Biserial, there is a statistical correlation between the municipalities that indicate they use rules for web accessibility like WCAG and the level of audit results (Figure 5.25).

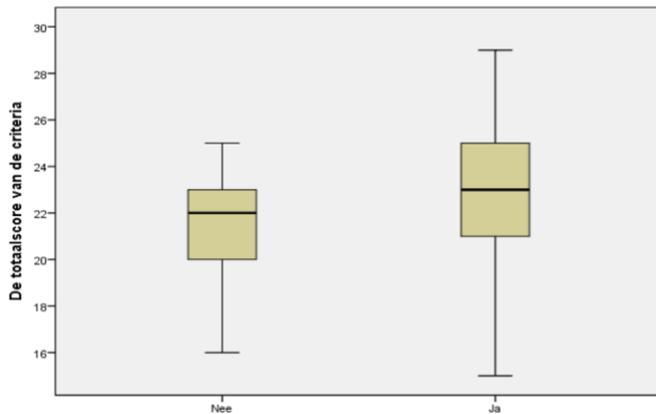


Figure 5.26: Correlation with combined answers for rules and procedures (Q21dich). ( $r_{pb} = 0.274$ ,  $p = 0.023$ ).

There is also a correlation with the audit results if we combine all the answers of question 21 and correlate the result with the audits (Figure 5.26) (Q21dich combines the scores of Q21a/b/c/e/f)). There are no separate correlations with the other items in Figure 5.24 like an ad hoc work approach, strict procedures, part of design guide, formal decisions and internal SLA contracts (see appendix 2, question 21).

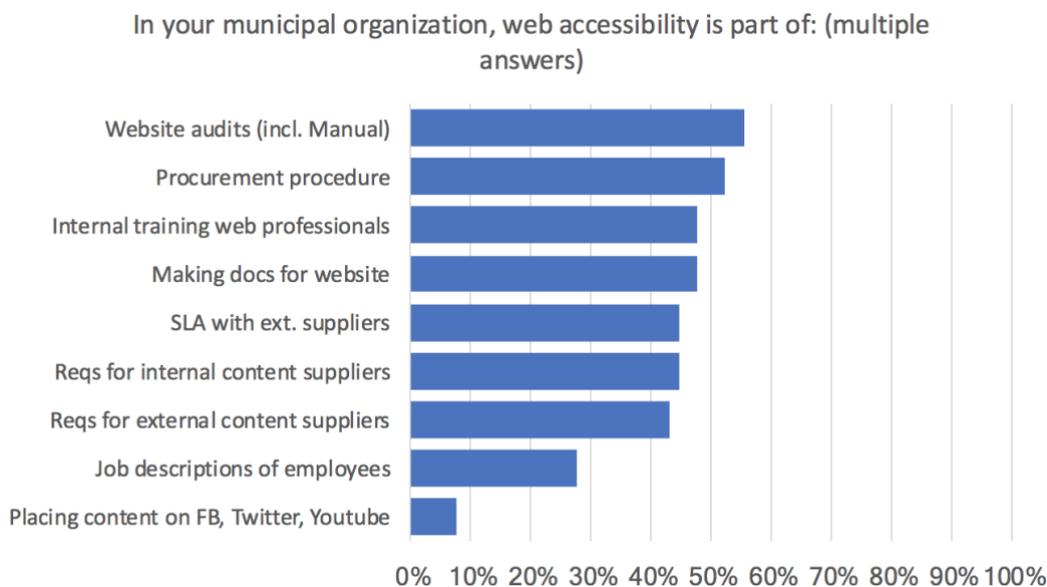


Figure 5.27: Web accessibility as part of rules and requirements.

Figure 5.27 shows that 52 percent of the respondents indicate that their municipality has procedures for buying or procuring web products from external suppliers and that these procedures include web accessibility requirements (Q27f). Also, 45 percent indicate that their

municipality includes web accessibility in contracts with external suppliers (Q27g). The same percentage (45 percent) have agreements within their own organization for the delivery of content.

As concluded from the answers of the respondents, 39 percent say their web teams do not have a strict approach to web accessibility (ad hoc). When asked if the initiative to repair failures is planned or mostly caused by complaints from users, only 20 percent answer ‘never’ (Figure 5.28). Note that these users include people with and without disabilities.

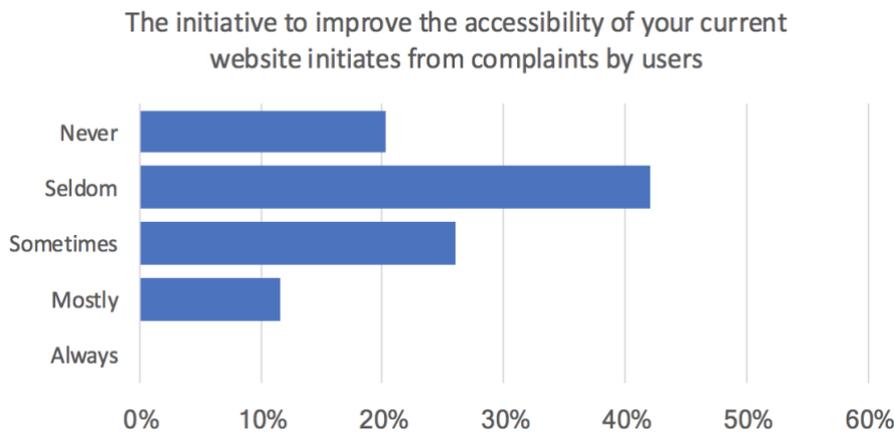


Figure 5.28: Frequency of improvement in web accessibility initiated by user complaints (Q13)

### Procurement

Procurement is one of the most important procedural instruments for the acquisition of web accessibility. 52 percent of respondents claim to have procedures for procurement that include web accessibility (Q27). Figure 5.29 shows that 78 percent of respondents state that, at the time, their municipality has added web accessibility to the procurement requirements for the current website (Q42).

*“It is difficult for us to address large suppliers and ask them to adapt their software to be conformant with the standards. If we would be strict about the requirements, we would have to tell suppliers that their product is not suitable because it is not conformant and go to another supplier. However, others are difficult to find or use other systems. So we would have nothing. No passports, no council information system etc.”*

*Webmanager of large municipality*

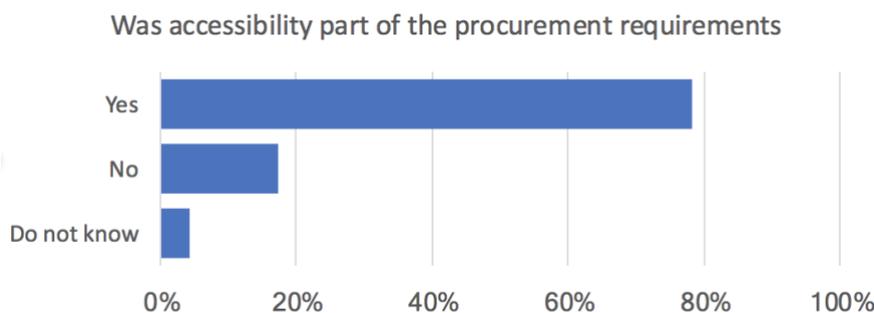


Figure 5.29: Percentages of municipalities including web accessibility in procurement (Q42).

In addition to procurement requirements, the organization can also check external parties and suppliers for quality assurance. Figure 5.30 shows that respondents say their municipalities check the skills of external suppliers before awarding the contract. 61 percent checked beforehand whether the supplier had expertise regarding web accessibility.

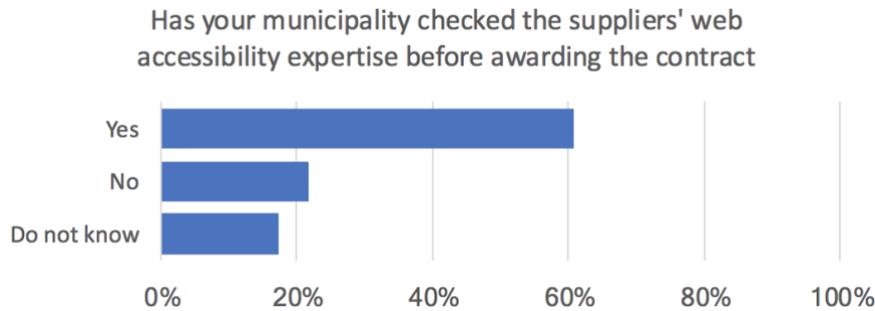


Figure 5.30: Percentages of municipalities checking skills of supplier before awarding the contract (Q44).

Additionally, municipalities say they have strict requirements concerning web accessibility for both internal (45 percent) and external suppliers (43 percent) (Q27). Some have Service Level Agreements with external suppliers (45 percent) (Q27). Based on the questionnaire and the audit results, no correlations were found regarding procurement or checking skills of outsourced parties.

#### 5.3.4.5 Influence and involvement of web team

Literature stresses the importance of seeking feedback from users and involving them in the implementation process. Figure 5.31 shows that most municipalities (94 percent) involve their own content editors (web team) in the design and development of the website.

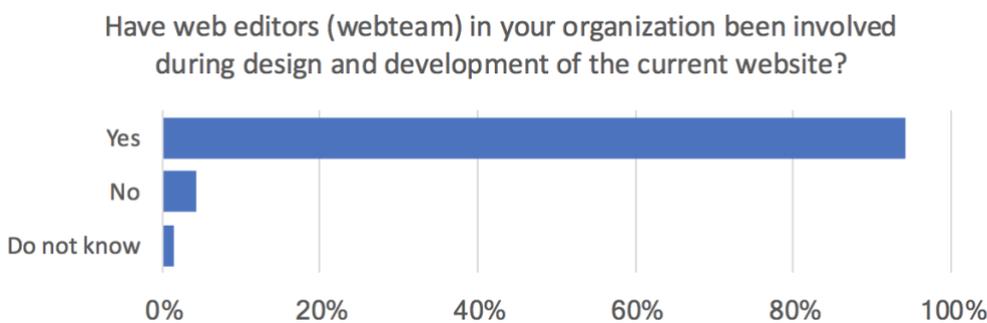


Figure 5.31: Percentages of web editors that have been involved in design and development of the current website(Q46).

In 33 of the municipalities, respondents indicate that there is a specially appointed internal employee to continuously check for conformance with web accessibility standards (Q47b). There is a correlation between the availability of this employee and the audit results (Figure 5.32). Municipalities with such an employee score better on web accessibility implementation.

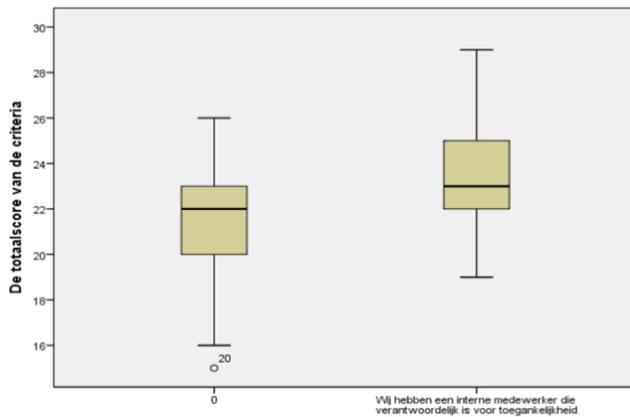


Figure 5.32: Correlation between having an internal employee for web accessibility and audit results ( $r_{pb} = 0.407, p = 0.001$ ).

### 5.3.4.6 Influence and involvement of disabled

Figure 5.33 shows that in 25 percent of municipalities, users with disabilities are involved in auditing the website (Q36i) and in 23 percent of municipalities they are involved in regular testing (Q47a).

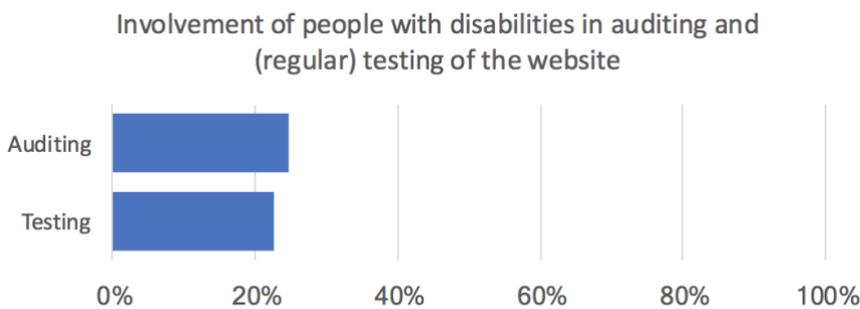


Figure 5.33: Percentages of municipalities that involve persons with disabilities in auditing and (regular) testing (Q47a;Q36i).

27 percent of respondents say that in their municipality, web accessibility standards implementation is influenced by external pressure from disability organizations (Q10b).

*“It’s predominantly been citizens encountering barriers that have been leading”*

*“You have to look at it from our perspective. How many people are actually knocking on our door to say “we cannot use your website. Nobody! At least, I have never seen them. How often does a person knock on the door of their municipality?”*

*Internet communication advisor of large municipality*

Using Point-Biserial, there is however no correlation between the number of respondents indicating that their municipality feels external pressure from disability organizations and the audit results ( $r_{pb} = -0.010, p = 0.936$ ) (see Appendix 2, Question 10b).

There is also no statistical correlation between the audit results and the percentage of municipalities that report having a citizen’s panel that can help if requested (13 percent) (Q36h) or with municipalities that are involved with Gebruiker Centraal (9 percent) (Q36j). Gebruikercentraal.nl (‘User Central’) is a network community of professionals who work together to achieve a more user-friendly online government.

#### 5.3.4.7 Influence and involvement of other stakeholders

Respondents also indicate the influence of other external pressure by the central government (79 percent), by publicity (24 percent) and by citizens (15 percent). 22 percent of respondents say that their municipality does not feel external pressure to apply the web accessibility standards (Figure 5.34).

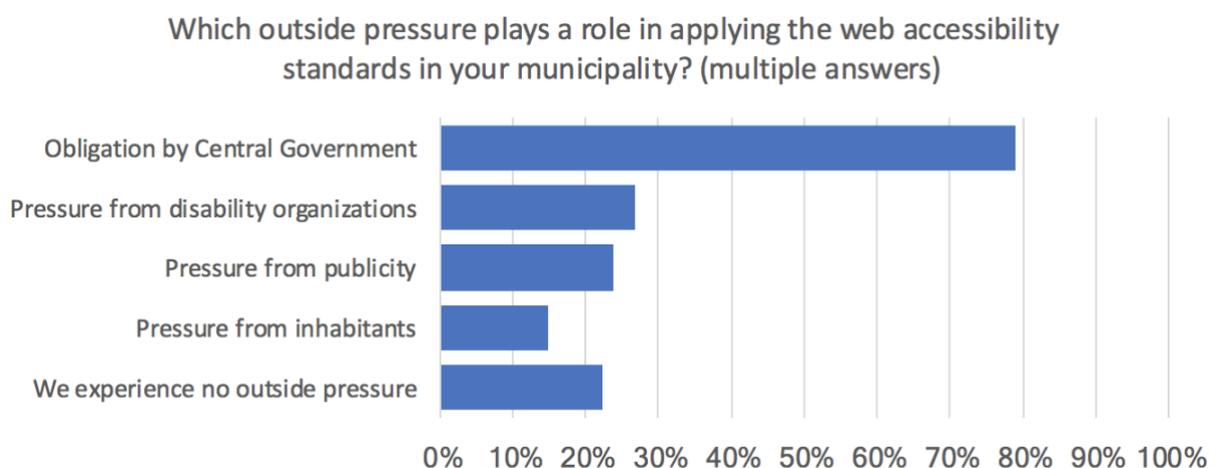


Figure 5.34: Percentages of external pressures perceived by municipalities (Q10).

There is a correlation between the audit results and the municipalities where respondents indicate that they feel pressured by the central government obligation (Q10a) to apply the web accessibility standards (Figure 5.35). The other outside pressures (publicity, inhabitants, disability organizations) do not show statistical correlations with the application of the web accessibility standard (see appendix 2, question 10).

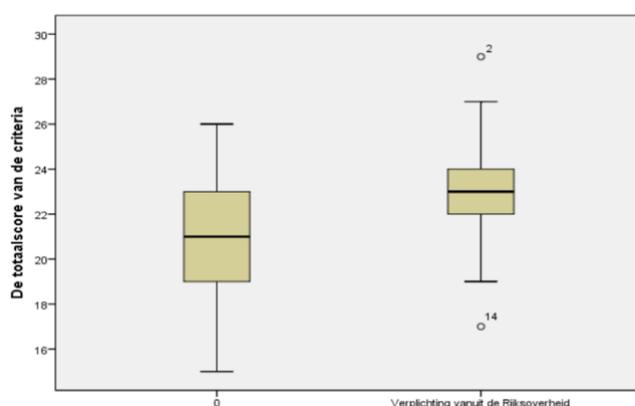


Figure 5.35: Correlation between pressure from Central Government obligation and the audit results. ( $r_{pb} = 0.324$ ,  $p = 0.007$ )(Q10a).

*“You know how this works in a municipality? If policymakers are interested, you have already achieved a lot. [So that is ok then?] uh no, to be honest I have never heard them about the subject. Maybe the organization should organize something, but that will only happen if there is legislation ”.*

*Digital services advisor of medium sized municipality*

#### 5.3.4.8 Network and collaboration

According to literature (section 3.4.4), partners in a network can slow down implementation. Below are the results of questions related to network and collaboration.

##### Variety of actors participating in the process

Most web teams (73.91 percent) have between 0 and 10 members who can publish content on the website (Figure 5.36). Respondents from 18 municipalities indicated that there were more than 10 people in their web teams (including part-timers). But not everyone who can publish content on the website is part of the web team (Figure 5.37). They may be from other internal departments. But they may also be external suppliers or even the ‘crowd’ through chats, forums, reaction and feedback forms, apps and media like Twitter, Facebook, YouTube, etc.

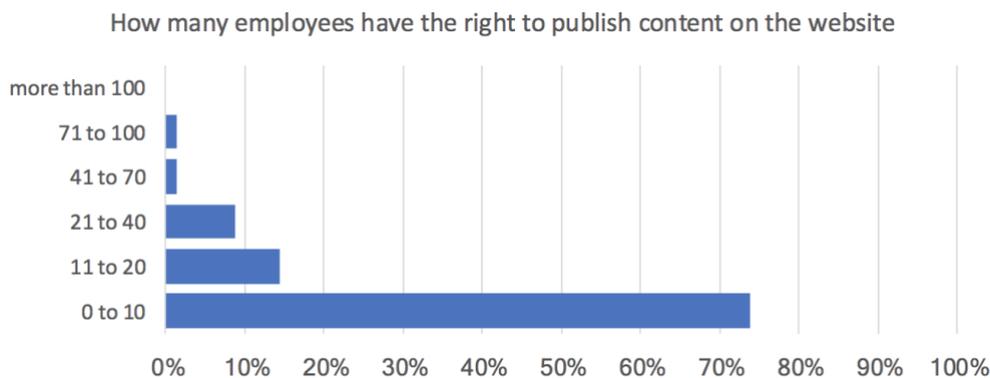


Figure 5.36: Percentages of municipalities with number of employees that have a right to publish content on the website (Q29).

The organization should ensure that these suppliers provide accessible content and media. This may involve adaptations to the organizational structure of the content provision.

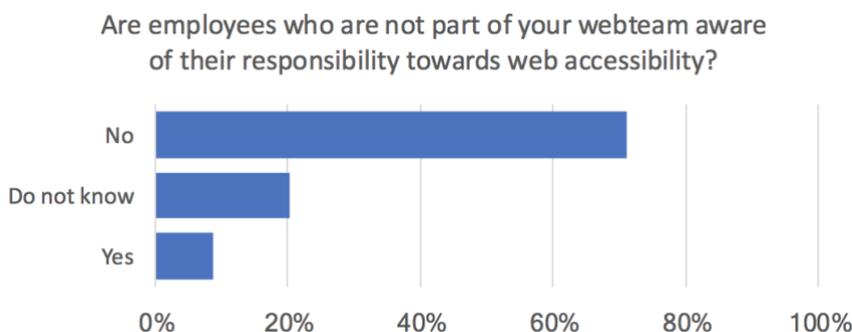


Figure 5.37: Percentage of municipalities where employees who are not part of the webteam are aware of their responsibility towards web accessibility (Q31).

Most municipalities only employ a very limited number of people in their web team (Figure 5.38). Most employ 1-2 people (43 percent) or 3-5 people (37 percent) (Q48). However, not all these people are working full time on the website. Most respondents report that work is divided among many part-time people. During the phase of contacting the municipalities for the questionnaire, it was not always easy to reach the contact person. We had long lists of people and the days when they were at work. The different agendas and working days of the part-time employees may slow down the implementation process.

