EDICIONES GESICAP

# DIGITAL INCLUSION:

## The challenge of web usability and accessibility of Latino Citizen Participation Portals

FIRST EDITION

Jorge Iván Pincay Ponce
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El Carmen, Manabí, Ecuador
www.gesicap.com

**ISBN: 978-9942-626-16-5**

**LEGAL DEPOSIT:**
1st Edition: Ediciones Gesicap, Calle 24 de julio y Ave. 3 de julio, El Carmen, Manabí, Ecuador.


**HOW TO CITE THIS BOOK:**
Pincay Ponce, J.I; Figueroa Suárez, J.A; Calderón Figueroa, C.D; Párraga Muñoz, L.A y Ponce Tomalá, A.M. (2023). Digital inclusion: The challenge of web usability and accessibility of Latino Citizen Participation Portals. Ediciones GESICAP. 100 pp.

**EDITORIAL TEAM:**
Editing and Layout: Sergio Alejandro Rodríguez Hernández.
Review and Correction: Xenia Pedraza González.
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# DEDICATION

To God, to my beloved parents, brothers, relatives, the most fraternal friends, and to every reader to whom this book reaches...

*Jorge Pincay*

To God, to my parents, wife, and children, and to the reader friends who motivate me to keep going...

*Juan Figueroa*

To God who sustains me, to my loved ones who motivate me every day to achieve personal and professional goals; They are the engines that move my life…

*Catherine Calderón*

To God for being my engine of life, to my unconditional parents, and to my inspiring nephews …

*Lisbeth Párraga*

To God and my loving family who provide me with strength and inspiration to overcome challenges and pursue my dreams…

*Ana Ponce*

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Born in Ecuador in 1983. He is a Systems Engineer, with a Diploma in Education by Competences, Master's in Information Technology Management, Master's in Software Engineering, and PhD. in Computer Science. Since 2008, has been a teacher in Information Technology-related careers at the Laica "Eloy Alfaro" University of Manabí. He has researched games development, data science, accessibility standards and technologies. He has published articles, books, and chapters in these areas.

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# SUMMARY

The purpose of this book is to supply an assessment in terms of usability and accessibility of citizen participation websites in Latin America. To establish the progress made against the goals, that is, the challenges to comply with the idealistic guidelines of inclusion and usability from a technological perspective. The study context is Latin America, and its unit of analysis is the online platforms implemented by governments for citizen participation.

For the development of this, a mixed investigation was used, in which through the bibliographical investigation the theoretical bases of the subject of work were studied and through the applied investigation it was obtained to elaborate a list of the government sites of citizen participation available up to end of 2020. The assessment was conducted with automatic, semi-automatic and heuristic assessment tools.

The study will reduce the existence of web accessibility and usability problems in Latin American citizen participation platforms, due to the lack of application of the WCAG conformity criteria recommended by the W3C and the web usability guidelines promoted. by the ISO 9241-151:2008 standard.

During the development of the chapters, reflections are offered on the strengths and weaknesses found in the evaluation, it was observed about the importance of considering the principles of accessibility and usability from the moment the online platform is built, with the aim of not restrict access to information to people who are hard of hearing and visually impaired. The work highlights that if a citizen participation site has web accessibility weaknesses, it can also negatively affect the user experience and satisfaction, as well as the quality and quantity of user contributions. This can generate exclusion, discrimination and inequality for those people who have difficulties accessing or using the contents of the web, such as people with visual, hearing, motor, cognitive or language disabilities.

We recommend you read it!

**Keywords:** Accessibility, WCAG 2.1, Usability, ISO 9241-151, Online Platforms, Citizen Participation.

# I INTRODUCTORY ASPECTS

In this work we evaluate the degree of accessibility and usability of electronic government platforms, through the application of indicators and standards that allow citizens to take part in decision-making.

Web usability and accessibility are two key concepts to ensure that government citizen engagement and interaction websites are inclusive, efficient, and satisfying for all users, regardless of their abilities, needs, or preferences.

Web usability refers to the ease of use of a web page or application, while web accessibility refers to the inclusion and adaptation of computer systems for special needs.

In a more formal way, accessibility (web) is the amount of structural information captured by the encoding; the degree to which this information is available to other applications and the availability of suitable software to process this structure (Raman, 1994).

Although there are studies on the accessibility and usability of websites on the Internet, there are not many about citizen participation websites. So, we consider that this is an important aspect to address, since an elementary premise in this type of website is to promulgate the participation supported by web access technologies by the communities.

The usability and accessibility of a website depends on the purpose and target audience of a given website. An accessible website is one that is operable, understandable, distinguishable, and robust. From the point of view of the evaluators and surely also from that of the citizens who interact on these sites, the web usability of the sites will influence their participation as users on these technological platforms.

According to the results of this research, efforts are required to improve the accessibility and usability of the contents and designs of the platforms. Perhaps more empathy over just the need to only generate information.

Regarding the organization of this book:

- In Chapter 1, which is the present one, the problematic situation is briefly mentioned, the importance of addressing it and certain aspects of how it has been done in this book.
- In Chapter 2, the theoretical foundations and associated challenges are presented.
- In Chapter 3, the situation of the citizen participation platforms is summarized once the respective assessments have been made.
- In Chapter 4, we present some ideas that are not intended to be conclusive, but rather our insights generated from this work.