*“And then our organization is not really cooperative. Our web team is aware and knowledgeable of the ‘Webguidelines’, but our organization has about 1000 persons walking around and the bulk of them say: “don’t be ridiculous.”*

*Internet communication advisor of a medium sized municipality*

There is a statistical correlation (Spearman’s Rank-Order) between the number of full time equivalents working on the website (according to the respondents) and the size of the municipality ( $r_s = 0.386$ ,  $p = 0.001$ ). The numbers do not differ very much between the small, medium and large municipalities. The G4 employ many more people than the others.

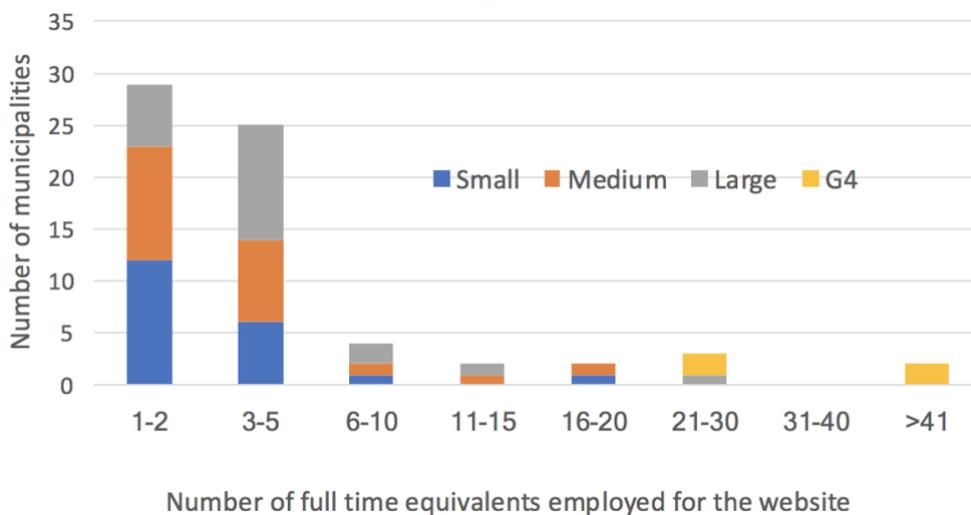


Figure 5.38: Full time equivalents in small, medium, large and G4 municipalities working on the website (Q48).

Figure 5.39 shows that respondents indicate that 22 percent of municipalities share employees with other municipalities (for example for maintenance and control). For small municipalities, this means that they can access more focused expertise than they would have been able to employ by themselves. This not only applies to maintenance and support, but also to content. Part of these shared experts (8 percent) are also involved in auditing the website (Q47). The advantage of shared teams is the bundled expertise, but also the fact that there is usually at least one web team member available. This does not seem to delay the implementation of web accessibility. The audit results show no statistical correlation when it

comes to sharing employees with other municipalities. Neither does the size of the municipality render a statistical correlation with sharing employees.

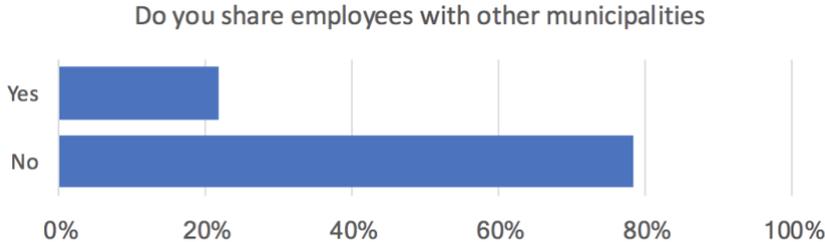


Figure 5.39: Percentage of municipalities that share employees with other municipalities (Q34).

Respondents also indicate that municipalities hire external expertise for web accessibility (13 percent) if necessary. These external experts generally work within the organization and thus extend the variety, but within the (shared) web team.

**Closedness of the organization**

Being closed to external organizations or interventions, such as the national government or inspection authorities, may influence the adaptations to the organizational structure. Organizations may not be open to changes or outside pressure. The questionnaire asked respondents whether outside events influenced (or could influence) their motives to implement web accessibility (Q11).

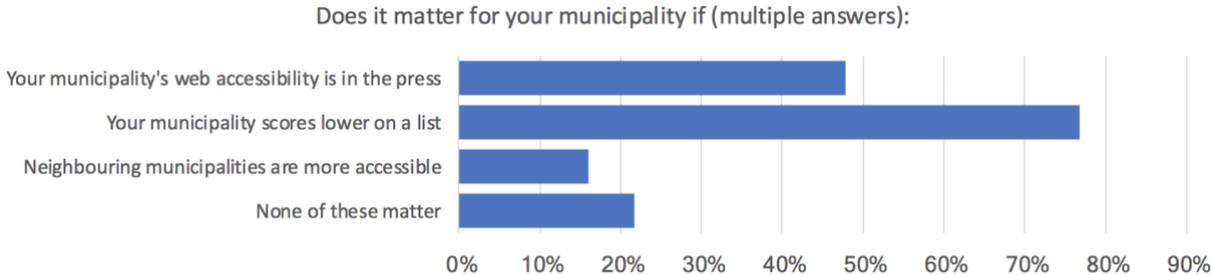


Figure 5.40: Percentage of municipalities that is Influenced by (four) outside events (Q11).

In Figure 5.40 respondents indicate the influence of outside events. It shows that if neighboring municipalities score higher on web accessibility, this matters to their organization (22 percent). However, if these scores are published on a public list, it matters even more (77 percent).

*“There used to be an online municipality monitor with a ranking of municipalities. All municipalities looked at that ranking. Specially management looked at the scores. At a certain moment, we were in the top 10. When we lost that position, management asked how that was possible. We answered “not enough money”. They arranged extra budget immediately. So that works!”*

*Digital media advisor of large municipality*

When correlating the influences in Figure 5.40 with the audit results, there is a correlation between the audit results and whether neighboring municipalities are more advanced with web accessibility (Figure 5.41).

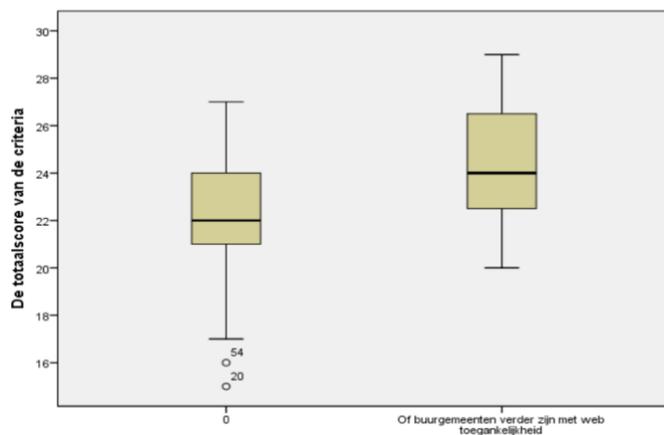


Figure 5.41: Correlation between 'influence if neighboring municipalities are further with web accessibility' and the audit results. ( $r_{pb}$  0.276,  $p = 0.022$ ) (Q11a).

The press was perceived as less important but still almost half of the respondents indicate that it matters when web accessibility of their municipality is in the press (48 percent).

### Dependency.

A possible implementation delay can be caused by interdependencies. They include external experts and shared employees but dependencies also involve the CMS and other (internal and external) technology and content suppliers. Some CMS systems like the 'Drupal Voor Gemeenten' ask municipalities to cooperate with the work on the platform.

Besides the CMS, almost half of the municipalities (49 percent) indicate that they are dependent on external parties for the implementation of web accessibility (Q50).

*"In the audit, they only looked at the forms of the appointment-module. That is an external module, we cannot influence it. This means that we have to wait till the next user-meeting to ask the supplier to please make some changes. And then they add it to their list for the next 1,5 years. This is not nice for us as a webteam. We changed all of our own forms, but they were not in the sample so now it looks as if we did nothing."*

*Internet communication advisor of medium size municipality*

The dependency on external suppliers is perceivable in the budget. Respondents indicate that extra costs are involved if they ask suppliers to repair web accessibility failures. Of the respondents, 42 percent report spending this extra budget in their municipality (Q53). This could indicate that municipalities depend on external suppliers to repair failures. The budgetary implications could delay the repairing. Depending on the budget required for a barrier, it could cost more time to obtain the necessary approval.

Capacity also plays a role. Respondents (12 percent) say that external suppliers do not always have sufficient capacity to solve the problems they report (Q20m). Also, the necessary people inside their own municipal organization may not always be available (57 percent) (Q20f). This can cause delays:

*"We really want to conform [with the standards]. What makes it difficult is that inside a municipality a lot of people want their opinion to be heard, even if they are not knowledgeable"*

*Chief information officer of a large municipality*

There can also be conflicting interests within an organization about timing, technology and content (pluralism). Respondents in 37 percent of the municipalities recognize this (Q20i). There is no correlation between the existence of conflicting interests with regard to web accessibility implementation and the audit results (see appendix 2, question Q20i).

*The results of the questionnaires show correlations with the audit results for some of the items studied within this process (adaptation of the organizational structure). Correlations were found with the items ‘use of rules and procedures’ (Use of rules), ‘responsibilities and task delegation’ (person appointed to continuously monitor web accessibility), ‘influence and involvement of the web team’ (internal employee for web accessibility and audit results), ‘influence and involvement of other stakeholders’ (pressure from Central Government obligation) and ‘Network and collaboration’ (influence of neighboring municipalities scoring higher for web accessibility). No correlations at all were found for the items ‘Drafting of plans’, ‘influence and involvement of disabled’ and ‘performance evaluation’.*

### 5.3.5 Monitoring and reporting

Based on the literature, in this dissertation monitoring and reporting is proposed as an indicator of organizational support and the absence of monitoring and reporting as an indicator of organizational resistance.

The items of this proposition have been described in more detail in section 3.4.5. They were measured using the related questions visible in Table 5.8.

Process	Items	Questions
<b>Monitoring and reporting</b>	Monitoring and testing activities	Q13; Q20; Q22; Q27b; Q35; Q36fk; Q38; Q53cd; Q47;
	Quality Assurance internal and external	Q39; Q42
	Plans/Statements	Q12; Q27b

Table 5.8: Monitoring and reporting. Items and questions in the questionnaire.

One of the most obvious examples of monitoring and reporting is appointing a specific person to monitor the accessibility. This is done by 48 percent of the municipalities and there is a direct correlation with the level of accessibility in the audits (Q35; Q53c) described earlier in section 5.3.4.1.

#### 5.3.5.1 Monitoring and testing activities

More than half (55 percent) of respondents have made web accessibility part of the auditing of the website (Q27b). Some municipalities (33 percent) hire an external auditing organization to determine the status. About 19 percent pay an external employee to check the web accessibility (Q53d) and 13 percent hire an expert themselves (Q36). These audits include automated and manual evaluation. More than half (55 percent) spend budget on paid tools like SiteImprove to monitor web accessibility (Q53).

*“I am actually disappointed in the tools provided by the government. There used to be tools. They were English, but at least they helped us”*

*Online communication advisor of medium sized municipality*

Figure 5.42 shows a boxplot of the correlation between the audit results and municipalities that report they do not use tools besides their CMS system (Q36k). Municipalities that do not use tools besides their CMS score lower in the audits.

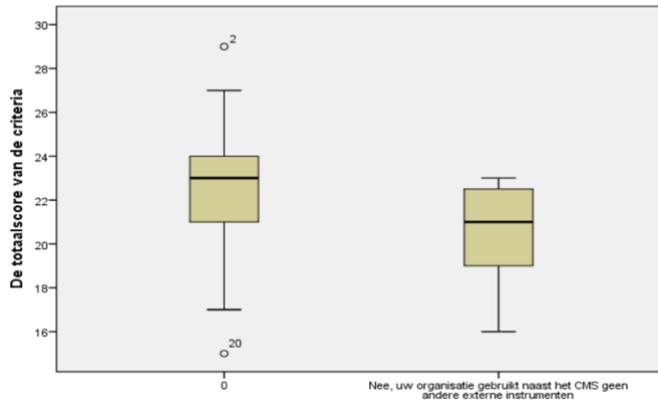


Figure 5.42: Correlation between the lack of using any tools (besides the CMS) and the audit results. ( $r_{pb} = -0.255$ ,  $p = 0.035$ ) (Q36k).

The frequency of audits varies markedly between the municipalities. Table 5.9 shows the frequency reported by the respondents for (external) audits. The answers exclude the use of tools for (continuous) monitoring. Some tools continuously monitor the status. However, as described in 2.1.5, they only measure a small part of the Success Criteria within the web accessibility standards. The rest of the Success Criteria need manual evaluation.

Answer choices	Responses	Numbers
Continuous	2.90%	2
Every year	24.64%	17
Every 2 years	14.49%	10
Every 3 years	10.14%	7
Less than every 3 years	23.19%	16
Never	24.64%	17
		69

Table 5.9: Frequency (percentages) of (external) (manual) audits of the website for web accessibility (Q38).

The frequency of (manual) monitoring is mostly low. The answers to question 13 (“The initiative to improve the accessibility of your current website initiates from complaints by users”) may indicate that most municipalities have a more ad hoc approach to monitoring (38 percent when combining always, mostly and sometimes).

Once web accessibility failures are reported or found, only 27 percent of municipalities organize repairs using clear goals and deadlines (Q22).

*“Goals and deadlines depend on the person / the priority”*

*“We decide this on a case to case basis”*

This may be explained by the fact that not many web accessibility failures may be reported and that the ones that are reported could be rather small or quickly repaired. For example, if a municipality uses an automated tool to alert them in the case of one or more missing alt-texts, this could be repaired in a few minutes and not require goals and deadlines.

Although nearly half of the municipalities use paid tools for evaluation (49 percent use paid tools), 23 percent of the respondents report a lack of tools to support them for web accessibility in their municipality (Q20).

#### *5.3.5.2 Monitoring user feedback*

Feedback is also an element of monitoring. As concluded earlier, feedback is not collected structurally by municipalities. When auditing, respondents indicate that they involve people with disabilities (23 percent), external expert(s) (29 percent) and experts shared with other municipalities (8 percent) (Q47).

Municipalities are required to have an accessibility statement. That statement is required to have a feedback mechanism where people with disabilities can react, ask questions or request accessible alternatives. Most websites have a feedback form but only 22 percent of respondents indicate that their feedback form can or may be used by people with disabilities to provide feedback, but also to request inaccessibility information in an accessible format (Q40). None of the websites that were audited had a specific/separate feedback form for persons with disabilities.

*“Our feedback form is more like an invitation to react. It is not a separate form for people with disabilities.”*

*“We have a “reaction” button but are working on a new solution.”*

*“We have a feedback button on every page, but it is never used except by one person who is a former employee. He sends us messages if something on the website is not ok.”*

*“We have never had complaints from people with disabilities.”*

Note that all websites in the audit had web accessibility failures.

#### *5.3.5.3 Monitoring from the start*

Figure 5.43 shows that according to respondents, 59 percent of municipalities test new content for web accessibility before it is published on the website (Q39). This correlates with the audit results. The correlation is visible in the boxplot in Figure 5.44. In total, 78 percent of

respondents indicate that web accessibility was part of the mandate requirements for the developer of the website (Q42).

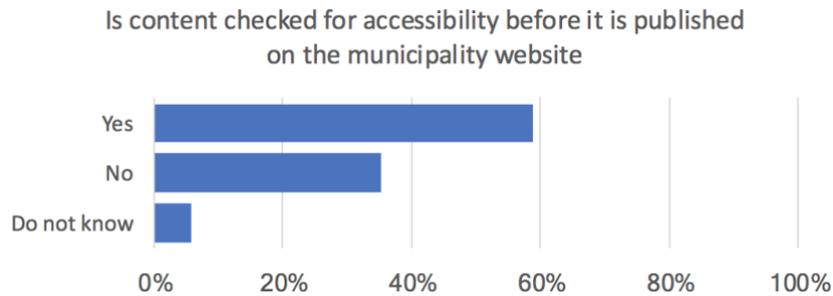


Figure 5.43: Percentage of municipalities that check content for web accessibility before publishing (Q39).

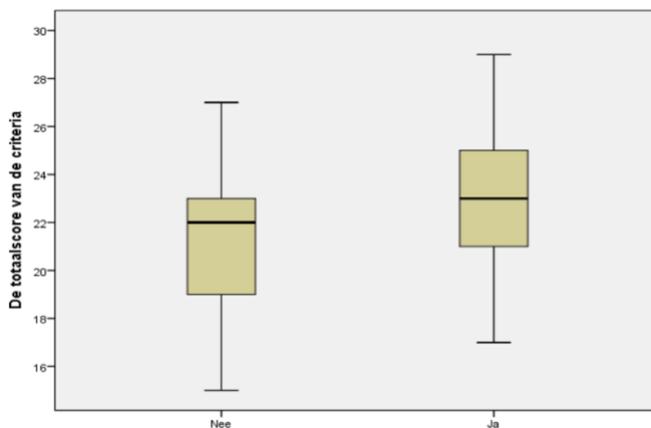


Figure 5.44: Correlation between checking content before publication and the audit results ( $r_{pb} = 0.264$ ,  $p = 0.035$ ) (Q39).

An important question is whether the municipality checks beforehand whether the supplier has sufficient skills regarding web accessibility. According to Figure 5.30, 61 percent did this (Q44). Even then, 25 percent of respondents conclude that (one of) their external suppliers does not have sufficient knowledge of web accessibility.

In some cases, municipalities have no choice. Many websites are linked to mid-office systems and it is not easy to shift to another CMS or supplier without high cost.

#### 5.3.5.4 Accessibility Statements

Figure 5.45 shows what municipalities think of publicly showing accessibility conformance. While 30 percent do not find this particularly important, 47 percent say it is important to publicly report how their website conforms with the web accessibility standards (Q12). This visibility can be achieved by publishing an accessibility statement or a conformance logo.

For the accessibility statements of Dutch municipality websites, an updated overview is available on the website 200ok.nl. In May 2018, the statements of 6 percent of all municipalities were up to date and contained deadline dates that had not yet passed. 264 of the then 380 municipalities had an accessibility statement on their website. Of these, 43 statements were no longer available (link no longer worked). 200 of the 264 statements were

not complete, old or incorrect. Many statements did not have a date or deadlines for repairs. Also many municipalities had a hidden link to their statement, making it difficult to find the statement at all.

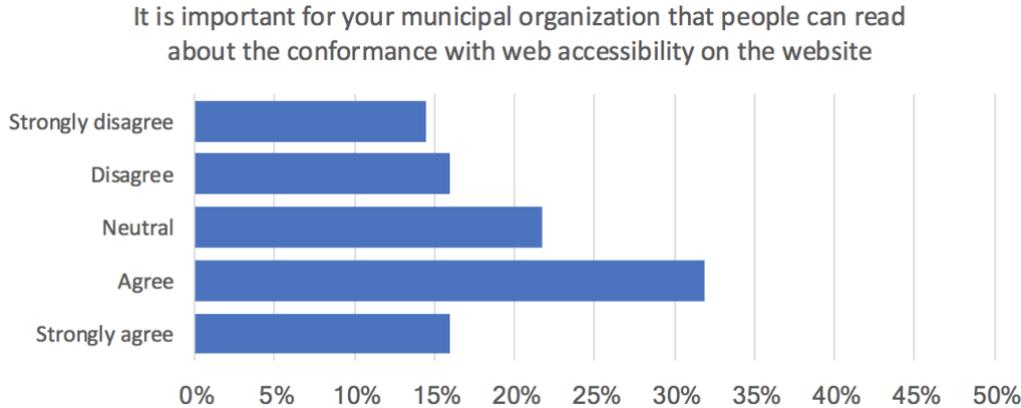


Figure 5.45: Percentage of municipalities who state that showing conformance on their website is important (Q12).

The results of the questionnaires show correlations with the audit results for some of the items studied within this process (Monitoring and reporting). Correlations were found with the items ‘monitoring and testing’ (specifically with the lack of tools besides the CMS system) and with ‘quality assurance’ (specifically testing content before publication). No correlations with monitoring and reporting were found for the element ‘plans/statements’.

### 5.3.6 Adaptation of policies and standards

Based on the literature, in this dissertation adaptation of policies and standards to support the implementation of web accessibility standards is proposed as an indicator of organizational support and the absence of adaptation of these policies as an indicator of organizational resistance.

The items of this proposition have been described in more detail in section 3.4.6. They were measured using the related questions visible in Table 5.10.

Process	Items	Questions
<b>Adaptation of policies and standards</b>	Changes to policy, legislation and regulations (Requirements in formal plans, identification and use of standards, availability of accessibility statement)	Q16; Q18; Q19; Q21; Q25; Q40
	Availability of time and capacity	Q20f/m/l; Q50
	Continuous control and repair	Q24; Q26; Q20g; Q20l; Q14; Q03
	Influence of software and ready-to-use solutions	Q20a/j/k; Q32; Q41; Q43

Table 5.10: Adaptation of policies and standards. Items and questions in the questionnaire.

### 5.3.6.1 Adaptation of policies

19 percent of respondents indicate that their municipality wants to be a frontrunner when it comes to implementation of web accessibility (Q16).

An important element in the adaptation of policies is whether the municipality has made changes to policy, procedures, rules or local legislation as a result of web accessibility requirements. Figure 5.46 shows that respondents in 36 percent of municipalities report changes to support implementation (Q25). Interestingly, 20 percent do not know whether this has happened. This may be due to respondents who have recently joined a municipality. However, with regard to their duties, one would expect them to be motivated to be familiar with such changes even if they happened before they started work in the municipality.

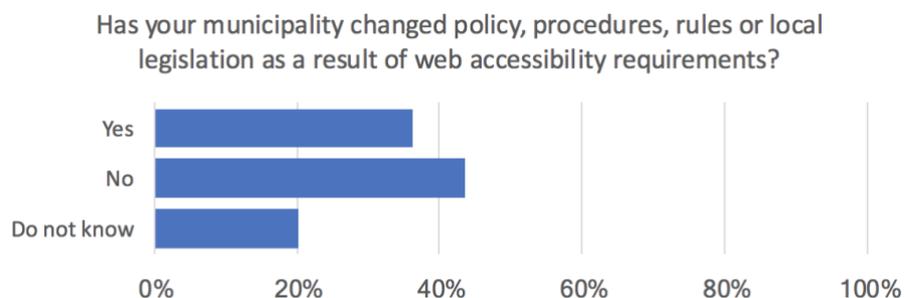


Figure 5.46: Percentage of municipalities that has made changes to local policy, procedures, rules or legislation as a result of web accessibility requirements (Q25).

Larger municipalities have been more active in changing policies, procedures and rules or local legislation than smaller municipalities. The correlation is visible in Figure 5.47.

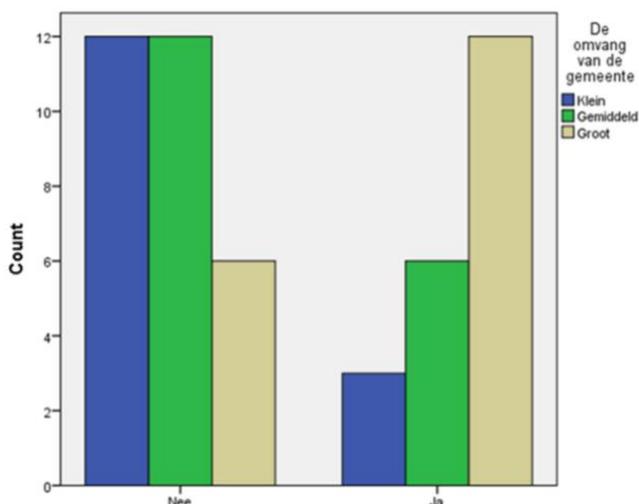


Figure 5.47: Correlation between changes to local policy, procedures, rules or legislation and the size of the municipality. Pearson's Chi-Square ( $\chi^2(2) = 8.063, p = 0.018$ ).

Respondents were also asked about the availability of plans and formal policy. Only some of the municipalities have policies regarding web accessibility (42 percent) (Q19) and a much smaller number reports management having written a plan to implement web accessibility standards (14 percent) (Q18). Some municipalities indicate that they will not make any local

arrangements, apart from the possible inclusion in the internal website design guide or a local process for procurement. Some indicate that they use documents and practices proposed by other municipalities or their umbrella organization (linked to their CMS system). Here are some reactions from respondents that illustrate different views regarding the adaptation of policies and plans:

*“There is a plan, but it is not yet locked in the organization”*

*“It is part of the requirements for our website”*

*“It is part of our online strategy”*

*“It is a formal order from our town clerk to make all external websites conform with the accessibility standards”*

All in all, 61 percent of the municipalities use rules for web accessibility (Q21). These vary between WCAG, Webrichtlijnen, digitoegankelijk and EN 301 549 but respondents also name the European privacy directive GDPR (AVG in the Netherlands) and the Digid audit to conform with.

An accessibility statement and a feedback form for accessibility are obligatory. Do all municipalities have one? And are they up to date? Of all Dutch municipalities, 69 percent had an accessibility statement in May 2018. Only 6 percent of municipalities had an up-to-date statement (see section 5.3.5.4).

### *5.3.6.2 Adaptation of the level of implementation of the standards*

#### **Availability of time and capacity**

Lack of time or capacity may influence the level of implementation of the web accessibility standards. Even though legislation requires 100 percent conformance, aspects like time, capacity, budget and available (legacy) information systems may force an organization to make a selection of the Success Criteria (SC) or to only partially implement (part of) them. They may choose to implement the rest at a later time. This lack of time to properly implement the innovation (by the web team) is reported by 57 percent of the respondents (Q20f). Besides a lack of time in their own organization, 12 percent of the respondents report a lack of capacity with their CMS supplier (Q20m). This means that they have to wait for repairs and therefore may have to prioritize. In the eyes of 25 percent of the respondents, CMS suppliers also lack the necessary knowledge of the standards (Q20l) to make their website conformant.

*“Many of the failures in the audit are caused by the code in the stylesheet. We asked our CMS supplier to make necessary changes, but they say it requires them to rebuild the complete template. That could take 2 years. So now we exclude it from our statement. Really not what we want, but what choice do we have?”*

*Digital media advisor large municipality*

Besides the CMS, almost half of the municipalities (49 percent) say they depend on external parties (other than the CMS supplier) to make the website accessible (Q50). This may explain

specific non-conformities that are not controlled by the webteam but have to be repaired externally (e.g. external agenda or meeting system that is within the scope of the website audit). Although respondents indicate that the lack of time, capacity and dependency is a barrier to the full implementation of the web accessibility standards, causing them to prioritize or fail for specific Success Criteria, the audit results do not show a correlation (see appendix 2).

**Continuous control and repair (for crowd-sourced content)**

Although the standards set strict requirements for conformance, WCAG does provide the option of repairing failures at a later date. This means that at a certain moment, there may be failures on the website. If repairs take place within 2 business days, the Web page may still be declared conformant. This can be used for crowd sourced content where the owner has no control over the content. Respondents from 55 percent of the municipalities report the use of a commercial tool like SiteImprove for continuous checking and repairing (Q53). However, such tools only cover a small amount of the Success Criteria of WCAG2.0 (see section 2.1.5). The answers given by the respondents do not show a correlation between the use of commercial tools to improve and maintain the accessibility of the website and the audit results.

**Influence of software and ready-to-use solutions**

Software and ready-to-use solutions can influence the level of implementation of the web accessibility standards. According to 62 percent of all respondents, their CMS makes it easy to implement web accessibility (Q41) (Figure 5.48). Nonetheless, lack of support for web accessibility by the CMS is reported by 27 percent of the respondents (Q20j).

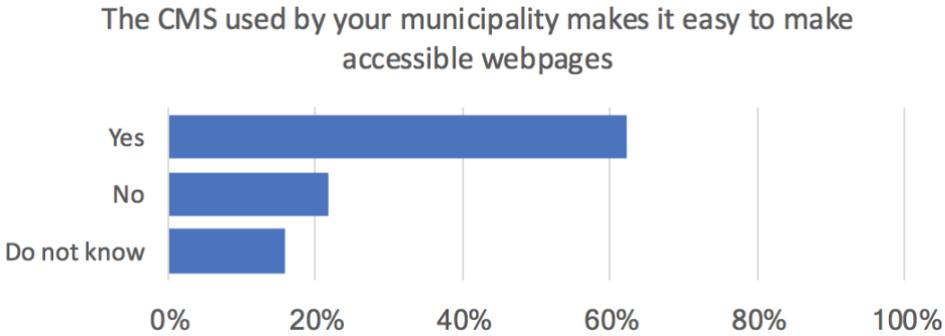


Figure 5.48: Percentage of municipalities where the CMS makes it easy to make accessible Web pages (Q41).

More than a quarter of the respondents (28 percent) report the existence of legacy information systems in their municipality as a barrier to the implementation of web accessibility standards (Q20a) and causes a lower level of implementation of the standards. Other barriers include the use of specific tools like a form generator that does not generate forms that are conformant with the web accessibility standards (29 percent) (Q20k). This means that the web team has to spend time to repair them afterwards if they can because in many cases software is external and generates content by itself. The web team cannot influence it but depends on the supplier to make the changes.

Even if respondents know about the possibilities provided by the standards to adapt the level of implementation of the standard to their situation, they do not report them. In the questionnaire, 19 respondents added a remark when they answered question 8: “people with disabilities (visual, auditory, motor) can use your current website (yes/no/do not know)”. The remarks could point to the existence of a conscientious strategy with regard to non-conformance related to time, capacity, existing software or continuous monitoring and repairing. Six remarks are about ReadSpeaker, presenting it as their accessibility solution or apologizing for not having the tool on their website. Five report that they have inaccessible PDFs without further explanation, three only know about accessibility for the visually disabled, and single remarks say: “we try”, “our video and geo information is not accessible” and “we applied as many as possible.” Only one remark is related to the the “external tools [we have to use] do not support web accessibility.” This supports the influence of specific software tools (see next section).

There is a correlation between the use of the CMS and the audit results (see section 5.3.8.1). The results of the questionnaire show that legacy systems and ready-to-use solutions like form generators influence the implementation but this is not reflected in the audit results. Results for applying information systems are further described in section 5.3.8.

*The results of the questionnaires show no correlations with the audit results for the items studied within this process (Adaptation of policies and standards). Although an earlier correlation may be relevant here: municipality has rules for the website and content shows correlation. No correlations with the audit results were found for the other items.*

### 5.3.7 Deploying financial resources

Based on the literature, in this dissertation deploying financial resources to support the implementation of web accessibility standards is proposed as an indicator of organizational support and the absence of financial resources is considered as an indicator of organizational resistance

The items of this proposition have been described in more detail in section 3.4.7. They were measured using the related questions visible in Table 5.11.

Process		Items	Questions
<b>Deploying resources</b>	<b>financial</b>	Budget and cost (for training, tools, awareness, external experts, percentage of total IT costs)	Q20e; Q29; Q45; Q48; Q49; Q51; Q52; Q53; Q54
		Current infrastructure and sunk cost of already existing infrastructure	Q45
		Municipal collaboration	Q33; Q34

Table 5.11: Deploying financial resources. Items and questions in the questionnaire.

Respondents report that their municipality spends financial resources on raising awareness and informing its own employees (55 percent) and training its web team (47 percent). Also 55 percent report spending financial resources on commercial tools to monitor web accessibility. 41 percent use text to speech services on their website (Figure 5.49). Although more than 50

percent report having a person appointed to monitor web accessibility, spending for this person is reported by 17 percent for an internal and 19 percent for an external employee.

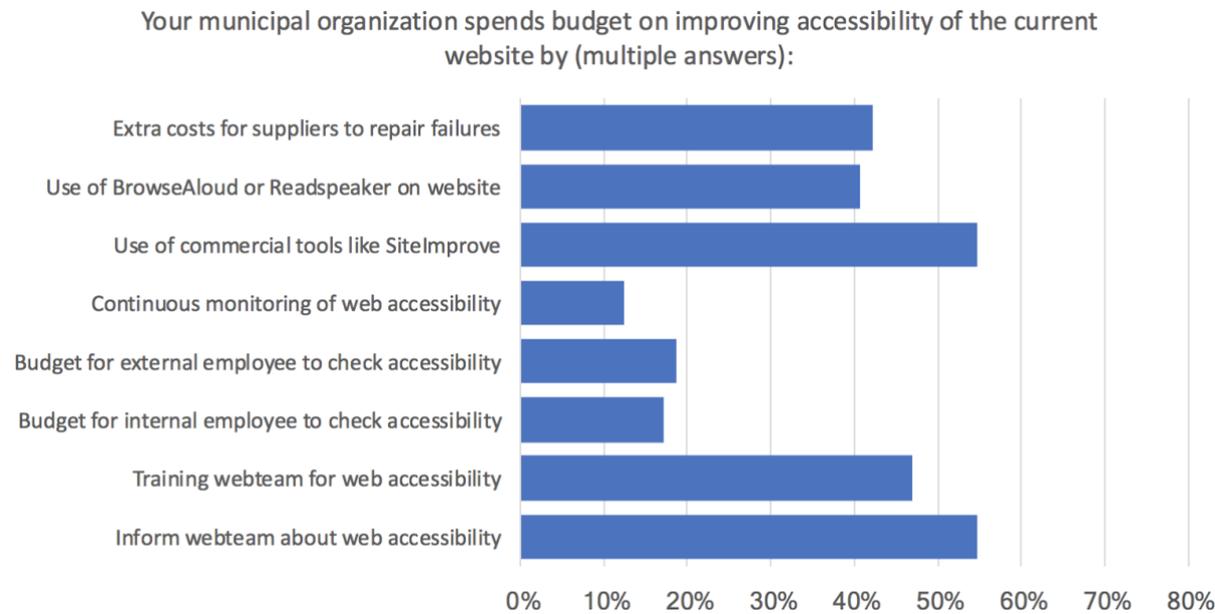


Figure 5.49: Percentage of municipalities that spend budget on particular activities and tools to improve the accessibility of the website (Q53).

29 percent of respondents state that they experience a lack of budget and indicate that this is a barrier to implementation (Q20e). When asked directly whether they feel that the budget is sufficient to maintain or improve website accessibility, respondents are divided (Q52). Figure 5.50 gives an overview of the reactions.

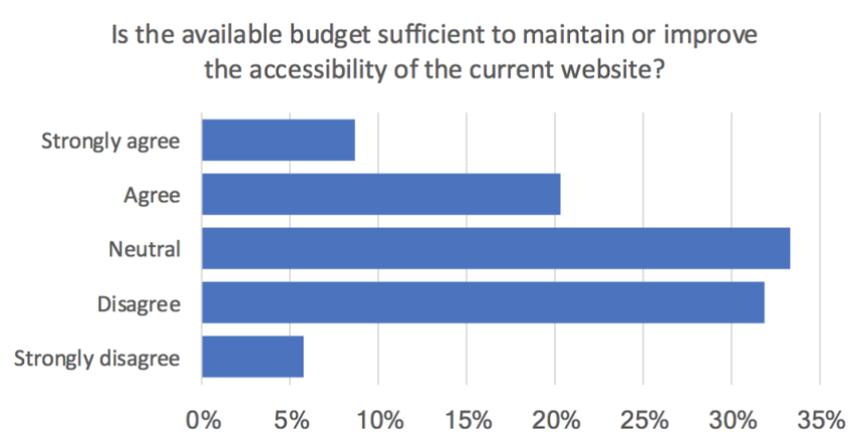


Figure 5.50: Percentage of municipalities and their opinion about the sufficiency of the available budget to maintain or improve web accessibility? (Q52)

Some municipalities are not hopeful when it comes to estimating the cost of implementing web accessibility standards to their website. Figure 5.51 shows that 22 percent of the respondents agree (including strongly agree) that it will be less costly to develop a new website than to make the current website conformant with the web accessibility standards (Q45). The rest may be just as pessimistic but due to the use of CMS systems it is not always

easy to change. If the CMS supplier is also the supplier of the mid-office, it may be impossible to redevelop a new website. The municipality is then completely dependent on the supplier.

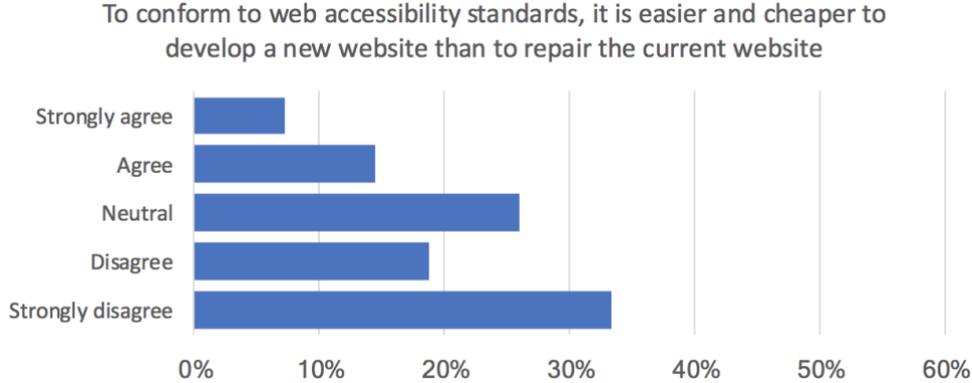


Figure 5.51: Percentage of municipalities that think it is easier and cheaper to develop a new website than to repair the current website (Q45).

Municipalities spend varying amounts on their website. Some have no idea of the cost because the CMS is part of a larger suite of applications. When asked for an indication of the total cost of the website including hosting, licenses, maintenance, changes, repairs, bug fixes, tools and training, the majority of websites fall between 11 and 50 thousand euros. Figure 5.52 shows the estimates of the respondents. Nine respondents skipped the question. The reactions include “I have no idea” and “unknown.” The numbers given by the respondents correlate with the number of employees who can publish content on the website. Municipalities that spend more money on their website (Q54) also have more employees who can publish on the website (correlation with Q29, calculated using Spearman’s Correlation,  $r_s = 0.321$ ,  $p = 0.012$ ) and they also report a higher percentage of cost (correlation with Q49, calculated using Spearman’s Correlation,  $r_s = 0.266$ ,  $p = 0.045$ ).

*“It is difficult to specify costs because the CMS is part of a large suite of applications including intranet, office system and answering portal”*

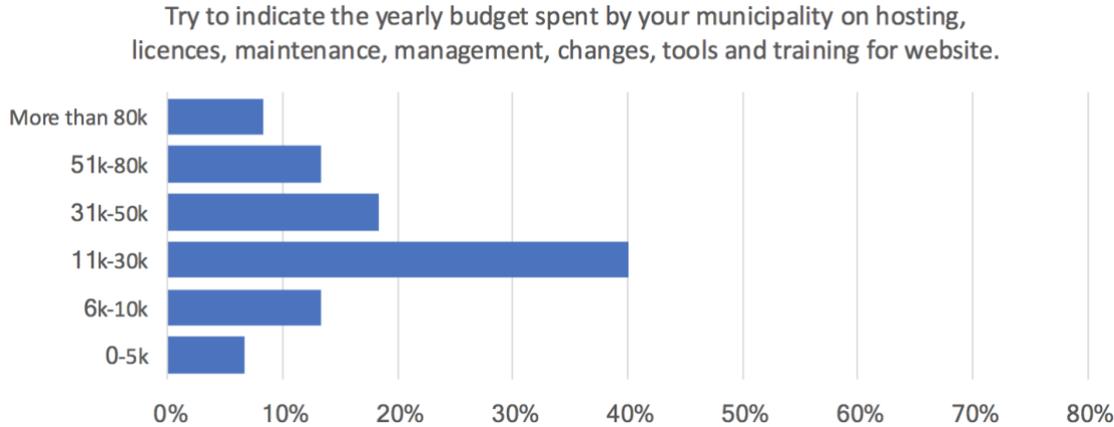


Figure 5.52: Percentage of municipalities and their estimation of the budget for the total cost of ownership of the website in thousands of Euros (Q54) n=60.

Spending on web accessibility is much lower. Figure 5.53 shows how respondents estimate the percentage of the total cost for the website that have been spent on web accessibility. The total spending over all municipalities would probably be much higher, but some

municipalities did not want to name figures and it is difficult to identify these specifics from the total costs of all applications and systems they have running. Some respondents indicated that the reason for not wanting to give more detailed figures and budget information was that they are afraid that this might negatively influence the prices in quotes and suppliers could use the information to charge more for their services.

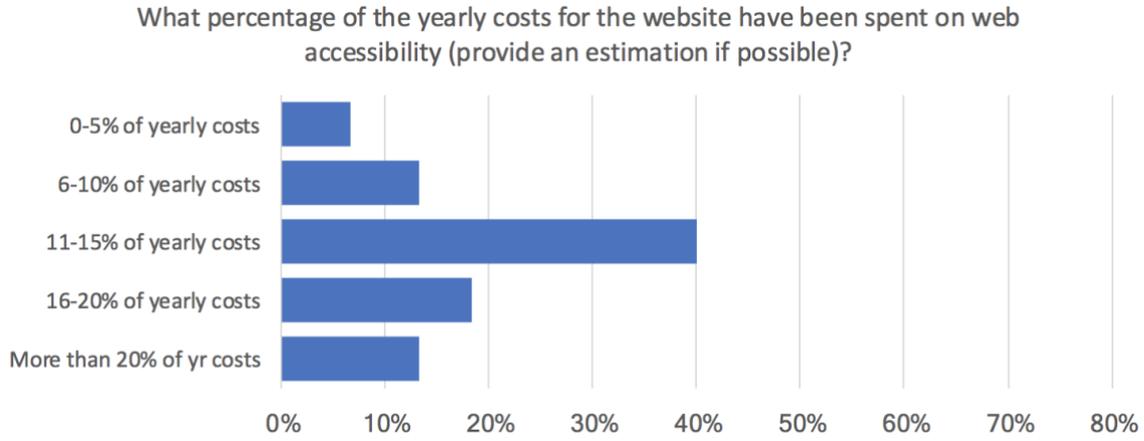


Figure 5.53: Respondents estimation of the percentage of the yearly costs of the website spent on web accessibility (Q49).