We invite you to read and share with us the challenge of web usability and accessibility of Latino citizen participation portals.

## 1.1. PROBLEMATIC SITUATION AND OBJECTIVES FOR ITS APPROACH

Since the beginning of the internet, there has always been a need to make the web universal and accessible to all, with the aim of enabling people with certain types of disabilities or age-related difficulties to perceive, understand, navigate and interact effective on the web, as well as creating and contributing content; However, achieving this objective is not an easy task, therefore the developers of these websites avoid the applicability of standards and recommendations that allow a web for all, being a big problem for those users who have some type of disability (Pincay, 2017; J. I. Pincay-Ponce, 2018).

Access to information online is an important issue for the autonomous and efficient development of people in their daily activities, which is why the Internet is considered to be an open

world where all types of users, including people with disabilities, can navigate, not only from the aesthetic aspects of websites (J. I. Pincay-Ponce et al., 2023).

The authors perceive a notorious breach of accessibility and usability standards about government websites in Latin America, which may have implications for low participation and loss of interest on the part of citizens. Therefore, we approach the problem step by step following the following goals:

1. Determine the criteria for evaluating the accessibility and usability of the platforms.

2. List the citizen participation platforms at the Latin American level to identify their degree of accessibility and usability, through automatic assessment tools and expert manual evaluation.

3. Interpret the results of the analysis of the accessibility and usability criteria evaluated in the citizen participation platforms.

## 1.2. WHY IS IT IMPORTANT TO CONSIDER USABLE AND ACCESSIBLE DESIGNS?

The importance of web usability and accessibility lies in the fact that they allow citizens to access the information, services and communication channels offered by governments in a simple, intuitive, pleasant, and safe way. In this way, the exercise of rights, democratic participation, transparency, accountability, and trust in public institutions are favored.

To achieve greater web usability and accessibility, it is necessary to follow a series of principles, guidelines and good practices that are based on four fundamental aspects: perception, operation, understanding and robustness. Some recommendations to improve these aspects are use a clear and consistent design, facilitate navigation and search, provide text alternatives to multimedia content, adjust the size and contrast of fonts, offer customization options, avoid elements that can cause discomfort or seizures, validate the code, and test compatibility with different devices and browsers (Nuñez et al., 2019; Pelzetter, 2021).

In short, web usability and accessibility are essential elements for government citizen participation and interaction websites to fulfill their social function and respect the diversity of users. By improving web usability and accessibility, greater inclusion, efficiency, and satisfaction of the citizens who access these websites are achieved.

Considering the special importance of web accessibility and usability and the continuous growth of user participation on the Internet, this research has been proposed, which aims to evaluate the degree of web accessibility and web usability of online participation platforms. citizen in Latin America. This evaluation consists of applying automatic evaluation tools and expert manual evaluation. It is expected that the results will serve as a starting point for future studies related to this topic, in addition, it can also provide support to developers of platforms, websites or web systems, letting them know where to concentrate more effort in their creations.

To conclude this section, we present some information that may interest the reader. For example, it is known that the schooling of education in Latin America is a complex and relevant issue, which implies analyzing the factors that favor or hinder access, permanence, and learning for the different populations that make up the region. Among these populations are people with disabilities, who according to some studies represent between 5% and 24% of the Latin American population, depending on the criteria and sources used (UNESCO, 2020).

However, education is a fundamental human right and a key tool for personal and social development. However, people with disabilities face multiple barriers to exercise this right, both in the physical sphere, as well as in the communicational, pedagogical, attitudinal, and regulatory spheres. These barriers translate into lower participation, higher dropout, and poorer educational performance for people with disabilities compared to people without disabilities (Mititelu, 2019).

While, from the labor perspective, according to the World Bank, people with disabilities have less participation. In Latin

America and the Caribbean, the informality rate of workers with disabilities is, on average, 35% and in countries like Costa Rica and Mexico, these people earn 20% less than workers without disabilities (Banco Mundial, 2021).

These educational and employment gaps have a negative impact on the social and political inclusion of people with disabilities, as well as on their quality of life and their exercise of citizenship. It is that citizen participation is an essential part of democracy and development. It implies the right and ability of people to influence public decisions that affect their lives. However, people with disabilities are often underrepresented or excluded from spaces and mechanisms for citizen participation, due to factors such as discrimination, lack of accessible information, low mobility, or dependence on third parties (J. I. Pincay-Ponce, 2018; UNESCO, 2020).

With the background, web platforms for citizen participation can be an opportunity to broaden and help the participation of people with disabilities, provided they are designed and implemented with usability and universal accessibility criteria. This implies considering aspects such as the use of clear and simple languages, the incorporation of audiovisual or sound resources, compatibility with special devices or programs, intuitive and safe navigation, among others.

Likewise, it is important to promote the awareness and training of people with disabilities so that they can take advantage of these digital tools and assert their rights and interests.