Not all municipalities seem to be in control when it comes to an overview of the total cost of information systems in the organization. The system’s costs are sometimes spread over many departments or even shared with other municipalities.

Literature proposes a spending of 10 to 15 percent on web accessibility (specifically on training) to be successful. However, spending by municipalities (estimated by the respondents) in the questionnaire is lower. Figure 5.53 shows the estimated percentage of the total budget spent on web accessibility. Figure 5.54 shows the spending compared to previous years (Q51). One respondent reported much higher spending than a year earlier. This is caused by preparations for a new website. Also other respondents (13 percent) report higher spending. Some of them are also caused by revisions of their website, mostly for a new website.

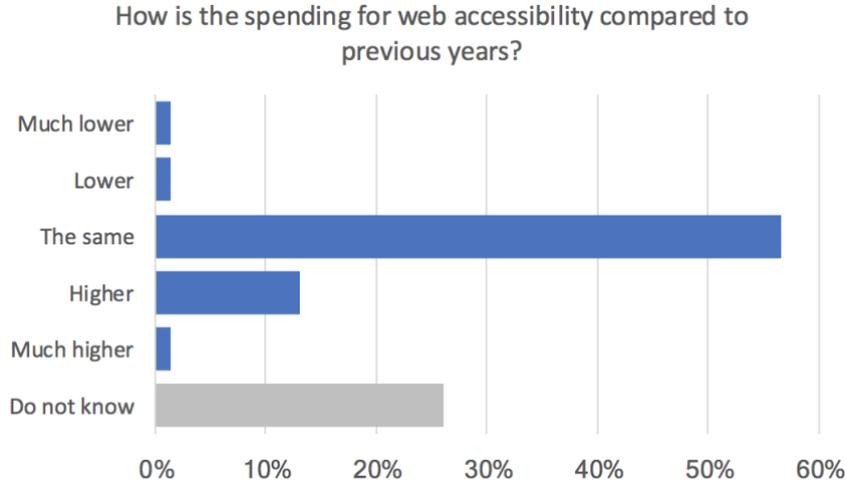


Figure 5.54: Frequency of spending by municipalities compared to previous years (Q51).

When talking to municipalities, their costs never seem to include employees. In the questions, specifically in question 54, employee costs were left out because respondents indicated they did not know them. Separate questions were then added to try and map the number of persons involved with the website and specifically with web accessibility.

Most respondents indicate they have 1 to 2 (43 percent) or 3 to 5 (37 percent) full time equivalents working on the website (back office, maintenance, management and content) (Q48). Figure 5.36 shows the number of people with the right to publish content on the website (Q29).

Respondents report collaboration with other municipalities and in platforms (such as for the further development of the CMS). In many instances, this is done for budgetary reasons. Sharing employees can save money and at the same time generate a larger shared budget. This budget could then potentially cover the costs of an accessibility expert, audits or web accessibility training for the web team. 22 percent of respondents indicate that they share employees with other municipalities (Q34). 50 percent indicate that they exchange information and best practices with other municipalities.

*The results of the questionnaires show no correlations with the audit results for the items studied within this process (Deploying financial resources).*

**5.3.8 Applying information systems**

Based on the literature, in this dissertation applying information systems to support the implementation of web accessibility standards is proposed as an indicator of organizational support and the absence of the application of information systems is considered as an indicator of organizational resistance.

The items of this proposition have been described in more detail in section 3.4.8. They were measured using the related questions visible in Table 5.12.

Process	Items	Questions
<b>Applying information systems</b>	Accessibility of CMS	CMS-data
	Techniques / elements in Web pages (interdependencies)	Q27c/d/e/l; Q20a; (20f/h/i/m; Q50; Q31)
	Legacy (within current infrastructure and sunk cost of already existing infrastructure)	Q20a
	Compatibility	Q20j/k; Q41; Q43
	Availability of testing- / other tools for accessibility	Q20n; Q36k-neg; Q36a/b/k(neg)
Quality of procurement	Q20l; Q44	

*Table 5.12: Applying information systems. Items and questions in the questionnaire.*

### 5.3.8.1 Accessibility and Content Management Systems

Even though the differences are moderate, when the top 5 CMS systems used on the websites are correlated with the audit results using Welch’s ANOVA, there is a statistically significant difference in the success of web accessibility implementation ( $F(4, 16) = 3.741, p = 0.025$ ) (Table 5.13). A Games-Howell post hoc test showed that Green Valley CMS ( $23.89 \pm 2.369, p = 0.046$ ) and SIMSite ( $23.20 \pm 1.581, p = 0.013$ ) had a significantly higher audit score compared to TYPO3 ( $20.90 \pm 1.663$ ).

CMS name	Frequency	Mean accessibility audit score	Std dev
GreenValley CMS	10	23.89	2.369
SIMSite	25	23.20	1.581
SmartSite	6	23.17	3.061
Drupal	8	21.88	5.027
TYPO3	10	20.90	1.663

Table 5.13: Website frequency and Mean accessibility audit scores for top 5 CMS systems in audit (CMS data).

Note that the differences in Table 5.13 are not just due to the CMS system. Content editors perform much of the implementation of the web accessibility standards when they add new content and functionality. For example, all CMS systems support alt-text for images, but it is up to content editors to actually add the alt-text to the page. Many respondents (62 percent) indicate that less than half (40 percent) of the people with the right to publish content on the municipality website have been trained in accessibility. If new or temporary or untrained employees add content, they may not know what the ‘alt-text’ field is for. Respondents (57 percent) also report a lack of time for the web team as a factor that influences the implementation of web accessibility (Q20f).

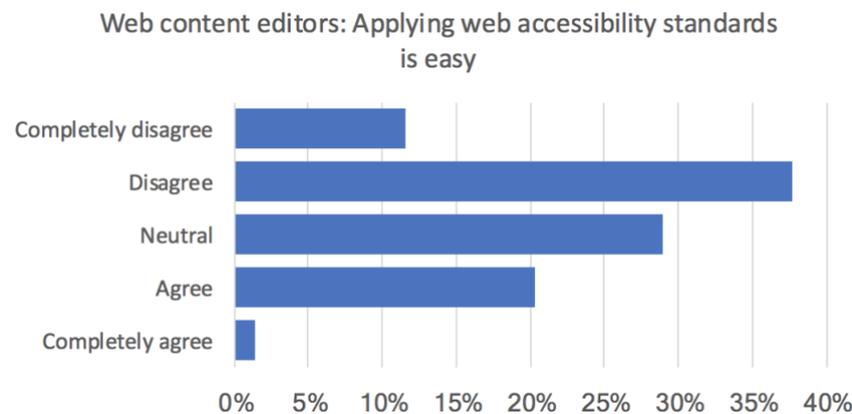


Figure 5.55: Percentage of municipalities where web content editors perceive applying web accessibility standards as easy (Q32).

The respondents were asked how they perceive the CMS in helping them make accessible Web pages. To the statement “with your CMS it is easy to make a Web page accessible” (Q41), 62 percent of the respondents answered “yes.” Less respondents (43 percent) answered “yes” when asked whether their CMS system makes it easier to fully conform with the web accessibility standards (Q43).

*“We asked the supplier to provide a document that describes where we do not yet conform to the standards. We have not yet received it.”*

*“Yes, it is easy to conform (and without extra cost), but it still requires a lot of manual work”*

*“There are always technical issues left that have to be solved by the developer”*

Web content editors do not find it easy to apply web accessibility to Web pages (Q32)(Figure 5.55). In 43 percent of municipalities, web accessibility is one of the requirements set for external suppliers (Q27d). For CMS systems, however, respondents do not always have a choice.

Some respondents indicate that their content is produced by people from other departments and that it may therefore not always be accessible when entered into the CMS (Q20h). This usually happens in larger municipalities. Respondents (12 percent) also report that their CMS suppliers have insufficient capacity to repair problems. Some respondents (49 percent) indicate that their municipality depends on external parties other than their CMS supplier to make the website accessible (Q50).

#### *5.3.8.2 Techniques elements in Web pages*

Use of specific technology can influence the successful implementation of web accessibility standards. Examples include video or office files (e.g. pdf, Word) or a technology like Adobe Flash that does not work on iOS devices. With regard to documents for the website, 48 percent of municipalities consider web accessibility.

*“Placing PDF on the website is a problem because they almost never conform”*

*“PDF documents are not conformant and it is expensive to make them conformant. This makes it impossible for us to fully conform with the requirements”*

Accessibility of content placed on Facebook Twitter or YouTube is considered by 8 percent of respondents. The audit results show that not many municipalities use video on their website. Most websites point to their Twitter and Facebook account, but this is usually considered out of bounds of the web accessibility standards.

Another type of content is provided by crowd sourcing. Users of a website can sometimes react to articles, use a chat (logged) or send in videos and images. None of the respondents indicated that they had arranged anything around the accessibility of crowd sourced content and media.

#### *5.3.8.3 Legacy*

28 percent of respondents name legacy systems as barriers for successful implementation of web accessibility standards (Q20a). There is no correlation between respondents experiencing legacy systems as barriers and the audit results (see appendix 2, question Q20a).

#### 5.3.8.4 Compatibility

All websites have components that are external and obligatory. Digid login was found on all sites. It is now accessible. No other obligatory systems or components were found on the audited websites.

#### 5.3.8.5 Availability of testing- / other tools for accessibility

Respondents (23 percent) complain about the lack of tools to support them with the implementation of web accessibility (Q20n). 38 percent report the use of free online tools to help them implement the web accessibility standards (Q36a). According to the respondents, 49 percent of the municipalities use external commercial tools to help them with accessibility (Q36b). It is not clear how much this use of tools actually helps accessibility implementation. But it is clear that if no tools are used besides what is in the CMS system, the website accessibility score is lower in the audits. There is a correlation between the audit results and the lack of use of tools to support web accessibility implementation. See results in Figure 5.42.

#### 5.3.8.6 Quality of procurement

Applying information systems and web accessibility is easier if the systems already support web accessibility. Procurement can be an important instrument to require this from suppliers. Besides checking the supplier's skills before awarding the contract (Q44), it is good to include web accessibility in the requirements for the end product or service (Q42) and to always test before launch. 61 percent check the skills of external suppliers before they award the contract and 78 percent includes web accessibility in the requirements. It is not known how many municipalities test the products before the acceptance phase.

*The results of the questionnaires show a correlation between the use of tools and the audit results for the items studied within this process (applying information systems). No correlations with the audit results were found for the other items.*

### 5.3.9 Moderators

Literature describes a number of moderators that could influence the implementation of web accessibility standards (section 3.5). Examples include the size of the municipality and available budget. Budget is part of one of the implementation processes and has been described in section 5.3.7. Below are the results of correlating the size of the municipality with the audit results. They were measured using the related questions visible Table 5.14.

Process	Items	Questions
<b>Moderators</b>	Size of municipality	Q27ah; Q35; Q49
	Available budget	(Section 5.3.7)

Table 5.14: Moderators. Items and questions in the questionnaire.

### 5.3.9.1 Size of municipality

One of the moderators from literature was the size of the organization, in this case of the municipality. The analysis found a number of statistical correlations. There is a statistical correlation between the size of the municipality (number of inhabitants) and:

- Internal web accessibility training of web professionals (Q27a) (Figure 5.56).
- Web accessibility included in job descriptions for new employees (Q27h) (Figure 5.57)
- Someone has been appointed to continuously monitor web accessibility (Q35) (Figure 5.58)
- Percentage of yearly website costs spent on web accessibility in 2017 (Q49) (Figure 5.59)

As can be expected, there is also a correlation between the size of the municipality and the number of full time equivalent employees working on the website (back office, maintenance, management and content) (Q48).

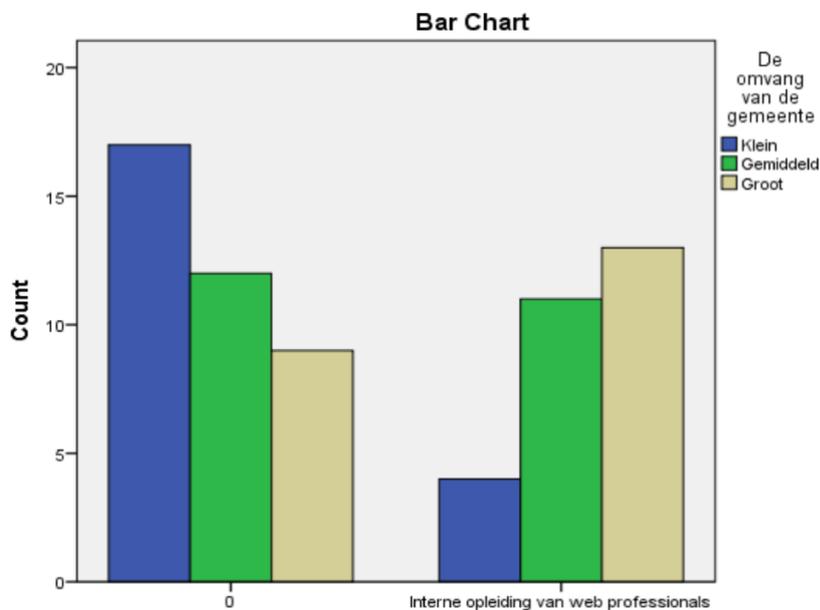


Figure 5.56: Bar Chart correlation between internal training of web professionals (Q27a) and the size of the municipality. (Pearson Chi-Square.  $\chi^2(2) = 7.676, p = 0.022$ ).

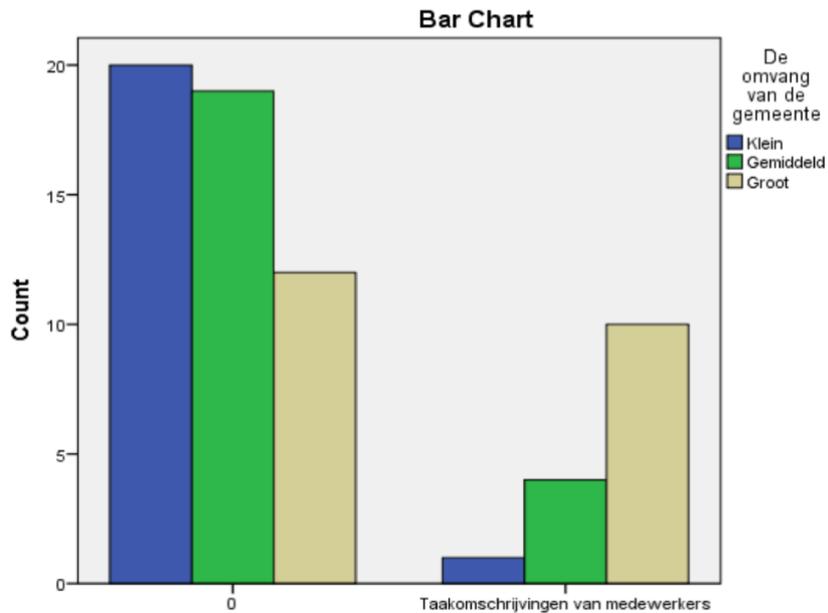


Figure 5.57: Bar Chart correlation between task description of employees (Q27h) and the size of the municipality. (Pearson Chi-Square.  $\chi^2(2) = 10.471$ ,  $p = 0.005$ ).

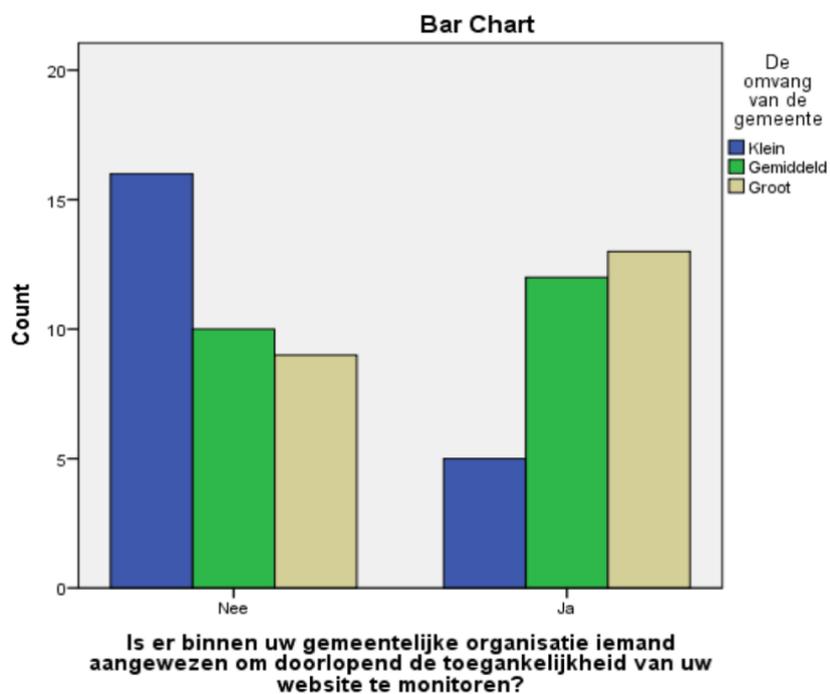


Figure 5.58: Bar Chart correlation between appointing someone to continuously monitor web accessibility (Q35) and the size of the municipality. (Pearson Chi-Square.  $\chi^2(2) = 6.324$ ,  $p = 0.042$ ).

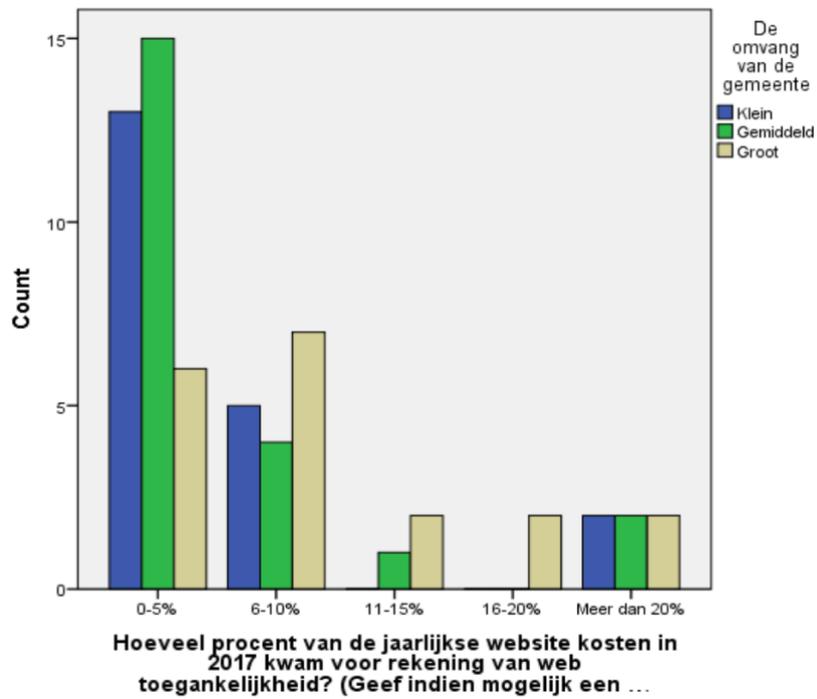


Figure 5.59: Bar Chart correlation between percentage of yearly website costs spent on web accessibility in 2017 (Q49) and the size of the municipality. (Spearman correlation)( $r_s = 0.266$ ,  $p = 0.038$ ).

## 6 PART 6: CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Conclusions

There are laws and regulations in force, requiring public sector bodies to adopt and implement standards for web accessibility. Municipalities in the Netherlands have freely and collectively adopted these standards. However, they often seem unable to fully implement web accessibility standards even if the law requires them to and they are actively pursuing it. Comparable results are available from many other countries. Many efforts have been made to support municipalities and actively help them implement the standards, but after the publication of a monitoring report showing non-conformance, the responsible Dutch minister concludes that “municipalities, provinces, water boards, non-departmental public bodies and central government agencies websites fail to conform with the required quality and accessibility standards.” He expects “that this will also be the outcome of the next reports except for central government websites.” This means that the Internet, made to offer equal opportunities to all users, including people with disabilities, has become a medium that creates a digital divide excluding persons with disabilities.

The minister proposes an approach that is less focused on testing conformance at the end of the process and one that is more focused on the implementation process as a whole. This dissertation follows that approach by looking into adoption and implementation theory (instead of compliance theory) to see whether that approach is better able to help identify factors that indicate resistance to and/or support for the implementation process of web accessibility standards to municipality websites. This is achieved by operationalizing organizational innovation processes into questions that are relevant for the implementation of web accessibility standards and then correlating the results with actual audit data relating to the conformance of the municipality websites with the web accessibility standards. While most literature focuses on compliance and on acceptance by individuals, this dissertation studies organizational implementation processes and searches for indicators that support or resist implementation of web accessibility standards by municipalities.