## 1.3. RESEARCH APPROACHES

We address the problem described with bibliographical and applied research. Regarding applied research, accessibility has been evaluated by ISO 9241-171, which provides guidance and ergonomic specifications for the design of accessible software for people with and without disabilities, including people with temporary disabilities and adults. greater. The standard addresses the principles, criteria, and techniques so that web content is perceptible, operable, understandable, and robust, complementing

the general design for usability. The standard applies to a wide range of software, e.g., office, web, learning support and library systems. It is based on the use of assistive technologies as an integrated component of interactive systems (W3C, 2018, 2021). The most current versions of this document come from the WAI initiative (Web Accessibility Initiative) of W3C (World Wide Web Consortium).

Also, about applied research, usability has been evaluated in accordance with the ISO 9241-151:2008 standard, which provides guidelines for user-centered design of web user interfaces with the aim of increasing their usability. The standard focuses on the high-level design, content, navigation, search, and presentation aspects of web content. The standard applies to a wide range of web user interfaces that are addressed to all Internet users or to restricted groups of users. The standard is based on other standards related to ergonomics, accessibility, and the quality of interactive systems. The document refers to the ISO 9241:151:2019 version, which is the version of this Standard provided by the Institute of Technical Standards of Costa Rica (INTECO).

In conducting this study, two electronic forms were used to facilitate the evaluation of the online citizen participation platforms and analyze the results obtained more effectively. Both forms were filled out with the information provided by the automatic evaluation tools for both usability and accessibility.

For the automatic and online assessment of accessibility, Cynthia Says *(https://tinyurl.com/ptadn7fz)* and TAW *(https://www.tawdis.net/?lang=es)* were used. While for the automatic assessment of usability Nibbler *(https://nibbler.insites.com)* was used.

Regarding the websites analyzed, an exploration was conducted in each Latin American country and 50 sites were selected in which characteristics of a citizen participation platform were observed, these correspond to 20 different countries. To be included in the study, each website should allow the user to take part, discuss and propose ideas. In this sense, the sampling of websites is non-probabilistic, of expert choice. The research design is cross-sectional because the data sample compiled via

electronic forms corresponds to the status shown by the websites as of September 2021.

**Table 1:** Websites for citizen participation in Latin American countries.

| N° | Country/City | URL |
|---|---|---|
| 1 | Argentina | https://leyesabiertas.hcdn.gob.ar/ |
| 2 | Argentina | https://consultapublica.argentina.gob.ar/ |
| 3 | Argentina - Bahía Blanca, Buenos Aires | http://participa.bahia.gob.ar/ |
| 4 | Argentina - Buenos Aires | https://baelige.buenosaires.gob.ar/ |
| 5 | Argentina - Godoy Cruz | https://participa.godoycruz.gob.ar/ |
| 6 | Argentina - Lujan de Cuyo | http://decide.lujandecuyo.gob.ar/ |
| 7 | Argentina - Mendoza | http://participa.ciudaddemendoza.gob.ar/ |
| 8 | Argentina - Rosario | https://participa.rosario.gob.ar/ideas |
| 9 | Brasil | http://pensando.mj.gov.br/debates/ |
| 10 | Brasil - Pernambuco | https://www.participa.pe.gov.br/ |
| 11 | Brasil - Plataforma Ciudades Sostenibles | https://www.cidadessustentaveis.org.br/inicial/home |
| 12 | Brasil - Porto Alegre | https://opdigital.prefeitura.poa.br/ |
| 13 | Brasil - Senado Federal | https://www12.senado.leg.br/ecidadania |
| 14 | Chile | https://votainteligente.cl/ |
| 15 | Chile | https://congresovirtual.cl/ |
| 16 | Chile | https://ahoranostocaparticipar.cl/processes |
| 17 | Chile | http://participacionciudadana.subdere.gov.cl/ |
| 18 | Chile | http://chilequequeremos.cl/ |
| 19 | Colombia | https://www.urnadecristal.gov.co/ |
| 20 | Colombia - Potosí | http://www.potosi-narino.gov.co/ |
| 21 | Colombia - Bogotá | https://bogota.gov.co/sdqs/ |
| 22 | Colombia - Bogotá | https://bogota.gov.co/yo-participo |
| 23 | Colombia - Empresas Públicas de Medellín | https://www.epm.com.co/site/home/nuestra-empresa/participacion-ciudadana |
| 24 | Colombia - Medellín | https://siciudadania.co/ |
| 25 | Colombia - Medellín | https://mimedellin.org/ |
| 26 | Colombia - Nariño | https://ganapienso.narino.gov.co/ |
| 27 | Colombia - Sogamoso | http://ideatusogamoso.org/ |
| 28 | Colombia - Sogamoso-Boyacá | http://sogamosoboyaca.micolombiadigital.gov.co/ |
| 29 | Colombia - Tolima | http://www.anzoategui-tolima.gov.co/ |