The research objective of this dissertation is to formulate recommendations for Dutch municipality organizations to improve the level of implementation of web accessibility standards. The outcomes may also help comparable public sector body organizations in other countries.

The conclusions start with a brief summary of the content of this dissertation including the research questions. This is followed by a section that presents the main findings of the study and sections giving the theoretical and practical implications. Finally, there is a section with recommendations for Dutch municipality organizations based on the findings and the literature.

### 6.1.1 Brief summary of parts

This dissertation consists of 6 parts. Part one describes the background and motivation for this dissertation. It then sets out to define the main terminology and concepts used in this dissertation, like people with (temporary) disabilities, web accessibility, adoption and implementation and factors of resistance and support. It describes how people with disabilities use the web and explores some of the effects of inaccessibility like low employment rates. Persons with disabilities are defined using the UN Convention: *“persons who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.”* The definition is further extended to support both the social perspective of disability and situational disabilities. Web accessibility is defined based on the W3C requirements for web accessibility as: *“Accessibility means that websites, mobile applications and the web of things are Perceivable, Operable, Understandable and Robust for all people, whatever their hardware, software, language, location, or ability.”*

In this dissertation, resistance is the extent to which the implementation of web accessibility standards is not supported, obstructed, delayed or prevented from making progress. Note that this includes barriers to implementation like a lack of support or passivity of the organization regarding the implementation. As implementation of web accessibility standards is obligatory, taking no action is regarded as a form of resistance.

Part one ends with the conceptual framework and the research questions. The main research question in this dissertation is:

*“Which organizational factors influence resistance and/or support in the implementation of web accessibility standards to local government websites in the Netherlands?”*

Part two then provides an explanation of the web accessibility standards. This includes a short explanation of the limitations of web accessibility tools. It also describes the legal and human rights case, the business case for accessibility and the actual progress of the implementation of web accessibility in the last decade(s). It concludes with an overview of common website accessibility failures. The web accessibility failures are universal. Almost the same failures reported in literature studies around the world are found in the Netherlands. From this part it may be concluded that the implementation problems encountered in the Netherlands occur in many other countries around the world. This part answers the questions about the extent to which municipalities in the Netherlands are conformant with the web accessibility standards. The current conformance level of municipalities is available through the audits of the municipalities that participated in the study.

Part three describes compliance, conformance and performance and then searches models from literature that can help find factors that support or resist web accessibility related implementation processes.

This dissertation focuses on adoption and implementation theory (instead of compliance theory) to see whether that approach is better able to help identify factors that indicate resistance to and/or support for the implementation process of web accessibility standards to municipality websites. While compliance theory is based on a more normative approach to

the problem (is the law applied, are the standards applied), adoption and implementation theory looks for an empirical approach observing the actual factors that play a role in the process of implementation. Following this, a model is composed, based on and adapting the model proposed by Ebbers & van Dijk that does not focus on compliance, but on identifying organizational processes of resistance to and support for e-government innovations (See Figure 6.1 for the adapted model). The model contains many of the innovation-related elements identified in other models and frameworks but instead of focusing on the individuals within organizations, or extending such models to include organizational aspects, this model describes *organizational* processes that support or resist the initiation and implementation of innovations within e-government organizations. The model also views implementation as a continuous (non-linear) activity thus reflecting the reality of implementing web accessibility standards to websites and mobile applications. The model specifies adoption as the exact demarcation between the initiation and the implementation phases but it offers the cyclical possibility to include adoption of new innovations at all times. In this dissertation, the processes have been applied to web accessibility implementation and operationalized to questions regarding web accessibility implementation. The processes, their indicators, indices and items related to web accessibility have been described in section 3.4.

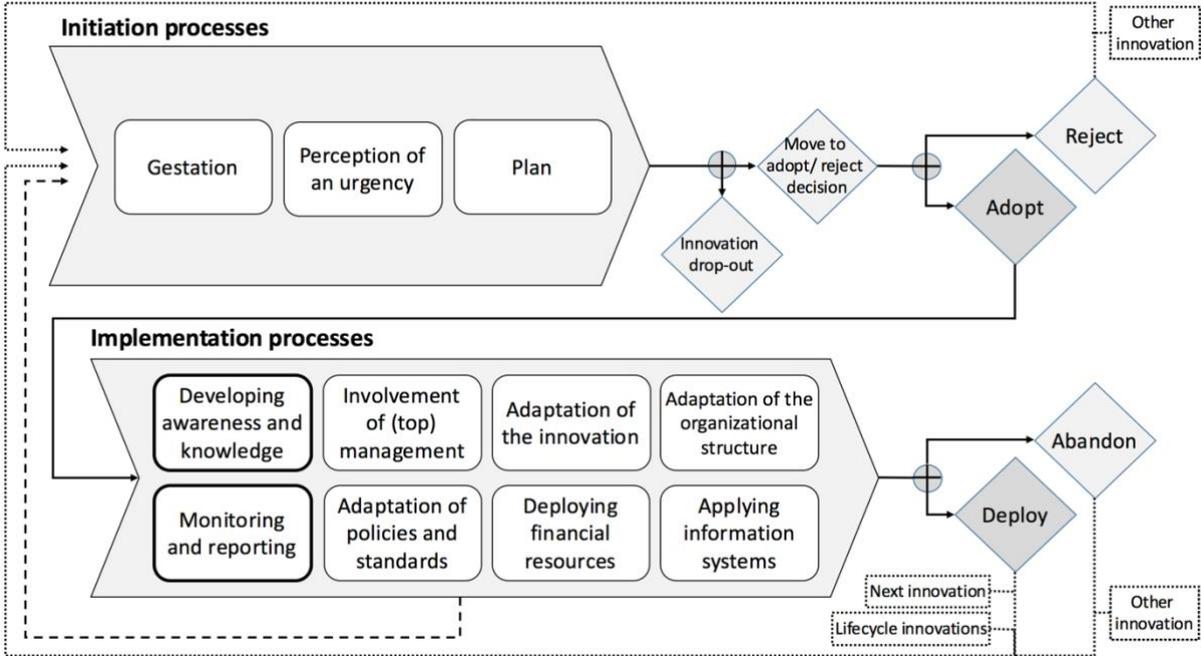


Figure 6.1: Web accessibility innovations initiation and implementation model. The model is an adaptation of the model of the initiation and implementation of innovations by Ebbers & van Dijk (2007) to the subject of this dissertation (web accessibility implementation by municipality organizations). Main changes include (1) replacing ‘clarification’ by ‘developing awareness and knowledge’ and (2) adding ‘monitoring and reporting’.

This part answers the questions about relevant factors (processes, indicators, indices and items) for web accessibility standards implementation by municipal organizations by looking at theories of organizational adoption and implementation processes of ICT, web accessibility literature, monitoring reports and other literature. It includes factors named in literature like the legal case and the business case for web accessibility.

Part four presents the empirical investigation of the implementation of web accessibility standards in Dutch municipalities. It describes how the model in part three has been operationalized in the conformance measurement, the questionnaire and interviews.

Part five describes the results of the audits of the municipality websites and of the questionnaire for each of the implementation processes. In total, 69 municipalities participated in the study combining questions about the processes in their organization (related to web accessibility implementation) and the manual audit results by an accessibility expert (see section 4.1.4). The respondents were not necessarily familiar with the technical side of the web accessibility standards. This part answers research questions about the current conformance level of municipalities in the Netherlands, whether they have a good understanding of the state of accessibility of their website and whether the statements on their website reflect the actual accessibility evaluation results. This part also concludes what factors are indicators of resistance or support

### 6.1.2 Key findings

In most organizations, implementation of web accessibility standards does not seem to be structurally embedded in a process, although some respondents indicate that it is part of requirements set by policy, or included in the design guide of their website. Others indicate that they have a person who monitors the status. Many still seem to approach web accessibility in a rather ad hoc fashion and if there are web accessibility failures that need to be repaired, tasks are divided ad hoc over the web team.

Only 27 percent of the respondents report that their municipalities set clear goals and deadlines when they encounter web accessibility failures for people with disabilities. During the interviews, respondents indicated they rarely receive tips about web accessibility failures. This may not be surprising if we consider that most websites are audited less than once a year (72 percent), do not have a feedback form for accessibility (78 percent) and have not appointed a person to continuously monitor the accessibility of the website (52 percent). It may then not be surprising that municipalities indicate that people with disabilities rarely point them to web accessibility failures. And for municipalities, this may even be logical because 88 percent of the respondents report that their current website is accessible for persons with disabilities (visual, auditory, motor disabilities). Only 1.5 percent think that their website is not accessible and cannot be used by persons with disabilities. The others do not know.

However, the audit results for the websites show a totally different situation. The audits used the guidelines and methodology described in section 2.1.1 and section 2.1.4. The audit shows that none of the websites is fully conformant with level AA of the Web Content Accessibility Guidelines (WCAG2.0). The Mean number of failures per website was 8.04. The best websites still failed for 3 or more of the 38 Success criteria (WCAG2.0 AA). Some municipalities think that web accessibility standards are covered by adding text to speech tools on their website and some think that automated tools can check for all Success Criteria. This is not true. Section 0 describes the possibilities and limitations of tools.

To answer the question “What do municipalities publicly declare about their website accessibility standards conformance and does this reflect the actual accessibility evaluation results?” the study looked at the accessibility statements and conformance logos on the websites. Although only 47 percent of respondents indicate that their municipality finds it important to publicly report on how their website conforms with the web accessibility standards, they are required by law to provide an accessibility statement. The low importance may help explain why, at the time of the audits, a quick look around municipality websites showed that only 221 of the 380 municipalities had an accessibility statement on their website. 200 statements were incomplete, old or incorrect and only 23 accessibility statements were up-to-date and contained deadline dates that had not yet expired. This number is very low. Although the availability of an accessibility statement would presume that they are working on web accessibility, the municipalities with such a statement do not score better in the audit results than municipalities where no information about conformance was available prior to the audits.

Besides the accessibility statements, the websites of all municipalities were studied to find statements or logos of conformance or non-conformance. Of the 69 websites in the final sample, 8 were pre-estimated to be conformant with the standards, 30 were pre-estimated to be non-conformant based on their accessibility statement (of non-conformance) and for the other 31 websites no information could be found about their conformance prior to the audits. The audit results show that in the end, all websites failed on 3 or more Success Criteria. The failures that were found in literature (see section 2.5) were also found on the municipality websites in this study. When looking at the Mean values for the three groups of websites (accessible, statement and unknown), websites of organizations with logos or conformity declarations by third parties score better (but this is not statistically significant).

### 6.1.3 Implementation processes

#### **Developing awareness and knowledge**

Awareness of the current situation of their website’s accessibility is not high for many municipalities. This is illustrated by the fact that 88 percent of respondents think that their municipality website is accessible for persons with disabilities, while the audits show that none of the websites are actually fully conformant. This shows that the level of knowledge as well as the level of monitoring is still low and sometimes solely relies on automated testing or monitoring. Section 3.4.1 describes a number of misconceptions about web accessibility and argues that if knowledge levels are low, misconceptions tend to surface. This may explain some remarks by respondents about tools and the web accessibility standards. Some respondents think that tools like text2speech cover accessibility. Others think tools can test for all accessibility criteria while this is only somewhere between 5 and 15 percent.

Authors in literature propose spending between 10 and 15 percent of the implementation budget on training, 56 percent of municipalities spend less than 5 percent of their budget on training. 82 percent spend less than 10 percent.

Some authors argue that it is the right match between the user’s experience and the complexity of the system (here the web accessibility standards) that is important, but only a small portion of the respondents can be regarded as novice users. More than 90 percent has

3 or more years of experience with the website and almost all say they know the WCAG and Webguidelines standards (resp. 75 and 97 percent). They can hardly be regarded as novice. A quarter of the respondents indicate that both their own web team and their external suppliers lack the necessary knowledge about web accessibility. Although more than half of the municipalities say they spend money on training, only a very limited percentage of web team employees have actually been trained. A large percentage of the respondents (42 percent) indicate that in their organization, less than 1 in every 10 people receives training in web accessibility.

Organizations with more awareness and knowledge score significantly higher in the audit results. This is illustrated by correlations of the audit results with awareness of rules and regulations (e.g. EU Directive, WGBH/cz) and with knowledge of the standards for web accessibility (Web guidelines and/or WCAG2.0). This means that developing awareness and knowledge about web accessibility standards, rules and legislation seems to help the implementation of web accessibility and is reflected in the audit results. Items of this process include: developing awareness of rules and regulations, developing familiarity with the standards, availability of supporting information and tools, developing awareness of the current web accessibility situation, measures to promote awareness and knowledge (like training of skills) and municipal collaboration.

#### **Involvement of (top) management**

The urgency in municipalities, both among management and policy makers, is lower a top management person has not been appointed. Correlations were found with a sense of urgency, management writing plans and availability of a municipal policy plan specifically including web accessibility. No direct correlations were found with the audit results. The results of the questionnaires lead to correlations regarding the items studied within this process (involvement of (top) management) but not with the audit results. This means that involvement of (top) management seems to have generated a positive change in the sense of urgency within municipalities regarding web accessibility but that the results are not reflected in the audit results.

#### **Adaptation of the innovation**

In the case of web accessibility standards, making changes involves participation in international standardization activities. These activities can take a long time (sometimes many years) and involve many stakeholders. It would require municipalities and/or their umbrella organizations to spend time and budget on standardization. The outcome could however benefit the implementation by municipalities. Their (indirect) involvement could support adaptation of the standards to the requirements of (future) municipality users (e.g. the organization, employees, designers, developers etc.) with and without disabilities. Despite the fact that they have to implement the standards and that 28 percent of the respondents complain about the complexity of the standards, Dutch municipalities or umbrella organizations like VNG (Association of Netherlands Municipalities/Vereniging van Nederlandse Gemeenten) are not (currently) participating in the W3C Accessibility Guidelines Working Group (August 2018). Because of the non-participation of municipalities in the standardization work, it was not possible to correlate this with the audit results.

### **Adaptation of the organizational structure**

With regard to this process (adaptation of the organizational structure), the results of the questionnaire show positive correlations with the audit results. A correlation was found between the 'use of rules and procedures' (Use of rules) and the audit results. A correlation was also found between 'responsibilities and task delegation' (person appointed to continuously monitor web accessibility) and the audit results. Additionally, a correlation was found between 'Network and collaboration' (influence of neighboring municipalities scoring higher for web accessibility) and the audit results. At the same time, there is a correlation between the size of the municipality and 'performance evaluation' (in larger municipalities, people in the organization are addressed more often in the case of non-compliance with the web accessibility guidelines).

Correlations were also found with the items 'influence and involvement of web team' (correlation of audit results with the presence of an internal employee responsible for web accessibility) and for 'influence and involvement of other stakeholders' (correlation with pressure from central government obligations with regard to web accessibility). Organizations that organize the involvement of users score better in the audit results.

No correlation was found for the element 'Drafting of plans and policies' except that there is a correlation between the existence of a plan written by management and the availability of top level management commitment. The same applies to the existence of a policy plan.

When it comes to web content, various actors participate in the process. Most web teams (73 percent) have between 0 and 10 members. But not all people who can publish content on the website are part of the web team. Many are part-time employees with different agendas and working days. Additionally, more than 20 percent of respondents indicate that their municipality shares employees with other municipalities. This creates opportunities for smaller municipalities, but can also slow down the implementation process (dependencies). This means that adaptation of the organizational structure generates a positive change in the actions of municipalities regarding web accessibility and that this is reflected in the audit results

### **Monitoring and reporting**

The results of the questionnaires show correlations with the audit results for some of the items studied within this process (Monitoring and reporting). Positive correlations were found with the items 'monitoring and testing' (specifically with the lack of tools besides the CMS system) and with 'quality assurance' (specifically testing content before publication).

No correlations were found for the element 'plans/statements'. The frequency of monitoring is mostly low. 72 percent of municipalities monitor their website less than once every two years. Some municipalities hire an external expert organization (33 percent) and some municipalities monitor use a commercial monitoring tool (54 percent). If they do not add manual evaluation, the information they have about the actual accessibility of the website will be very limited. However, the correlations show that municipalities that do not use any tools besides the CMS score lower in the audit results.

When auditing, respondents indicate that they involve people with disabilities (23 percent), external expert(s) (29 percent) and experts shared with other municipalities (8 percent). About 22 percent of respondents report that their municipality has a feedback form that can be used by people with disabilities to provide feedback or request inaccessibility information

in an accessible format. An element of reporting is the requirement to provide an accessibility statement. As concluded earlier, only 23 accessibility statements were up-to-date and contained deadline dates that had not yet expired.

The figures and correlations show that monitoring and reporting influence the implementation of web accessibility standards by municipalities and are visible in the audit results.

### **Adaptation of policies and standards**

The results of the questionnaire show no correlations with the audit results for the items studied within this process (Adaptation of policies and standards). Respondents from 36 percent of municipalities report changes to policies, procedures, rules and local legislation to support implementation. Interestingly, 20 percent do not know whether this has happened. There is a correlation between the changes to local policy, procedures, rules or legislation and the size of the municipality. The changes are reported more by respondents in larger municipalities than in smaller municipalities. 42 percent of municipalities are reported to have policies regarding web accessibility. In only 14 percent of municipalities, a plan is written by management. This is related to the availability of a top level manager. Concerning standards, 60 percent of municipalities use rules for web accessibility (e.g. WCAG, webrichtlijnen, digitoegankelijk and EN 301 549).

Even though legislation requires 100 percent conformance, aspects like time, capacity, budget and available (legacy) information systems may force an organization to make a selection of the Success Criteria (SC) or to only partially implement (part of) them. They may choose to implement the rest at a later time. Respondents report lack of time in their web team (57 percent) and lack of knowledge (25 percent) and capacity (12 percent) with their suppliers. Almost half of the municipalities depend on others to repair failures. Suppliers can also be other departments providing content that is not conformant. In all cases, it means that they have to prioritize repairs (and corresponding budgetary effects) thus consciously influencing the level of implementation of the web accessibility standards. Although respondents indicate that the lack of time, capacity and dependency is a barrier to the full implementation of the web accessibility standards, the audit results do not show a correlation.

More than a quarter of the respondents report barriers to the full implementation of the web accessibility standards. These barriers include lack of support by their CMS (27 percent), the use of legacy information systems (28 percent) and the use of specific ready-to-use tools like a form generator that does not support the innovation (29 percent). The results of the questionnaire show that legacy systems and ready-to-use solutions like form generators influence the implementation but this is not reflected in the audit results.

Although no correlations were found (except with the CMSs), the respondents describe barriers and indicate these barriers are reasons for non-compliance both with the standard and with legal and regulatory requirements. Adaptation of the level of implementation of the standard seems to be a rather normal approach, forced by lack of time, lack of capacity and dependency on others (internal and external). In the long run it does however not yet seem to lead to full conformance. More knowledge about the possibilities to adapt the innovation and plans for control and repair would be advisable. Some organizations seem to already try and address control and repair using free and commercial tools. Respondents from 55 percent

of the municipalities report the use of a commercial tool for continuous checking and repairing, but it is important to note that these tools only offer limited coverage of the standards.

### **Deploying financial resources**

More than a quarter of the respondents (29 percent) state that they experience a lack of budget and indicate that this is a barrier to implementation. If asked for an indication of the total yearly cost of the website, including hosting, licenses, maintenance, changes, repairs, bug fixes, tools and training, the majority of the respondents report amounts between 11 and 50 thousand euros. Municipalities that spend more money on their website also have more employees who can publish on the website. When talking to municipalities, however, it seems that their costs never include employees. Most respondents indicate that they have 1 to 2 (43 percent) or 3 to 5 (37 percent) full time equivalents working on the website. These are mostly part-time employees.

Not all municipalities seem to be in control when it comes to an overview of the total costs for information systems in the organization. The system costs are sometimes spread over many departments or even shared with other municipalities.

No correlations with the audit results were found for the other items.

### **Applying information systems**

The results of the questionnaire show a correlation between the use of tools and the audit results for the items studied within this process (applying information systems). Almost half of the respondents (49 percent) use external commercial tools to help them with accessibility. Organizations that do not use tools besides their Content Management System (CMS) score significantly lower audit results.

More importantly, the audit results show a correlation with the CMS that is used. Looking at the top 5 CMS systems used by Dutch municipalities, there is a statistically significant difference in the success of web accessibility implementation. Note that content editors perform a large part of the implementation of the web accessibility standards when they add new content and functionality. It was concluded earlier that only a limited number of web team members have been trained for web accessibility. Almost 50 percent indicate that they depend on external parties (other than their CMS supplier) to repair accessibility failures. Twelve percent report that their CMS supplier lacks sufficient capacity to repair the failures. Accessibility of PDF documents is a major problem for municipalities. In 82 percent of the municipalities, the PDF documents are not conformant with the requirements. There is no correlation between the audit results and legacy software, but 27 percent of respondents name legacy systems as a barrier for successful implementation.

Quality of procurement is reported in literature as an important element to support web accessibility implementation. 78 percent of respondents include web accessibility in procurement requirements. However, this does not lead to a correlation with the audit results. The explanation may be in the fact that organizations do not really have a choice if they already use a certain CMS.

Applying information systems seems an indicator of web accessibility implementation. The choice of the CMS and the use of tools to support the web team is important for the actual audit results.

## **Moderators**

There is a statistical correlation between the size of the municipality (number of inhabitants) and a number of items like Internal web accessibility training of web professionals, web accessibility included in job descriptions for new employees, someone appointed to continuously monitor web accessibility and the percentage of yearly website costs spent on web accessibility in 2017. There is also a positive correlation between the size of the municipality and the number of full time equivalent employees working on the website (back office, maintenance, management and content). However, there is no direct correlation between the size of the municipality and the audit results. The size of the municipality does not directly influence the audit results

## **Changing techniques (standards)**

It is important to conclude that although the guidelines and Success Criteria in the Web Content Accessibility Guidelines (see section 2.1.1) are stable, technologies on the (mobile) web are constantly changing. This means that there is a constant flow of new techniques to apply them in an accessible way. One important example is the current visualization trend. Websites tend to place more and more interactive elements, videos and animations. Providing accessible alternatives can then be more work than adding a description to an image. At the moment the automatic subtitles generated by Youtube are not yet sufficient. This requires a person to sit down and add captions and if necessary audio descriptions to a video or animation. Another trend is placing user generated content like adding Twitter feeds or photos and videos of a product or place by users. In some municipalities, users can upload photos of roads that need reparations. Accessibility standards require these images to be described but not all users who upload this content will understand why they should do that. This complicates the implementation, specifically with regard to adaptation of the innovation.

## **6.2 Effects of results on the model**

The model includes 8 implementation processes that are based on the model proposed by Ebbers & van Dijk (see section 3.3). Their model provides an operational definition and a number of indicators for resistance (constraining) and support (enabling) for the initiation and implementation of innovations related to electronic government services in contemporary government organizations. For this dissertation, their model was operationalized and extended for web accessibility. To accomplish this, a few changes were made.

The clarification process in the model of Ebbers & van Dijk was focused on “helping government personnel to understand the usage and effects of the improved electronic government services”. In their model, awareness is not part of clarification but of the perception process during the initiation phase. However, web accessibility literature describes the continuous importance of awareness and knowledge during all phases. The results described in this dissertation show that in many municipalities, the implementation phase has started even if awareness is low. This means that developing awareness should also take place during the implementation phase. Also the level of knowledge is low. A quarter of the respondents indicate that their web team lacks the necessary knowledge about web accessibility and 56 percent of municipalities spend less than 5 percent of the implementation budget on training while literature proposes to spend between 10 and 15 percent. The results show that municipalities that develop awareness and knowledge score significantly higher in

the audit results. For web accessibility, 'clarification' was therefore reframed and extended to 'developing awareness and knowledge'. This way, awareness and knowledge are part of the implementation phase.

Because of the importance of monitoring and reporting in literature, this has been added to the model as a separate process 'monitoring and reporting'. This is related to awareness and knowledge. The answers to the questions about awareness and knowledge show that the actual status of the web accessibility conformance is unknown to a large group. The fact that 88 percent thinks their website is accessible while none are fully conformant with the standards indicates that knowledge of the actual status is mostly low. But it may also be an indication that monitoring is low. The results seem to support that conclusion by showing that 72 percent of municipalities monitor their website less than one every two years. Some use tools for continuous monitoring although tools can only measure a limited percentage of the total web accessibility standards. Also, only 23 out of 380 municipalities had up-to-date accessibility statements online. The use of tools for monitoring is important. Municipalities that do not use any tools (besides their CMS) score lower in the audit results. Monitoring and reporting is an important provider of information about the actual web accessibility status and influences the awareness and sense of urgency. Reporting by way of the Accessibility Statement is also legally required.

The process of adaptation of the innovation was included into the model but no municipalities were found that participated in the standardization activities. It was not included in the questionnaire, but could be interesting for further study.

This leads to a total of 8 processes of innovation implementation in the implementation phase of the web accessibility innovations initiation and implementation model used in this dissertation.

The model has proven to be useful to address web accessibility implementation. It is not a causal model but process oriented. The focus of the model on the organization versus the individual within the organization *and* the proposition of processes with indicators of resistance and support fit well with the goal of this dissertation. It addresses both initiation and implementation processes, has an emphasis on the implementation part of innovation, is not focused on policy compliance measurements and views implementation as a continuous (non-linear) activity.

When studying the answers provided by the respondents and relating them with the actual audit results, not all the items that are proposed to measure the processes seem equally relevant. Correlations with deploying financial resources seem to be limited to the size of the municipality where large municipalities have more employees in their web team and spend more budget on the website and on web accessibility than smaller municipalities. However, not all municipalities seem to be in control when it comes to an overview of the total costs for information systems in the organization. The systems costs are sometimes spread over many departments or even shared with other municipalities making it difficult even for managers to have an overview of the total cost of ownership of their website and of web accessibility. More research into the deployment of financial resource would be necessary. But this would also

mean that municipalities need to be able to present the financial information needed for such a research.

## 6.3 Recommendations for municipalities

Municipalities in the Netherlands have freely and collectively adopted the standards for web accessibility. They have also actively set out to implement these standards on their website. However, based on the results of the 2012 monitor and the audits of the 69 websites of participating municipalities in this dissertation, they often seem unable to fully implement web accessibility standards even if the law requires them to and they are actively pursuing it.

To explain this, most literature focusses on compliance (is the law applied, are the standards applied) and on acceptance by individuals. However, this dissertation takes a novel approach. It looks for organizational implementation processes and searches for indicators that support or resist implementation of web accessibility standards by municipalities. The exploratory 'web accessibility innovations initiation and implementation model' used in this dissertation helps to identify these organizational processes of resistance and support to web accessibility implementation. The model is applied to web accessibility using a questionnaire and detailed manual web accessibility audits of the 69 participating municipalities.

Besides the audit results and their correlation with the processes, this procedure also provides a long list of web accessibility failures. This offers the opportunity to look for quick wins. As promised to the participating municipalities, the result includes a list of things to do or not to do based on the factors that support or factors that resist web accessibility implementation.

### 6.3.1 Recommendations with regard to the technical standards implementation

Almost 28 percent of respondents perceive the web accessibility standards as too complex. As the web accessibility standards are a technical standard, it is difficult to require them to be easily understandable for non-technical people. However, there are many resources (including by the W3C/WAI) that explain the guidelines and Success Criteria in less technical terms including examples of the impact for people with disabilities and best-practice implementations. There are also documents about maturity models for the organization, easy checks etc. There are resources that address different roles like web content editors, managers and policymakers. It would be good to provide an overview of these documents and a translation of the most important resources into the Dutch language. The translations may be specifically focused on municipalities. Municipalities that know the standards and legal framework score higher audit results

When looking at the technical side of the standards, the results give an overview of the number of times a Success Criterion has failed for one of the 69 websites (Table 5.3). Figure 5.1 shows that none of the websites failed for more than 15 Success Criteria. The 3 best scoring websites fail for only 3 Success Criteria. This means they are doing well, but are not yet completely ready. Repairing Success Criteria that fail on many websites could have a significant impact on the total score of the municipalities. The following list presents a non-

exhaustive overview of Success Criteria of which repair seems feasible and that would have a high impact on web accessibility (Based on the results in Table 5.1). Some of the items may be applied by content editors, others have a more technical nature.

### Content related quick wins

1. **Use heading markup for headings (Dutch: Koppen).** Usually, when web content editors wish to use a heading, they can select the heading text and then use a preset for headings in their CMS (e.g.: h1 – h6 or kop1, kop2). Assistive technology (see section 1.2.3) can recognize heading markup and announce that the text is a heading. This helps people with disabilities understand a text. Using their assistive technology they can also navigate from heading to heading as a quick way to find content on a Web page (SC 1.3.1).
2. **Use list markup for lists.** Usually, when web content editors wish to make a bulleted or numbered list, they can use a preset in their CMS. This is a button with bullets or numbers. Assistive technology can then announce that the text is a list (including the number of items and subitems etc.). Do not make your own lists using ‘-’ or ‘\*’ etc. without using list markup (SC 1.3.1).
3. **Add descriptions to images.** By adding descriptions to images (like photos, charts, diagrams, audio, video, pictures, and animations), the content of the images can be read to persons with disabilities. This helps persons who cannot see or read these images. Many of the audited websites (62 percent) fail for this Success Criterion. Most CMS provide the option to add such a description (for images this is usually known as the ‘alt-attribute’). Note that some websites fail because they apply this Success Criterion the wrong way. (SC 1.1.1).
4. **Do not use ‘click here’ or ‘more’ for links.** Give links a description that works when they are read out of context (SC2.4.4). Assistive technologies can provide the user with an overview of the links on a page to help them navigate more quickly and easily. Do *not* use “click here” for links (Dutch: “klik hier” or “lees verder”).
5. **Make your PDF documents accessible from the start.** Many seem to ignore the fact that office documents downloadable from a website are also covered by the accessibility standards (see section 2.1.1). There is much information about making office documents like PDF accessible online. For PDF this can mostly be done directly from Word, Open Office or using Adobe Acrobat Pro. The failures most found in PDF documents are the lack of page titles (SC 2.4.2) and the lack of language indication (SC 3.1.1). Both page titles and language of the page can be added using Adobe Acrobat Pro or directly in Open Office or Word).

### Technology related quick wins

6. **Use labels.** Use label or title elements to associate text labels with text fields and other form controls (SC 4.1.2). Assistive technology can use this to recognize and present the information to user.

7. **Use sufficient contrast.** Make sure there is sufficient contrast on the Web page (this includes PDF and other office documents). Increase the contrast of text in error messages and of placeholder text in text (like for search and in forms). Also check the contrast of buttons and make sure the footer on the website has sufficient contrast (SC 1.4.3).
8. **Support resizing text.** Make sure all the content on your Web pages is still perceivable when you resize the text up to 200 percent. Also check if text in text fields, labels etc. resizes (SC 1.4.4).
9. **Provide skip-links.** Make sure you have skip-links on your Web pages to bypass blocks of content that are repeated on multiple pages (e.g.: navigation menus, advertising frames, etc.). Also check that the first skip-link is always to the main content of the page (SC 2.4.1). Note that it is not always visible and that on most Web pages the skip-links only show if a user uses the tab key.
10. **Provide keyboard accessibility.** Make sure that all elements on your Web pages and documents can be reached and operated using the keyboard (SC 2.1.1). You can test this by using the tab key and the space bar.
11. **Provide a visible focus.** The focus should be visible when you tab through a Web page (SC 2.4.7). Make sure this also works with menu items, text fields, buttons, etc. Also check if the order is correct (SC 2.4.3)
12. **Explain what goes wrong in a form.** If a user makes an error in a form, the feedback should be a text that tells them (1) that an error has occurred and (2) where it can be found (SC 3.3.1). This saves a person who is blind from having to go through the complete form again. If desired, this can be combined with other signals like use of color or an asterix.
13. **Do not use duplicate id's.** Check that id's have not been used twice on the same Web page (SC 4.1.1). Id's are like phone numbers. They become fairly useless if they are not unique. Assistive technology can use them to find and recognize content and help the disabled user. Duplicate id's can cause problems for the assistive technology understanding of a website.
14. **Make your hamburger menu accessible.** The audits show that hamburger menus cause many problems for accessibility. They are one of the reasons for failure on 54 percent of the websites in the audit. Many hamburger menus (on 17 percent of the websites) are not accessible using only a keyboard (SC 2.1.1). To test this, one can use the 'tab-key' to tab through the menu. While trying out if this works, one can also check if there is a visible focus (SC 2.4.7). Many hamburger menus (on 52 percent of the websites) miss the indication of the status (open/closed) (SC 4.1.2).

### 6.3.2 Recommendations with regard to the implementation processes

Regarding the processes, the results of the audits and the questionnaire show processes and their indicators, indices and items that play an important role in the implementation of web accessibility standards. This leads to the following list of recommendations for municipalities.

#### **Create organizational awareness and knowledge of the current status by monitoring the actual accessibility of the website (including manual evaluation).**

Currently the awareness of the actual web accessibility status seems rather low. Many respondents (88 percent) state that their current website can be used by persons with disabilities. However, the audits show that the Mean number of failed Success Criteria on all websites is 8.04 while the Mean number of Success Criteria that were actually applied is 30.48. None of the audited websites have less than 3 failed Success Criteria. Section 6.3.1 describes some examples of quick wins for the repair of the Success Criteria. The organization should provide regular monitoring information depending on the dynamic nature of the website. This information should include the results of manual evaluation as tools can only account for a small number of the Success Criteria (see section 0). Organizations can facilitate members of their web team to develop the necessary knowledge and skills or involve a third party.

#### **Provide organizational learning about web accessibility.**

This is not limited to just transferring knowledge from others or from the availability of books and articles. Developing awareness and knowledge includes organizing the availability of information and skills, usually acquired through education, training and/or experience. Organizations should do more to stimulate this as the current situation shows a shortage. This information should include the legal and organizational framework and detailed knowledge of the standards depending on the specific task(s) of a person or department.

Respondents report a lack of knowledge about web accessibility in their web team (26 percent) and with their supplier (25 percent). Municipalities who know the standards and/or the legal framework have higher scores in the audits.

Organizations should also address awareness specifically regarding the benefits of web accessibility implementation. Literature shows that the implementation of accessible technologies helps disabled *and* non-disabled users perform better on websites. Authors report substantial user, economic and reputational benefits for organizations. This may include higher user ratings, trust and can even boost employee morale to work for your organization. Not many organizations (or their employees) seem to be aware of this.

Make sure people working on content know that the web includes office documents, movies, audio and other media that are offered online on your website. For example, PDF documents of 82 percent of the municipalities have not been made accessible. Depending on the content of the document, the solution can be simple.

All members of the web team and other employees that can publish on the website should be trained and their knowledge updated regularly.

**Use tools with caution.**

Many municipalities provide tools to both the visitors of their website as to their web team. Note that text to speech engines like ReadSpeaker and Browsealoud are not necessary for conformance with the standards (see section 5.2.2) or for persons with (long term) disabilities. They can be useful for other groups like newcomers, persons with temporary disabilities low literate.

Web teams that use tools like SiteImprove or other monitoring tools to support them with the implementation of the web accessibility standards should keep in mind that only a very limited number of Success Criteria can be automatically measured by a tool (see section 0). Websites that use these tools do not score better in the audits but it could be reasonable to think that monitoring tools can help to keep accessibility on the agenda and provide continuous oversight. Also, they monitor a number of Success Criteria that are related to the work of content editors. This and the fact that they measure many other things related to content editing and control may help explain their popularity. At the same time, monitoring tools can also provide a false sense of conformance. More than one respondent indicated that they have accessibility covered with their monitoring tool and a text to speech tool on their website. This is not the fact! Respondents also indicated that they miss a free tool provided by the government or a ranking.

The audits show that municipalities where respondents do not report the use of (free or commercial) tools to support them with the implementation of web accessibility standards besides their CMS score statistically lower in the audit results.

**Ensure (top) management commitment.**

Appoint a top management person to implement web accessibility. Organizations that have such a person score higher on the audit results. Once top management commitment is in place, the sense of urgency to implement web accessibility is higher among managers and policy makers. Municipalities that have appointed a (top) management person for web accessibility more often have a plan written by management to implement and maintain web accessibility. They also more often have a policy plan that addresses web accessibility. Also read section 2.2.5 about how the outcome of legal cases in the US increasingly includes the requirement to to appoint an (independent) accessibility compliance officer at executive level.

The organization should ensure that managers are not only trained and informed about web accessibility but also take responsibility. Respondents report that in some municipalities, management does not see any benefits regarding website accessibility (13 percent) and 28 percent answers 'neutral'. This includes not seeing benefits for people with disabilities. Many respondents (70 percent) report a lack of management commitment in their organization and indicate this is a barrier to web accessibility implementation.

**Involve users with disabilities and your own employees.**

Make sure you involve the web team and (disabled) users during the design, development, testing and continuous monitoring of the (new) (functionality of a) website. Respondents indicated that only 25% of municipalities involve users with disabilities. Although there is not a correlation with the audit results, it may be rewarding to invite a disabled person to tell and show the organization how they use the web.

In 94 percent of municipalities, the web team is involved in the design and development of the website or of new functionality. Municipalities more often score higher audit results if there is an internal employee who is specifically responsible for auditing web accessibility of the website and new functionality. In most municipalities this will be a member of the web team involving the other members.

In some organizations, the respondents indicate they feel their municipality is implementing web accessibility standards specifically because of the influence of pressure by central government obligations. Municipalities where this is the case more often have higher audit results. This means that government obligations have an influence on the implementation process.

Additionally, when neighboring municipalities are further with the implementation of web accessibility, respondents indicate that positively influences the implementation of the standards.

Almost 28 percent of respondents report the complexity of the web accessibility standards as a barrier to implementation. It may be wise to engage them (through umbrella organizations or government support) in the drafting of the new version of the web accessibility standards to influence this.

Besides awareness and training to explain the standards to people in different roles (developer, content editor, communication manager, policymaker), it may also be good to provide more resources about web accessibility in the Dutch language. This could be a task for the central government. It could partly be covered by translating official W3C documents that are already online. But it could also be a more comprehensive resource specifically for municipalities. These resources are mostly available, but scattered over the Internet.

#### **Provide a feedback mechanism.**

Organize a mechanism on your website where users can provide feedback (both your own web team, developers and other internal suppliers *and* people with disabilities). For people with disabilities, the feedback mechanism is required by the EU Directive. The mechanism could be a simple form on your website. Make sure the mechanism is accessible and provide information about the timeline and what you will do with the input.

#### **Provide an Accessibility Statement.**

Provide a clear accessibility statement. The respondents (47 percent) support the importance of publicly reporting the web accessibility status. However, in March 2018, only 6 percent of all accessibility statements were complete. Make sure the contents of the statement is adapted to the target audience (people with disabilities) (see section 2.4.2). The EU, the Netherlands Government and W3C/WAI are all working on template Accessibility Statements.

#### **Support the provision of accessible content and functionality.**

The organization should provide sufficient support for their employees to ensure that suppliers provide accessible content and functionality. This may involve adaptations to the organizational structure of the content provision and to the delivery of new functionality of the website. Both content and functionality can originate from inside and outside of the organization. The web team may not be the only provider of content. Other departments, other organizations, but also shared teams with other municipalities, part-timers, etc. may

provide content and functionality. Make sure all the involved people are aware and knowledgeable with regard to web accessibility and make clear agreements concerning the delivery, the acceptance, the interpretation and the application of the web accessibility standards. This requires procedures inside the organization and agreements with external suppliers. In the results, 45 percent reports agreements within their own organization for the delivery of accessible content, only 1 municipality has approached that in the form of a Service Level Agreement (SLA).

#### **Require Web Accessibility in procurement.**

Literature indicates that requiring web accessibility during the procurement stage is an important success factor for web accessibility implementation. Municipalities that use rules to implement web accessibility score better audit results. Although 78 percent of the respondents report that web accessibility was a requirement for the current website, 61 percent checked the supplier before signing the contract (large municipalities do this more often) and 52 percent of the municipalities state they have procedures for buying or procuring web products that include web accessibility, none of the websites are fully conformant yet. Less than half of the municipalities report to have an SLA with their external suppliers that includes web accessibility.

Significant effect could therefore be expected from the new municipality procurement requirements (Dutch: 'GIBIT Gemeentelijke Inkoopvoorwaarden bij IT') provided by VNG. They include web accessibility.

#### **Choose your CMS and tools wisely.**

There is a correlation between the top 5 CMSs and the audit results (see section 5.3.8.1 as part of this may be caused by the content that is input into the CMS and by adding other tools and systems). It may be useful to involve both people with disabilities and the web team in the procurement process. They can test examples of a product before the contract is signed. This may prevent users from experiencing their CMS or other toolset as not helping them. Respondents are fairly pleased with their CMS. They say that their CMS makes it easy to make accessible Web pages (62 percent) or even a fully conformant website (42 percent). At the same time, they complain about the capacity and the lack of knowledge with the supplier.

#### **Check before publication.**

Municipalities that check content before publication (59 percent) score higher audit results.

#### **Assign responsibilities and evaluate performance.**

Appointing a person to continuously monitor accessibility and appointing a (top) manager on the subject support the drafting of plans, the use of rules and audits and the sense of urgency regarding web accessibility implementation. In larger municipalities web accessibility is more often part of job descriptions of employees. In 54 percent of all municipalities organizations evaluate performance and personally address employees in case of non-compliance of their work with the standards. It may be due to the low awareness of the actual accessibility status of the websites that this evaluation does not influence the audit results.