| N° | Country/City | URL |
|---|---|---|
| 30 | Costa Rica - Montes De Oca | https://decide.montesdeoca.go.cr/ |
| 31 | Ecuador - Quito | https://decide.quito.gob.ec/ |
| 32 | El Salvador | https://participacion.iaip.gob.sv/ |
| 33 | México | http://www.imss.gob.mx/transparencia/participacion-ciudadana |
| 34 | México - Electoral | https://www.iecm.mx/plataforma/ |
| 35 | México - Gobierno | https://www.participa.gob.mx/ |
| 36 | México - Guadalajara | https://guadalajara.gob.mx/ |
| 37 | México - Mérida | https://decide.merida.gob.mx/ |
| 38 | México - Morelos | https://ecatepec.gob.mx/ |
| 39 | México - Plaza Publica CD México | https://plazapublica.cdmx.gob.mx/ |
| 40 | México - Veracruz | http://decide.veracruzmunicipio.gob.mx/ |
| 41 | Panamá | https://participa.mupa.gob.pa/ |
| 42 | Paraguay | https://opinapy.com/ |
| 43 | Perú | https://www.gob.pe/participa |
| 44 | Perú - Congreso | http://www.congreso.gob.pe/participacion/foros/ |
| 45 | Perú - La Libertad | http://www.decidelalibertad.pe/ |
| 46 | República Dominicana | http://dominicana.gob.do/index.php/foro/welcome-mat |
| 47 | República Dominicana | http://gobiernoabierto.do/ |
| 48 | Uruguay | https://plan.gobiernoabierto.gub.uy/ |
| 49 | Uruguay - Montevideo | https://decide.montevideo.gub.uy/ |
| 50 | Uruguay - Rivera | https://www.gub.uy/gobierno-abierto |

# II
# CONCEPTS AND CHALLENGES

## 2.1. CITIZENSHIP

It refers to the relationship between an individual and a state to which the individual owes allegiance and in return receives its protection. Citizenship implies freedom, but with attendant responsibilities. For example, they have full political rights, including the right to vote and hold public office. Their duties are loyalty, taxation and in some country's compulsory military service. Citizenship carries other privileges, especially protection abroad (Cambridge Dictionary, 2023).

Historically the Romans first used citizenship as a device to distinguish the residents of the city of Rome from those peoples whose territories Rome had conquered and incorporated. As their empire continued to grow, the Romans granted citizenship to their allies throughout Italy proper and then to the peoples of other Roman provinces, until in AD 212. citizenship was extended to all free inhabitants of the empire (Encyclopedia Britannica, 2023).

## 2.2. CITIZEN PARTICIPATION

Citizen participation can be considered any individual or group activity that addresses issues of public interest, including communities working together or individuals working alone on political and non-political actions to protect public values or generate change in a community. This participation fosters a positive relationship between a government and the public through effective communication and cooperative conflict resolution, to ensure that a wide variety of points of view are taken into account, helping decision makers to better understand the interrelationships and nature of the problems facing the community (Checkoway & Aldana, 2013).

**Figure 1:** Illustrative image of citizen participation

## 2.3. CITIZEN PARTICIPATION PLATFORM

Citizen participation platforms can be formal bodies or platforms that enable civil society participation, including, but not limited to, legislation, politics, town hall meetings, town council committees, websites, elections, suggestion boxes, consultation processes. appeal, notice period for planning proposals, online surveys, mediation processes, and others. These platforms aim to ease and protect the participation and civic engagement of community organizations, non-governmental organizations and civil society in general. They can also promote education and training in civics and human rights so that urban residents (United Nations Human Settlements Program, 2019).

During these years, websites or platforms are appearing that look to channel citizen participation online locally or globally. They are developed with the aim of easing the execution of various tasks in the same place through the Internet, while positioning the citizen as a client who requires effective management and attention during the procedures they are conducting. The most common trait that some platforms present is that, although they have mechanisms to obtain the opinion of users on what topics are important to them, they do not allow the creation of campaigns by individuals or groups.

The arrival of technologies makes possible the development of software capable of exploiting the diversity of information to

analyze it efficiently through these tools and with these results to be able to interact in a beneficial way in society (Ferreira et al., 2019). The emergence of these platforms supported by digital technologies generate new values and rights during the intercommunication between administrations and citizens, who are now more participatory (Díaz Huici, 2019, pp. 24, 25). The following table shows some of these rights.

**Table 2:** Participation Rights in the Digital Environment

| | |
|---|---|
| Access | Access the Internet, regardless of geographic location and socioeconomic status.<br>Use digital participation platforms and channels, regardless of cognitive ability. |
| Security | Balance of security/verification requirements to access digital participation platforms and channels.<br>Protection of the privacy of personal data hosted on digital participation platforms, and channels. |
| Training | Receive training to acquire the necessary skills to access and use citizen participation platforms, and channels. |
| Transparency | Obtain all the necessary information about the participatory programs developed through digital platforms, and channels. |
| Electronic services | Interact digitally with the competent authorities. |
| Participation | Communicate with other participants through digital participation platforms and channels, to inform, share ideas and suggestions.<br>Freedom of expression in the media.<br>Participate and collaborate in networks and virtual communities.<br>Actively take part in the platforms, channels, bodies, and tools for face-to-face participation. |

Source: (Díaz Huici, 2019)

## 2.4. CITIZEN PARTICIPATION IN LATIN AMERICA

Citizen participation is understood as an incidence in which individuals and society, regardless of the stages in which they find themselves, resolve issues that are of public interest, becoming an essential task for Latin American governments (Chamorro, 2016). Although it is true that citizen participation is assumed as the substantive dimension of structural changes, it is understood as the exercise of rights concerning life.

For this reason, to promote citizen participation in public affairs, Latin American governments have made formidable efforts to improve transparency and public inquiry to show new mechanisms for participation in the development of public policies, mainly at the municipal level. Among the governments that opted for a better transparency we have Belize, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru, the Dominican Republic and Uruguay that currently have national laws on access to information public, most of them approved in the last decade of the 21st century (Badeneira, 2013).