#### **Include web accessibility in a (policy) plan.**

Where municipalities work with a formal process for the website, web accessibility is also more often a specific requirement for the development of the website. Only 14 percent of the

municipalities in the sample had a plan written by management to address web accessibility implementation and maintenance. Having a policy plan that include web accessibility is reported by 42 percent. Both are related to the commitment of (top) management.

Besides policy and other plans, some municipalities successfully include web accessibility into their design guide (25 percent) thus implementing into their procedures. When a problem, failure or other issue regarding web accessibility is identified, 27 percent formulate clear goals and deadlines, 39 percent of all municipalities use an ad hoc approach to the implementation.

**Make changes to policy, procedures, rules and regulations (if necessary).**

This includes internal and external procurement rules and procedures, internal quality assurance procedures, policy plans, strategies (with regard to the EU and national regulation deadlines for the implementation), job descriptions and other policy, procedures, rules and regulations that should be changed to include web accessibility. In total 36 percent reports changes of this kind. Larger municipalities already do this more often. They could share their experience and best-practice with smaller municipalities.

**Provide sufficient budget for web accessibility implementation.**

Not all municipalities seem to be in control when it comes to an overview of the total cost of information systems in the organization. The system's costs are sometimes spread over many departments or shared with other municipalities. More than a quarter of the respondents report a lack of budget as a barrier to implementation of web accessibility. Budget should be allocated primarily to monitoring, training and tools. For some organizations it may be necessary to allocate budget to pay for external accessibility services (e.g. for video and pdf accessibility). Respondents also indicate that they have to reserve budget for their CMS supplier who charges them for repairing failures, even if they are in the CMS. This should change with the new procurement requirements. Respondents also report a capacity problem with their CMS supplier.

Also provide sufficient time for web accessibility implementation (mostly related to the available budget). Respondents (57 percent) report a lack of time for the web team as a factor that negatively influences the implementation of web accessibility.

**Share web accessibility expertise.**

Only 22 percent of respondents indicate that in their municipality they collaborate with other municipalities for the website. This means less expenses and at the same time generating a larger shared budget. This budget can then be used to cover the costs of an accessibility expert, monitoring, audits and/or training. Currently mostly smaller municipalities share web accessibility expertise. Larger municipalities have more persons in their web team, a higher yearly budget for web accessibility and share their employees and information less often. It would be good to do this on a wider scale and share best-practices, monitoring experiences, training, etc. Government and umbrella organizations could work together with CMS and tool suppliers to support the development of ready-to-use solutions like for the hamburger menu, editors and forms.

## 6.4 Implications for theory and practice

The audits show that none of the websites are fully conformant with web accessibility standards yet. However, when comparing yearly accessibility monitoring of government websites in the Netherlands, it is clear that progress is being made. Where most authors use compliance theory to study web accessibility implementation, this dissertation uses adoption and implementation theory with a clear focus on processes that support or resist the initiation and implementation of innovations within e-government organizations.

For many years, the approach to web accessibility implementation has been focused on compliance, taking a more normative approach to the problem, measuring if the law and the standards have been applied (compliance) and mostly concluding that the target has not yet been reached. The compliance approach towards web accessibility is mostly focused on the individuals within organizations. As concluded above, studies over the past 10 years show that this approach has not had the required results with regard to the actual web accessibility implementation. It may even demotivate the individuals actively pursuing full implementation when they have to hear continuously that despite all their hard work, the target of full conformance has still not been reached. Maybe the individual cannot succeed. As Rogers states, “an individual cannot adopt a new idea until an organization has previously adopted it”.

What does this mean for compliance theory of organizations? Information about compliance is still important as concluded in this dissertation, but there is a need to look further than the *individual* in the organization and to purely *normative* aspects because they alone do not seem to explain why organizations are unable to fully implement web accessibility standards even if the law requires them to and they are actively pursuing it.

The model used in this dissertation seems a better approach because it looks at the implementation *process* of web accessibility standards in municipality *organizations*. It does not focus on the individuals and on results but it describes organizational processes, their indicators, indices and items that support or resist the initiation and implementation of innovations within e-government organizations. What can the organization do to support adoption and implementation within the innovation processes. Using adoption and implementation theory it is possible to use an empirical approach observing the actual factors that play a role in the process of web accessibility implementation. In this process, implementation is viewed as a continuous (non-linear) activity. This fits well with life-cycle of websites and mobile applications.

The exploratory 'web accessibility innovations initiation and implementation model' helps identify the organizational processes and the indicators, indices and items related to web accessibility implementation. The correlations show that some of the processes impact the implementation of the innovation. But even without the correlations, the respondents name the items identified in the processes as important factors that support or resist the implementation of the web accessibility standards.

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# Appendices

## Appendix 1: Questionnaire (Dutch)

### Pagina 1

1. Bij welke gemeente werkt u?

-  Open invulveld

2. Wat is uw functie?

-  Open invulveld

3. Hoe lang bent u binnen de gemeente betrokken bij de website?

-  0-2 jaar/ 3-5 jaar/ 6-10 jaar/ 11-15 jaar/ meer dan 15 jaar

4. Vult u de enquête alleen in of samen met een collega?

-  alleen/ samen met een collega

Indien samen:  Wat is de functie van uw collega:

5. Wat is de URL van de homepage van de gemeentelijke organisatie waarvoor u deze enquête invult? (Bijvoorbeeld <https://www.utrecht.nl> of <https://gemeente.groningen.nl/>)

-  Open invulveld

6. Indien u de resultaten van de scan naar de toegankelijkheid van uw website en de resultaten van dit onderzoek wilt ontvangen, vul dan a.u.b hieronder uw gegevens in

- Voornaam:

- Achternaam:

- Email:

- Telefoonnummer:

### Pagina 2

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Pagina 2 van 7

Handig om te weten:

1. In deze enquête bedoel ik met (web) toegankelijkheid: toegankelijkheid van webpagina's voor mensen met beperkingen (visueel, auditief of motorisch)
2. De enquêtevragen gaan over de huidige website van uw gemeentelijke organisatie

LET OP: Sla tussendoor regelmatig uw antwoorden op met de knop 'Opslaan / Verder' onderaan deze pagina. U kunt daarna gewoon verder invullen of later terugkeren via de link in uw mail.

7. Hoeveel unieke bezoekers krijgt de homepage van uw huidige website gemiddeld per maand?

8. Mensen met beperkingen (visueel, auditief en motorisch) kunnen uw huidige website gebruiken?

Ja

Nee

Weet ik niet

Indien dit niet geldt voor alle beperkingen graag toelichten voor welke beperkingen wel en welke niet:

9. Uw gemeentelijke organisatie herkent de volgende voordelen van een toegankelijke website voor mensen met beperkingen (meerdere antwoorden mogelijk):

Kosten reductie

Kwaliteitsverbetering

Minder vragen aan de balie

Besparing op onderhoud en beheer

Minder telefoontjes

Minder klachten

Beter vindbaar in zoekmachines

Vergroting zelfredzaamheid mensen met beperkingen

Administratieve verlichting van taken

Geen voordelen

10. Welke druk van buiten speelt voor uw gemeentelijke organisatie een rol bij de toepassing van standaarden voor web toegankelijkheid (meerdere antwoorden mogelijk):

a. Verplichting vanuit de Rijksoverheid

b. Druk vanuit belangenorganisaties

c. Druk vanuit publiciteit

d. Druk vanuit inwoners gemeente

e. Wij ervaren geen druk van buiten

f. Anders, namelijk:

11. Voor uw gemeentelijke organisatie maakt het uit (Meerdere antwoorden mogelijk):

a. Of buurgemeenten verder zijn met web toegankelijkheid

b. Of uw gemeente slecht scoort op web toegankelijkheid in een overzicht van websites

c. Of web toegankelijkheid van uw gemeente aandacht krijgt in de pers

d. Geen van deze motieven

12. Uw gemeentelijke organisatie vindt het belangrijk dat iedereen op de website kan lezen/zien dat de huidige website aan de web toegankelijkheidsrichtlijnen voldoet.

Helemaal mee oneens

Redelijk mee oneens

Neutraal

Redelijk mee eens

Helemaal mee eens

13. Het initiatief om de toegankelijkheid van uw huidige website te verbeteren ontstaat meestal na klachten van gebruikers.

- Altijd
- Meestal
- Soms
- Zelden
- Nooit

14. Klopt deze bewering? 'Het **management** van uw gemeentelijke organisatie ervaart het toepassen van richtlijnen voor web toegankelijkheid als eenvoudig'

- Helemaal mee oneens
- Redelijk mee oneens
- Neutraal
- Redelijk mee eens
- Helemaal mee eens

15. Het management (we bedoelen niet het gemeentebestuur of college) ziet voordeel in de realisatie van een toegankelijke website.

- Helemaal mee oneens
- Redelijk mee oneens
- Neutraal
- Redelijk mee eens
- Helemaal mee eens

16. Het management (we bedoelen niet het gemeentebestuur of college) wil onze gemeente positioneren als voorloper door de realisatie van een toegankelijke website.

- Helemaal mee oneens
- Redelijk mee oneens
- Neutraal
- Redelijk mee eens
- Helemaal mee eens

17. Is er binnen de gemeentelijke organisatie op topniveau (management) iemand die zich sterk maakt voor webtoegankelijkheid?

- Ja
- Nee
- Weet ik niet

18. Het management (we bedoelen niet het gemeentebestuur of college) heeft een plan gemaakt om web toegankelijkheid te realiseren en te onderhouden.

- Helemaal mee oneens
- Redelijk mee oneens
- Neutraal
- Redelijk mee eens
- Helemaal mee eens

19. Is webtoegankelijkheid voor mensen met beperkingen bij uw gemeentelijke organisatie opgenomen in een formeel beleidsplan?

Ja

Nee

Weet ik niet

Evt toelichting:

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20. Zijn er bij uw gemeentelijke organisatie hobbels die volledige implementatie van web toegankelijkheid voor uw huidige website bemoeilijken of zelfs onmogelijk maken? Welke zijn deze hobbels? (Meerdere antwoorden mogelijk)

- a. Legacy (oudere) informatie systemen
- b. Minder urgent bij bestuurders
- c. Minder urgent bij management
- d. Minder urgent bij communicatie afdeling
- e. Onvoldoende budget
- f. Gebrek aan tijd bij webteam
- g. Gebrek aan kennis over toegankelijkheid bij webteam
- h. Aangeleverde content door andere delen van de organisatie die niet toegankelijk is
- i. Tegengestelde belangen binnen onze organisatie (bijv. timing, technologie, e.d.)
- j. Gebrekkige ondersteuning voor toegankelijkheid door ons CMS systeem
- k. Specifieke tools die we moeten gebruiken of waarvoor geen alternatief is (zoals een formulieren generator etc.)
- l. Externe leverancier heeft onvoldoende kennis over toegankelijkheid
- m. Externe leverancier heeft onvoldoende capaciteit om problemen op te lossen
- n. Gebrek aan tools om ons bij implementatie van toegankelijkheid te ondersteunen
- o. De richtlijnen zelf zijn te ingewikkeld

21. Bestaan er binnen uw gemeentelijke organisatie (specifiek voor het webteam) regels en procedure(s) voor de toegankelijkheid van de website en de geplaatste content? (Meerdere antwoorden mogelijk):

- a. Regels (bijvoorbeeld voor toegankelijkheid van content)
- b. Vaste procedure(s) waarin webtoegankelijkheid is opgenomen
- c. Formele besluiten
- d. Ad hoc werkafspraken
- e. Interne SLA overeenkomsten
- f. Webtoegankelijkheid is onderdeel van onze huisstijl
- g. Geen

22. Als er drempels worden waargenomen m.b.t. de toegankelijkheid van de huidige website worden er dan binnen uw gemeentelijke organisatie heldere doelen en duidelijke deadlines gesteld voor het verwijderen van deze drempels?

Ja  
Nee  
Weet ik niet  
Anders, namelijk:

23. Wordt er voor de website gewerkt volgens een formele proces standaard voor kwaliteit, toegankelijkheid, security, privacy of een andere (interne) processtandaard?

Ja  
Nee  
Weet ik niet  
Indien ja, welke:

24. Kent u de volgende standaarden voor web toegankelijkheid? Meerdere antwoorden mogelijk:

- a. WCAG2.0
- b. WCAG2.1
- c. EN 301 549
- d. Webrichtlijnen
- e. ATAG
- f. UAAG

25. Worden of zijn er binnen uw gemeente - naar aanleiding van web toegankelijkheidseisen - wijzigingen aangebracht in beleid, procedures, regels of lokale wetgeving?

Ja  
Nee  
Weet ik niet

26. Bent u op de hoogte van de volgende wetten en regels en wat die zeggen ten aanzien van de verplichting van toegankelijkheid van websites van overheden (meerdere antwoorden mogelijk)?

- a. VN verdrag inzake de rechten van personen met een handicap
- b. Europese richtlijn voor de toegankelijkheid van websites en mobiele applicaties van overheidsinstanties
- c. Wet gelijke behandeling op grond van handicap of chronische ziekte
- d. Algemene Maatregel van bestuur op basis van de Wet Generieke Digitale Infrastructuur (GDI)
- e. Artikel 429q van het Wetboek van Strafrecht
- f. Pas Toe of Leg Uit regime van het Forum Standaardisatie

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27. Bij uw gemeentelijke organisatie is web toegankelijkheid onderdeel van (Meerdere keuzes mogelijk):

- a. Interne opleiding van web professionals

- b. Audits van de website (inclusief handmatige toetsen)
- c. Het maken van documenten voor op de website (Pdf, Word etc.)
- d. Eisen aan externe leveranciers van content (tekst, pdf, video, etc.)
- e. Eisen aan interne leveranciers van content (tekst, pdf, video, etc.)
- f. Inkoopprocedure voor web gerelateerde producten en diensten
- g. (Onderhouds-) Contracten met externe leveranciers (Bijvoorbeeld in SLA)
- h. Taakomschrijvingen van medewerkers
- i. Plaatsen van content op Facebook, Twitter of Youtube
- j. Anders:

28. Uw gemeentelijke organisatie en uw leveranciers beschikken over de noodzakelijke informatie (boeken, artikelen en andere materialen) om de huidige website toegankelijk te maken.

- Ja
- Nee
- Weet ik niet

29. Hoeveel medewerkers hebben het recht om zelf content op de website te publiceren?

- 0 – 10
- 11 – 20
- 21 – 40
- 41 – 70
- 71 – 100
- Meer dan 100

30. Hoeveel procent van het hierboven aangegeven aantal heeft volgens u training gehad over web toegankelijkheid? (Geef indien mogelijk een indicatie)

- 0% - 10%
- 11% - 20%
- 21% - 40%
- 41% - 60%
- 61% - 80%
- 81% - 100%

31. Zijn andere medewerkers in uw gemeentelijke organisatie die geen deel uitmaken van het webteam zich bewust van de verantwoordelijkheid die zij hebben ten aanzien van web toegankelijkheid?

- Ja
- Nee
- Weet ik niet

32. Klopt deze bewering? 'De redacteurs (webteam) van uw gemeentelijke organisatie ervaren het toepassen van richtlijnen voor web toegankelijkheid als eenvoudig'

- Helemaal mee oneens
- Redelijk mee oneens
- Neutraal
- Redelijk mee eens

Helemaal mee eens

33. Uw gemeentelijke organisatie wisselt ervaringen en kennis over de toegankelijkheid van de huidige website uit met andere gemeenten.

Ja

Nee

Weet ik niet

Evt. toelichten:

34. Deelt u medewerkers met andere gemeenten (bijvoorbeeld voor onderhoud en beheer)?

Ja

Nee

Weet ik niet

35. Is er binnen uw gemeentelijke organisatie iemand aangewezen om doorlopend de toegankelijkheid van uw website te monitoren?

Ja

Nee

Weet ik niet

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36. Maakt uw gemeentelijke organisatie gebruik van externe instrumenten/tools of externe personen om de toegankelijkheid van de huidige website te waarborgen voor mensen met beperkingen? Zo ja, welke? (Meerdere antwoorden mogelijk):

a. Gratis online tools

b. Betaalde externe tools (Bijv. SiteImprove)

c. Jaarlijkse externe audits (Bijv. Drempelvrij/Accessibility)

d. Andere externe (handmatige) toetsing

e. Ondersteuning door de leverancier van het CMS

f. Uw organisatie huurt daarvoor externe deskundigheid in

g. Uw organisatie huurt daarvoor een externe projectleider in

h. Uw organisatie heeft een burgerpanel dat op verzoek meekijkt

i. Uw organisatie betreft gehandicapten bij het testen van de web toegankelijkheid

j. Uw organisatie is aangesloten bij Gebruiker Centraal

k. Nee, uw organisatie gebruikt naast het CMS geen andere externe instrumenten

l. Weet ik niet

37. Worden mensen binnen uw gemeentelijke organisatie persoonlijk aangesproken als niet wordt voldaan aan de richtlijnen voor toegankelijkheid?

Ja

Nee

Weet ik niet

38. Hoe vaak laat u (extern) toetsen of uw website voldoet aan de richtlijnen voor toegankelijkheid? (Deze vraag gaat niet over het gebruik van tools)

Doorlopend

Elk jaar

Elke 2 jaar

Elke 3 jaar

Minder vaak dan elke 3 jaar

Nooit

39. Wordt nieuwe content voorafgaand aan publicatie getoetst op toegankelijkheid?

Ja

Nee

Weet ik niet

40. Heeft uw huidige website een feedbackformulier dat gebruik kan worden door mensen met beperkingen om informatie alsnog in een toegankelijk format op te vragen?

Ja

Nee

Weet ik niet

URL feedbackformulier:

41. Klopt de volgende bewering? 'Het CMS dat uw gemeente gebruikt maakt het gemakkelijk om toegankelijke webpagina's te maken'

Ja

Nee

Weet ik niet

Evt. toelichting:

42. Was web toegankelijkheid een specifieke opdracht voor de bouw van de huidige website?

Ja

Nee

Weet ik niet

43. Klopt de volgende bewering? 'Het is met het CMS dat uw gemeente gebruikt makkelijk om volledig te voldoen aan de richtlijnen voor toegankelijkheid (zonder extra kosten)'

Ja

Nee

Weet ik niet

Evt. toelichting:

44. Heeft uw gemeentelijke organisatie voorafgaand aan de opdracht voor de huidige website gecontroleerd of de leverancier expertise heeft ten aanzien van web toegankelijkheid?

Ja

Nee

Weet ik niet

45. Om aan alle toegankelijkheidsrichtlijnen te voldoen is het eenvoudiger en goedkoper om een nieuwe website te maken dan de huidige te repareren.

- Helemaal mee oneens
- Redelijk mee oneens
- Neutraal
- Redelijk mee eens
- Helemaal mee eens

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46. Waren de web redacteuren (webteam) binnen uw gemeentelijke organisatie betrokken bij het ontwerp en de bouw van de huidige website?

- Ja
- Nee
- Weet ik niet

47. Wie worden er altijd betrokken bij het toetsen van de toegankelijkheid van uw website? (Meerdere antwoorden mogelijk):

- a. Mensen met beperkingen (bijvoorbeeld een burgerpanel)
- b. Wij hebben een interne medewerker die verantwoordelijk is voor toegankelijkheid
- c. Externe toegankelijkheidsexpert(s)
- d. Expert(s) die wij delen met andere gemeenten
- e. Weet ik niet

48. Hoeveel FTE interne medewerkers heeft uw gemeentelijke organisatie die bezig zijn met de website (backoffice, onderhoud, beheer, content)?

- 0
- 1-2
- 3-5
- 6-10
- 11-15
- 16-20
- 21-30
- 31-40
- > 41
- Evt. toelichting:

49. Hoeveel procent van de jaarlijkse website kosten in 2017 kwam voor rekening van web toegankelijkheid? (Geef indien mogelijk een indicatie)

- 0-5%
- 6-10%
- 11-15%
- 16-20%
- Meer dan 20%

50. Is uw gemeentelijke organisatie afhankelijk van externe partijen bij het toegankelijk maken/houden van de website? (Naast uw CMS leverancier)

Ja

Nee

Weet ik niet

51. Hoe zijn de uitgaven voor web toegankelijkheid in 2017 ten opzichte van eerdere jaren?

Veel hoger

Hoger

Gelijk

Lager

Veel Lager

Weet ik niet

Evt. toelichting:

52. Het nu beschikbare budget is voldoende om de toegankelijkheid van de huidige website vast te houden of indien nodig te verbeteren.

Helemaal mee oneens

Redelijk mee oneens

Neutraal

Redelijk mee eens

Helemaal mee eens

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53. Uw gemeentelijke organisatie besteedt budget aan het verbeteren van de toegankelijkheid van de huidige website door (Meerdere antwoorden mogelijk):

a. Voorlichten van eigen web medewerkers over web toegankelijkheid

b. Training van web medewerkers over web toegankelijkheid

c. Bekostigen van uren voor speciale interne medewerker voor het controleren van web toegankelijkheid

d. Bekostigen van externe medewerker voor het controleren van web toegankelijkheid

e. Continue monitoring van web toegankelijkheid van de huidige website

f. Inzetten van betaalde tools zoals SiteImprove

g. Gebruik van BrowseAloud of ReadSpeaker op de website

h. Meerkosten van leveranciers om toegankelijkheidsdrempels weg te nemen

Evt. toelichting:

54. Probeer een indicatie te geven van het bedrag dat uw gemeentelijke organisatie jaarlijks besteedt aan hosting, licenties, beheer, onderhoud, aanpassingen, tools en opleiding voor de website:

0-5k

6k-10k

11k-30k  
31k-50k  
51k-80k  
Meer dan 80k  
Evt. toelichting:

## Appendix 2: Correlation calculation results

The results below show the question (marked with Qxx in the dissertation) and the results of the correlation with the audit results (including the test, statistic, value and significance).

Question	Sub	Type	N yes	N no	Neg	Test	Statistic	Value	Signif.
7		Ratio				Pearson	Correlation	0,092	0,473
8		Dichotom.	60	1		Only one no			
9	a	Dichotom.	9	60		Point-Biserial	Correlation	0,048	0,694
	b	Dichotom.	56	13		Point-Biserial	Correlation	0,049	0,688
	c	Dichotom.	26	43		Point-Biserial	Correlation	-0,101	0,409
	d	Dichotom.	7	62		Point-Biserial	Correlation	0,017	0,892
	e	Dichotom.	26	43		Point-Biserial	Correlation	0,073	0,553
	f	Dichotom.	27	42		Point-Biserial	Correlation	-0,083	0,495
	g	Dichotom.	41	28		Point-Biserial	Correlation	0,152	0,213
	h	Dichotom.	64	5		Point-Biserial	Correlation	-0,098	0,423
	i	Dichotom.	7	62		Point-Biserial	Correlation	-0,123	0,315
	j	Dichotom.	1	68		Only one yes			
9	DICH	Dichotom.	68	1		Rank-Biserial	Correlation	-0,193	0,111
10	a	Dichotom.	53	16		Point-Biserial	Correlation	0,324	<u>0,007</u>
	b	Dichotom.	18	51		Point-Biserial	Correlation	-0,010	0,936
	c	Dichotom.	16	53		Point-Biserial	Correlation	0,075	0,538
	d	Dichotom.	10	59		Point-Biserial	Correlation	0,085	0,490
	e	Dichotom.	15	54	Yes	Point-Biserial	Correlation	-0,122	0,320
10	DICH	Dichotom.	57	12		Rank-Biserial	Correlation	0,219	0,071
11	a	Dichotom.	11	58		Point-Biserial	Correlation	0,276	<u>0,022</u>
	b	Dichotom.	53	16		Point-Biserial	Correlation	0,137	0,263
	c	Dichotom.	33	36		Point-Biserial	Correlation	0,081	0,510
	d	Dichotom.	15	54	Yes	Point-Biserial	Correlation	-0,122	0,320
11	DICH	Dichotom.	54	15		Point-Biserial	Correlation	0,122	0,320
12		Likert				Pearson	Correlation	-0,129	0,290
12	DICH	Dichotom.	33	36		Point-Biserial	Correlation	-0,141	0,249
13		Ordinal			Yes	Spearman	Correlation	0,008	0,946
14		Likert				Pearson	Correlation	0,232	0,057
14	DICH	Dichotom.	12	56		Point-Biserial	Correlation	0,126	0,305
15		Likert				Pearson	Correlation	-0,101	0,417
15	DICH	Dichotom.	39	28		Rank-Biserial	Correlation	-0,031	0,805
16		Likert				Spearman	Correlation	-0,016	0,893
16	DICH	Dichotom.	13	56		Rank-Biserial	Correlation	-0,168	0,168
17		Dichotom.	15	48		Point-Biserial	Correlation	-0,022	0,861
17	wnn	Dichotom.	15	54		Rank-Biserial	Correlation	-0,084	0,490
18		Likert				Spearman	Correlation	0,191	0,115
18	DICH	Dichotom.	10	59		Point-Biserial	Correlation	0,219	0,070
19		Dichotom.	29	32		Point-Biserial	Correlation	0,210	0,105
20	a	Dichotom.	18	51	Yes	Point-Biserial	Correlation	-0,146	0,231

	b	Dichotom.	17	52	Yes	Point-Biserial	Correlation	-0,142	0,245
	c	Dichotom.	26	43	Yes	Point-Biserial	Correlation	-0,127	0,298
	d	Dichotom.	20	49	Yes	Point-Biserial	Correlation	0,054	0,657
	e	Dichotom.	19	50	Yes	Point-Biserial	Correlation	-0,032	0,792
	f	Dichotom.	37	32	Yes	Point-Biserial	Correlation	0,001	0,994
	g	Dichotom.	17	53	Yes	Point-Biserial	Correlation	0,005	0,969
	h	Dichotom.	41	28	Yes	Point-Biserial	Correlation	-0,131	0,285
	i	Dichotom.	24	45	Yes	Point-Biserial	Correlation	-0,128	0,295
	j	Dichotom.	14	55	Yes	Point-Biserial	Correlation	-0,104	0,397
	k	Dichotom.	19	50	Yes	Point-Biserial	Correlation	-0,032	0,792
	l	Dichotom.	16	53	Yes	Rank-Biserial	Correlation	-0,110	0,367
	m	Dichotom.	8	61	Yes	Point-Biserial	Correlation	-0,157	0,199
	n	Dichotom.	15	54	Yes	Point-Biserial	Correlation	-0,019	0,878
	o	Dichotom.	18	51	Yes	Point-Biserial	Correlation	-0,038	0,756
21	a	Dichotom.	42	27		Point-Biserial	Correlation	0,342	<u>0,004</u>
	b	Dichotom.	24	45		Point-Biserial	Correlation	0,050	0,681
	c	Dichotom.	9	60		Point-Biserial	Correlation	0,095	0,437
	d	Dichotom.	27	42		Point-Biserial	Correlation	-0,213	0,079
	e	Dichotom.	1	68		Only one yes			
	f	Dichotom.	17	52		Point-Biserial	Correlation	0,044	0,719
	g	Dichotom.	10	59	Yes	Point-Biserial	Correlation	-0,230	0,058
21	DICH	Dichotom.	52	17		Point-Biserial	Correlation	0,274	<u>0,023</u>
22		Dichotom.	17	42		Point-Biserial	Correlation	-0,010	0,939
23		Dichotom.	35	23		Point-Biserial	Correlation	0,163	0,221
24	a	Dichotom.	51	18		Point-Biserial	Correlation	0,262	<u>0,030</u>
	b	Dichotom.	26	43		Point-Biserial	Correlation	0,171	0,161
	c	Dichotom.	14	55		Point-Biserial	Correlation	0,117	0,340
	d	Dichotom.	66	3		Point-Biserial	Correlation	0,266	<u>0,027</u>
	e	Dichotom.	3	66		Point-Biserial	Correlation	0,302	<u>0,012</u>
	f	Dichotom.	0	69		Only 0 yes			
25		Dichotom.	25	30		Point-Biserial	Correlation	0,212	0,120
26	a	Dichotom.	32	37		Rank-Biserial	Correlation	0,141	0,247
	b	Dichotom.	44	25		Point-Biserial	Correlation	0,327	<u>0,006</u>
	c	Dichotom.	33	36		Point-Biserial	Correlation	0,334	<u>0,005</u>
	d	Dichotom.	20	49		Point-Biserial	Correlation	0,236	0,051
	e	Dichotom.	3	66		Point-Biserial	Correlation	0,121	0,321
	f	Dichotom.	53	16		Point-Biserial	Correlation	0,062	0,614
26	DICH	Dichotom.	65	4		Point-Biserial	Correlation	0,242	<u>0,045</u>
27	a	Dichotom.	31	38		Point-Biserial	Correlation	0,080	0,516
	b	Dichotom.	36	33		Point-Biserial	Correlation	0,151	0,215
	c	Dichotom.	31	38		Point-Biserial	Correlation	0,006	0,964
	d	Dichotom.	28	41		Point-Biserial	Correlation	0,052	0,673
	e	Dichotom.	29	40		Point-Biserial	Correlation	0,057	0,639
	f	Dichotom.	34	35		Point-Biserial	Correlation	0,087	0,480
	g	Dichotom.	29	40		Point-Biserial	Correlation	0,057	0,639

	h	Dichotom.	18	51		Point-Biserial	Correlation	0,014	0,909
	i	Dichotom.	5	64		Point-Biserial	Correlation	0,078	0,526
27	DICH	Dichotom.	61	9		Point-Biserial	Correlation	0,139	0,253
28		Dichotom.	40	17		Point-Biserial	Correlation	0,194	0,148
29		Ordinal				Spearman	Correlation	-0,056	0,650
30		Ordinal				Spearman	Correlation	0,105	0,389
31		Dichotom.	6	49		Point-Biserial	Correlation	0,140	0,308
32		Likert				Spearman	Correlation	0,162	0,183
32	DICH	Dichotom.	15	54		Point-Biserial	Correlation	0,185	0,129
33		Dichotom.	34	35		Point-Biserial	Correlation	-0,050	0,681
34		Dichotom.	15	54		Point-Biserial	Correlation	-0,007	0,957
35		Dichotom.	33	36		Point-Biserial	Correlation	0,397	<u>0,001</u>
36	a	Dichotom.	26	43		Point-Biserial	Correlation	0,073	0,553
	b	Dichotom.	34	35		Point-Biserial	Correlation	0,171	0,161
	c	Dichotom.	23	46		Rank-Biserial	Correlation	0,140	0,251
	d	Dichotom.	5	64		Point-Biserial	Correlation	0,078	0,526
	e	Dichotom.	45	24		Rank-Biserial	Correlation	0,113	0,354
	f	Dichotom.	9	60		Point-Biserial	Correlation	0,017	0,890
	g	Dichotom.	0	69		Only 0 yes			
	h	Dichotom.	9	60		Point-Biserial	Correlation	-0,139	0,254
	i	Dichotom.	17	52		Point-Biserial	Correlation	0,020	0,873
	j	Dichotom.	6	63		Point-Biserial	Correlation	0,232	0,056
	k	Dichotom.	8	61	Yes	Point-Biserial	Correlation	-0,255	<u>0,035</u>
	l	Dichotom.	0	69	Yes	Only 0 yes			
37		Dichotom.	37	28		Rank-Biserial	Correlation	0,155	0,219
38		Ordinal				Spearman	Correlation	0,167	0,171
38	DICH	Dichotom.	52	17		Point-Biserial	Correlation	0,139	0,254
39		Dichotom.	40	24		Point-Biserial	Correlation	0,264	<u>0,035</u>
40		Dichotom.	15	54		Point-Biserial	Correlation	0,057	0,641
41		Dichotom.	43	15		Point-Biserial	Correlation	0,241	0,068
42		Dichotom.	54	12		Point-Biserial	Correlation	0,130	0,299
43		Dichotom.	30	29		Point-Biserial	Correlation	0,003	0,982
44		Dichotom.	42	15		Point-Biserial	Correlation	0,135	0,315
45		Likert			Yes	Pearson	Correlation	0,000	0,999
45	DICH	Dichotom.	36	33	Yes	Point-Biserial	Correlation	0,035	0,773
46		Dichotom.	65	3		Point-Biserial	Correlation	0,215	0,078
47	a	Dichotom.	15	54		Point-Biserial	Correlation	-0,147	0,228
	b	Dichotom.	33	36		Point-Biserial	Correlation	0,407	<u>0,001</u>
	c	Dichotom.	19	50		Rank-Biserial	Correlation	-0,085	0,490
	d	Dichotom.	5	64		Point-Biserial	Correlation	0,057	0,640
	e	Dichotom.	16	53	Yes	Point-Biserial	Correlation	0,074	0,544
48		Ordinal				Spearman	Correlation	0,048	0,702
49		Ordinal				Spearman	Correlation	-0,122	0,338
50		Dichotom.	34	32		Point-Biserial	Correlation	-0,078	0,535
51		Ordinal				Spearman	Correlation	0,096	0,503

52		Likert				Spearman	Correlation	0,036	0,766
53	a	Dichotom.	35	34		Point-Biserial	Correlation	0,114	0,353
	b	Dichotom.	30	39		Point-Biserial	Correlation	0,074	0,546
	c	Dichotom.	11	58		Point-Biserial	Correlation	0,018	0,886
	d	Dichotom.	12	57		Point-Biserial	Correlation	0,053	0,668
	e	Dichotom.	8	61		Point-Biserial	Correlation	0,157	0,199
	f	Dichotom.	35	34		Point-Biserial	Correlation	0,177	0,146
	g	Dichotom.	26	43		Point-Biserial	Correlation	-0,003	0,978
	h	Dichotom.	27	42		Point-Biserial	Correlation	-0,191	0,115
54		Ordinal				Spearman	Correlation	0,180	0,169

Additional information: Q9DICH: Maximum of Q9a-l; Q10DICH: Maximum of Q10a-d (no homogeneous variance); Q11DICH: Maximum of Q11a-c; Q12DICH: HO,RO,N=disagree/RE, HE=agree; Q14DICH: HO,RO,N=disagree/RE, HE=agree; Q15DICH: HO,RO,N=disagree/RE, HE=agree (does not have normal distribution in group "agree"); Q16: Scores in group "neutral" do not have normal distribution; Q16DICH: HO,RO,N=disagree/RE, HE=agree (no homogeneous variance); Q17: Unknown=No (Scores in group "no" do not have normal distribution); Q18DICH: HO,RO,N=disagree/RE, HE=agree; Q20l: No equal variances; Q21DICH: Maximum of Q21a-c,e,f; Q26a: No homogeneous variance; Q27DICH: Maximum of Q27a-l; Q29: does not have normal distribution; Q30: does not have normal distribution; Q32: does not have normal distribution; Q32DICH: HO,RO,N=disagree/RE, HE=agree; Q36c: does not have normal distribution; Q36e: No homogeneous variance; Q37: Scores in group "no" do not have normal distribution; Q38: does not have normal distribution; Q38DICH: 0=f/1=a-e; Q47c: does not have normal distribution.

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## About the author

Eric Velleman is scientific director and founder of the Accessibility Foundation and innovation and implementation expert at Bartiméus. He is co-author of the first book about web accessibility. He worked on the official translation of WCAG2.0 to Dutch. He participated in the Mandate 376 project group for the European Commission. He acted as accessibility expert for the Dutch Parliament and has addressed the European Parliament about accessibility during the preparation of the EU Directive 2016/2102. He worked as expert on the WADEX subgroup, preparing implementing acts for the Directive. He is Member of the W3C Advisory Committee and acted as facilitator of the Eval TF (Evaluation Taskforce) within W3C. He is lead author / facilitator of UWEM and of the W3C WCAG-EM evaluation methodology. He is co-founder of the Drempelvrij quality mark. He is co-responsible for the drafting of the CEN CWA 15554 Specifications for a Web Accessibility Conformity Assessment Scheme and a Web Accessibility Quality Mark, the W3C accessibility support database, the W3C WCAG evaluation reporting tool and the W3C accessibility statement generator tool. He is expert in the field of the accessibility of new media and technology implementations, including accessibility policy implementation and factors influencing accessibility implementation in both government and companies. He leads an enthusiastic team of accessibility experts at the Accessibility Foundation.

With Accessibility Eric partnered in EU projects: SEAM; EIAO; BenToWeb; WAI-ACT; eAccessplus; EIII; WAI-Tools.

## Summary (Dutch)

**In Nederland is wet en regelgeving van kracht die vereist dat websites van overheden voldoen aan standaarden voor toegankelijkheid. Nederlandse gemeenten hebben die standaarden vrijwillig en collectief omarmd. Echter, zelfs wanneer de wet dat vereist en ambtenaren er actief aan werken zien we dat het nog niet altijd lukt om die standaarden volledig te implementeren. Hetzelfde beeld zien we ook in de landen om ons heen.**

Bij het onderzoek naar de implementatie van web toegankelijkheid gebruiken veel onderzoekers compliance theorie. Die gaat uit van een normatieve aanpak van het probleem (is de wet toegepast, zijn de standaarden toegepast). Deze dissertatie gebruikt adoptie en implementatie theorie en zoekt naar een empirische benadering waarbij wordt gekeken naar werkelijke factoren die een rol spelen in het implementatie proces. Het resultaat is een exploratief 'initiatie en implementatie model voor web toegankelijkheidsinnovaties'. Dat model wordt gebruikt om organisatorische processen te identificeren die een hindernis of een stimulans zijn voor de implementatie van web toegankelijkheid.

Het model bevat veel van de innovatie gerelateerde elementen die we ook in andere modellen en frameworks aantreffen. De meeste modellen en frameworks richten zich op het individu in de organisatie (soms uitgebreid met organisatorische aspecten). Het model in dit proefschrift richt zich niet op het individu maar beschrijft organisatorische processen en de daarbij passende indicatoren, indices en elementen die een hindernis of stimulans zijn voor de initiatie en de implementatie van innovaties binnen de e-overheid.

Door middel van een enquête en handmatige web toegankelijkheidsaudits is het model toegepast op web toegankelijkheid. In totaal werkten 69 gemeenten mee aan het onderzoek. De uitkomsten omvatten behalve de audit resultaten en de correlaties met de processen ook een overzicht van de fouten die zijn aangetroffen en aanbevelingen voor de aanpak van zogenaamd laaghangend fruit. Alle websites in het onderzoek zijn gedetailleerd onderzocht op de WCAG2.0/EN301549 standaarden voor toegankelijkheid.

In totaal worden in het onderzoek 8 implementatie processen onderscheiden. Bij een aantal van die processen werd een statistische correlatie gevonden met de mate van toegankelijkheid van de websites. Het gaat om de volgende processen: (1) Ontwikkelen van bewustwording en kennis; (2) Betrokkenheid van (top) management; (3) Aanpassen van de organisatorische structuur; (4) Monitoring en rapportage en (5) Toepassen van informatiesystemen. Omdat gemeenten niet direct betrokken zijn bij het aanpassen van standaarden wordt (6) Aanpassen van de innovatie geen indicator voor implementatie van web toegankelijkheids standaarden. Voor (7) Aanpassing van beleid is een correlatie gevonden met de grootte van de gemeente en met betrokkenheid van (top) management. Voor (8) Inzetten van financiële middelen is een correlatie gevonden met de grootte van de gemeente maar niet met de scores van de audits. Respondenten geven aan dat het budget voor web toegankelijkheid voldoende is (62 procent). Dit zou kunnen worden veroorzaakt doordat bijna 90 procent van de respondenten gelooft dat de website toegankelijk is voor mensen met beperkingen. Tenslotte correleert de grootte van de gemeente met de mate van interne opleiding ten aanzien van web toegankelijkheid, met het wel of niet opnemen van web toegankelijkheid in functiebeschrijvingen van nieuwe medewerkers, met de benoeming van

een specifieke persoon om continu de toegankelijkheid van de website te monitoren en met het percentage van de jaarlijkse kosten die worden besteed aan web toegankelijkheid.

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Almost 20 years ago a Professor at the University of Utrecht advised me not to start with a dissertation. He said there were so many questions to answer in the field of web accessibility that I could best help people with disabilities by not focusing on a single research question. His advice was: “first try to find all the questions that need an answer with regard to web accessibility for persons with disabilities and then answer as many as possible of them.” He continued: “You can always write a dissertation when you are older”.

So, now I am older, many questions have been answered and I have now arrived at a time where some questions need more research. This dissertation answers one of those questions. A question that has frustrated many people in the past 20 years. People working hard to make web accessibility happen in their organization only to conclude that they are not succeeding possibly because their *organization* has not yet really adopted the idea. For all those people who are out there and feel like they are alone chasing windmills. This dissertation is written for you and your organization. I hope the conclusions and recommendations will support you in the ultimate goal that many of you reported in the questionnaire: *the full and effective participation of persons with disabilities in society on an equal basis with others*.

This quest started at Bartiméus, the organization I have been working with since 1987, some ten years later continuing on the accessibility of new media and technology. Bartiméus helped to start up the Accessibility Foundation in 2001 and I am thankful for the time and support provided by both to work on this subject. And for all the colleagues who have always been genuinely interested every time I explained what I was doing. Special thanks to Johan Berghuis, Paula van Woudenberg, Jopie Nooren, Joeke van der Mei, Frans van Nie, Hans Scholten, Dick Lunenburg, Paula Sterkenburg, Tobias Witteveen, Henk Snetselaar, Jantine Gelink, Henk van de Beld, Yolande Mansveld, Ron Beenen, Frank Roos, Tom Lankamp, my RvT, members of ICT4VIP and all the other colleagues at Bartiméus and Accessibility who read this. Bartiméus is also one of the places where I have met many persons with disabilities who helped me search for accessible solutions and formulate more questions with regard to digital inclusion. Thank you for your inspiration and help.

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e.velleman@accessibility.nl