## 2.5. THE ACCESSIBILITY OF CITIZEN PARTICIPATION PLATFORMS

**"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect."**

***Timothy "Tim" John Berners-Lee*, Director of the W3C and inventor of the Web. (Image from Wikipedia).**

Citizen participation platforms are virtual media, in which many people, regardless of their knowledge or personal abilities, can interact, even if they have some degree of visual, hearing, physical, or neurological disabilities, among others. In this sense, the definition of accessibility, which says that this is the set of principles, techniques and good practices that allow access to information and services offered by the Internet to all people, regardless of their personal limitations or conditions, fits very well. those derived from the context of use. Web

accessibility seeks the inclusion of all citizens in public and private spaces, guaranteeing not only mere accessibility, but also circulation, use, orientation, security and functionality (Carter & Markel, 2015).

Organizations that care about making their sites accessible may have understood the benefits of accessibility, which the expert Shawn Lawton (2014), a prestigious member of the WAI initiative, summarizes in:

1. It reduces the social and economic costs derived from exclusion and segregation.

2. Increases the efficiency, safety and convenience of services and products.

3. Expands the potential market and the competitiveness of companies and institutions.

Web accessibility not only benefits people with disabilities, but also other groups such as the elderly, people with low digital literacy or people who access from mobile devices or with slow connections (Pincay Ponce et al., 2020; W3C, 2021).

An example to follow is the city council of Zaragoza (Spain), whose purpose is to include all possible citizens in the administrative processes that require their consideration. The city council invests in the accessibility and usability application on its web platform so that it is different from others (Universidad de Sevilla et al., 2018). The following image corresponds to Porto Alegre, Brazil.


**Figure 2:** Porto Alegre - Brazil website. Same as displaying a menu with some accessibility options.

The most significant international organization that deals with promoting accessibility is the World Wide Web Consortium (W3C), through the Web Accessibility Initiative (WAI), develops standards and support materials to help software development teams understand and implement the accessibility, aim to include the diversity of people and web technologies (Pincay, 2017; W3C, 2021).

Currently there are specific guidelines, laws, regulations, and best practices recommended for accessibility, for example, the W3C has been developing comprehensive guides called Web Content Accessibility Guidelines or WCAG. The latest version as of the writing date of this book is WCAG 3.0, but this book is based on WCAG 2.1, which was made official in June 2021 WCAG 2.1. It is designed to be universally applicable to different web technologies now and in the future and to be testable with a combination of automated testing and human evaluation. Compared to its predecessor versions, 2.1 includes greater coverage of mobile accessibility, people with low vision, cognitive disabilities, and learning disabilities (Pincay, 2017; W3C, 2018, 2021).

WCAG 2.1. It is a structure of 4 principles that address a total of 13 guidelines. These in turn address 78 criteria (also called checkpoints) and as of June 2021 these criteria address 580 techniques and known errors. The 4 principles and 13 guidelines are summarized in the following table:

**Table 3:** Description of accessibility principles and guides according to WCAG.

| Principle (4) | Description | Guidelines (12) |
|---|---|---|
| Perceptible | Information and user interface components must be presentable to users in ways they can perceive. | 1.Provide text alternatives for non-text content.<br>2. Provide captions and other alternatives for multimedia.<br>3.Create content that can be presented in different ways, including by assistive technologies, without losing information.<br>4.Make it easier for users to see and hear content. |

| Principle (4) | Description | Guidelines (12) |
|---|---|---|
| Operable | User interface components and navigation must be operable. | 1. Provide access to all functionalities via the keyboard.<br>2. Give users enough time to read and use content.<br>3. Do not use content that could cause seizures or physical reactions.<br>4. Help users navigate and find content.<br>5. Facilitate different input methods other than the keyboard. |
| Understandable | Information and the operation of user interface must be understandable. | 1. Provide text that is readable and understandable.<br>2. Provide content that is predictable in appearance and operation.<br>3. Help users avoid and correct mistakes. |
| Robust | Content must be robust enough to be interpreted reliably by a wide variety of user agents, including assistive technologies. | 1. Maximize compatibility with current and future user tools. |

**Source:** (W3C, 2018, 2021)

Each criterion or checkpoint has one of three levels of priority: (1) Priority 1: Web content developers must meet these requirements, otherwise one or more user groups will have difficulty accessing the information. The site can be certified by the A-level logo provided by W3C. (2) Priority 2: Web content developers should comply with the verification points. (3) Priority 3: Web content developers could meet these checkpoints.

**Table 4:** Description of web accessibility levels according to WCAG

| Level | TOTAL WCAG 2.1 |
|---|---|
| A – MUST BE COMPLIED – Priority 1<br>It includes the most basic web accessibility features. | 30 |
| AA – SHOULD BE COMPLIED – Priority 2<br>It includes a group of features that addresses the most common barriers for disabled users. | 20 |
| AAA – COULD BE FULFILLED – Priority 3<br>The highest (and most complex) level of web accessibility. | 28 |
| Total | 78 |

If any of the accessibility principles are not met in the evaluation, a website or platform will not be considered accessible because users with disabilities. The following table groups show each criterion of the Perceptible principle, its priority and in turn provides a link to the August 2023 documentation. The next ones do the same with the other principles.

**Table 5:** Success criteria associated with the <Perceivable> principle

| Criterion | Level |
|---|---|
| 1.1.1 Non-text Content | A |
| 1.2.1 Audio-only and Video-only (Prerecorded) | A |
| 1.2.2 Captions (Prerecorded) | A |
| 1.2.3 Audio Description or Media Alternative (Prerecorded) | A |
| 1.2.4 Captions (Live) | AA |
| 1.2.5 Audio Description (Prerecorded) | AA |
| 1.2.6 Sign Language (Prerecorded) | AAA |
| 1.2.7 Extended Audio Description (Prerecorded) | AAA |
| 1.2.8 Media Alternative (Prerecorded) | AAA |
| 1.2.9 Audio-only (Live) | AAA |

| Criterion | Level |
|---|---|
| 1.3.1 Info and Relationships | A |
| 1.3.2 Meaningful Sequence | A |
| 1.3.3 Sensory Characteristics | A |
| 1.3.4 Orientation | AA |
| 1.3.5 Identify Input Purpose | AA |
| 1.3.6 Identify Purpose | AAA |
| 1.4.1 Use of Color | A |
| 1.4.2 Audio Control | A |
| 1.4.3 Contrast (Minimum) | AA |
| 1.4.4 Resize text | AA |
| 1.4.5 Images of Text | AAA |
| 1.4.6 Contrast (Enhanced) | AAA |
| 1.4.7 Low or No Background Audio | AAA |

**Table 6:** Success criteria associated with the <Understandable> principle

| Criterion | Level |
|---|---|
| 2.1.1 Keyboard | A |
| 2.1.2 No Keyboard Trap | A |
| 2.1.3 Keyboard (No Exception) | AAA |
| 2.1.4 Character Key Shortcuts | A |
| 2.2.1 Timing Adjustable | A |
| 2.2.2 Pause, Stop, Hide | A |
| 2.2.3 No Timing | AAA |
| 2.2.4 Interruptions | AAA |
| 2.2.5 Re-authenticating | AAA |
| 2.2.6 Timeouts | AAA |

| Criterion | Level |
|---|---|
| 2.3.1 Three Flashes or Below Threshold | A |
| 2.3.2 Three Flashes | AAA |
| 2.3.3 Animation from Interactions | AAA |
| 2.4.1 Bypass Blocks | A |
| 2.4.2 Page Titled | A |
| 2.4.3 Focus Order | A |
| 2.4.4 Link Purpose (In Context) | A |
| 2.4.5 Multiple Ways | AA |
| 2.4.6 Headings and Labels | AA |
| 2.4.7 Focus Visible | AA |
| 2.4.8 Location | AAA |
| 2.4.9 Link Purpose (Link Only) | AAA |

**Table 7:** Success criteria associated with the <Operable> principle

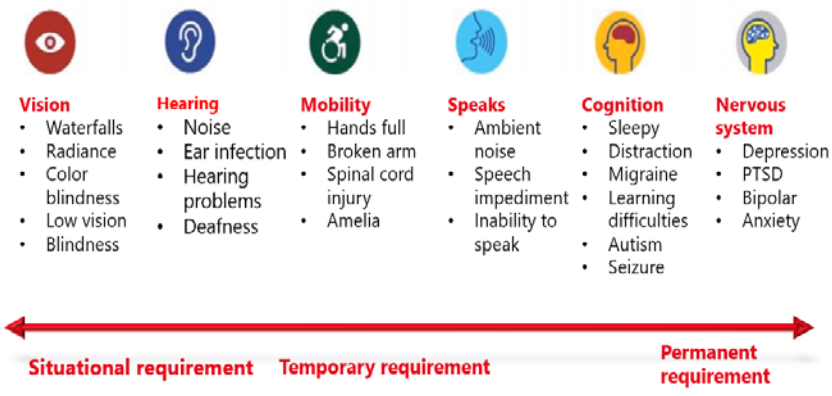
| Criterion | Level |
|---|---|
| 3.1.1. Language of Page | A |
| 3.1.2. Language of Parts | AA |
| 3.1.3. Unusual Words | AAA |
| 3.1.4. Abbreviations | AAA |
| 3.1.5. Reading Level | AAA |
| 3.1.6. Pronunciation | AAA |
| 3.2.1. On Focus | A |
| 3.2.2. On Input | AA |
| 3.2.3. Consistent Navigation | AA |

| Criterion | Level |
|---|---|
| 3.2.4. Consistent Identification | AA |
| 3.2.5. Change on Request | AAA |
| 3.3.1. Error Identification | A |
| 3.3.2. Labels or Instructions | A |
| 3.3.3. Error Suggestion | AA |
| 3.3.4. Error Prevention (Legal, Financial, Data) | AA |
| 3.3.5. Help | AAA |
| 3.3.6. Error Prevention (All) | AAA |

**Table 8:** Success criteria associated with the <Robust> principle

| Criterion | Level |
|---|---|
| 4.1.1. Parsing | A |
| 4.1.2. Name, Role, Value | AA |
| 4.1.3. Status Messages | AAA |

It is important to mention that disabilities can be produced by limitations of the context and can be aggravated according to the barriers that the moment or situation represents, as shown in the following image:



The following illustrations show what a software development team should and shouldn't do while building accessible software. To the left of each illustration is shown what is advisable and to the right what is not advisable:

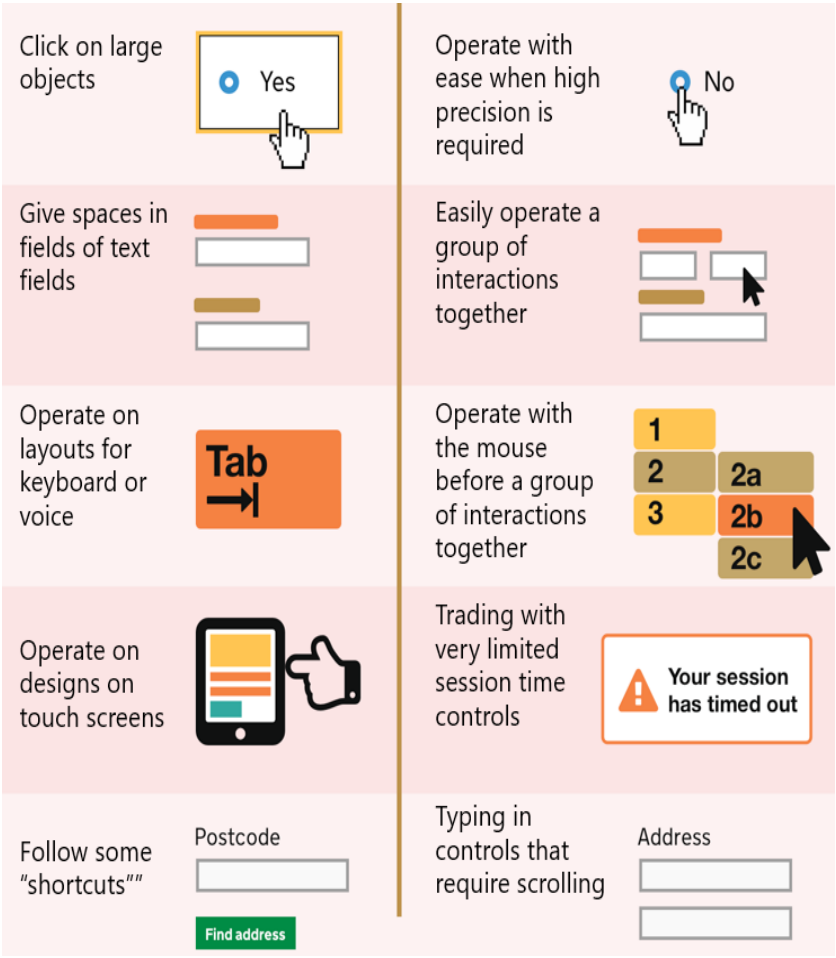



**Figure 3:** What is advisable and what is not advisable to conveniently address the reduced mobility of people


**Figure 4:** What is advisable and what is not advisable to adequately address hearing impairment in people


**Figure 5:** What is advisable and what is not advisable to conveniently address autism in people

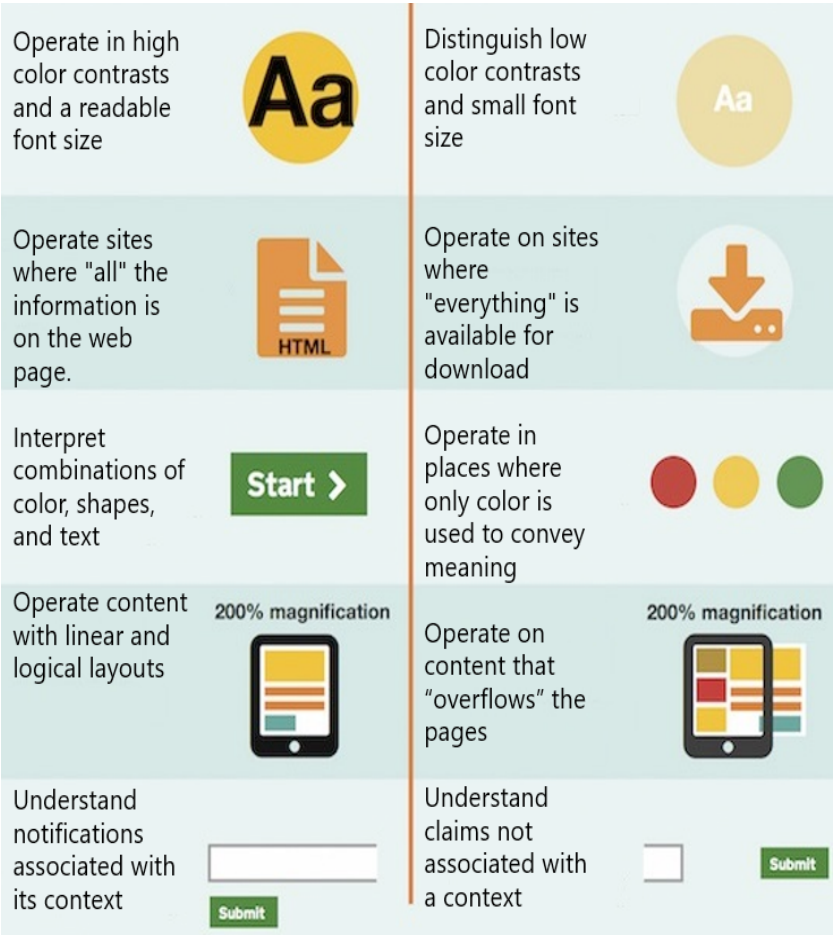



**Figure 6:** What is advisable and what is not advisable to adequately address low vision in people


**Figure 7:** What is advisable and what is not advisable to conveniently address thinking about a screen reader

**"When the web is accessible, it is incredibly empowering for people with disabilities and also for society in general",**

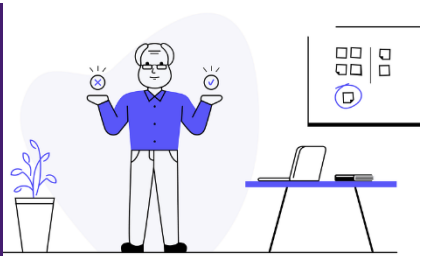
***Shawn Lawton Henry***

## 2.6. THE USABILITY OF CITIZEN PARTICIPATION PLATFORMS

**"Designers are not users."**

***Jakob Nielsen***

**Human-computer interaction researcher and co-founder of the Nielsen Norman Group**



In the participation platforms, it is convenient to include all the people in the processes that a government assumes for a decision-making process, so the digital content of the sites has as its main function to reach all possible users regardless of their special capacity, it is say the platform has to be accessible and usable (Díaz Huici, 2019, p. 25). The application of accessibility standards must first be specified and then the site must be easy to use for the user (Palchevich Rodríguez, 2012, p. 8)

One of the techniques to find usability flaws in a website is observation, in the later this must be pointed out to the software development team, which must correct and optimize the problem (Baiget, 2015; Nielsen Norman Group, 2016; J. Pincay-Ponce et al., 2020).

This book is based on the ISO 9241-141 standard, which defines the requirements and recommendations for the design and evaluation of interactive systems that allow the search for information. The standard addresses aspects such as Navigation criteria, General Design, Content Design, Search and the Presentation of Results (INTECO, 2018).

In this research, a multicriteria heuristic evaluation was carried out based on the ISO 9241-151 standard. Many authors agree that heuristic evaluation is a method that does not require the direct participation of end users, therefore, it is faster and cheaper to carry out than the application of techniques with user participation to evaluate a website (Anganes et al., 2016; Karoulis & Pombortsis, 2004; Palma-Laáz et al., 2022).

Regarding Navigation, it must be consistent and predictable throughout the interactive system. It must allow the user to orient

himself and find the information or functionality he is looking for. You must provide the user with feedback on their current position, system status, and available options. It should give the user control over the flow of interaction and access to information or functionality. Finally, you must offer the user help and support when necessary or asked.

Regarding the General Design, this must be based on an explicit understanding of the users, tasks, and environments. It is guided by defined and agreed usability goals. Use recognized standards and consistent design principles. It supplies a user experience proper to the context of use. Finally, it is iterative and is evaluated often.

Regarding the Content Design, these must be relevant and adequate for the purpose, context, and users of the interactive system. They must be clear and understandable to users, using right language and avoiding ambiguities or errors. They must be consistent and coherent throughout the interactive system. They must be accessible and legible for users, considering their visual, auditory, and cognitive characteristics. Finally, they must be updated and true, reflecting the real state of the interactive system and the information it presents.

Regarding the Search on websites, the search criteria must be clear, understandable, and relevant to the information domain. They must allow the user to specify the level of detail and breadth of the search. They must allow the user to easily change, add or remove criteria. They must be visible throughout the search process and reflect the current state of the query. Finally, they must supply feedback on the number and quality of expected results.

Regarding the presentation of the website, it must be clear, consistent, and proper to the type and format of the information. It must allow the user to easily find the relevant results and compare them with each other. You must supply information about the origin, reliability, and timeliness of the content. It must help navigation and adapt to the preferences and needs of the user, as well as the context of use.

A citizen participation site is a space where people can express

their opinions, proposals and demands on issues of public interest, and where the government or the private sector can respond and consider the needs and expectations of citizens. Therefore, it is especially important that these types of sites are easy to use, accessible and attractive to users, following the principles of ISO 9241-1511, which provides guidance on user-centered design of web interfaces.

# III

# WHAT HAPPENS IN LATIN AMERICA?

This chapter develops the assessment of online citizen participation platforms in Latin America. It is expected that these results will support development teams in building websites with accessibility and usability standards. The global protocol followed was:

1. Establish the selection criteria for citizen participation platforms.
2. Establish the selection criteria for guides, standards, and tools for the assessment of Usability and Accessibility.
3. Evaluate the Accessibility based on the principles of being Perceptible, Operable, Understandable and Robust of each website of the platforms. These principles are addressed by 13 guidelines and 78 conformance criteria of WCAG 2.1. These ratings are entered into a Microsoft Forms.
4. Evaluate Usability based on the criteria of Content Design, Navigation, Search, General Design and Content Presentation. These 5 criteria are addressed with 125 indicators of the ISO 9241:151: 2008 standard. These assessments are entered into a Microsoft Forms.
5. Tabulate the results of the Microsoft Forms.
6. Present the results.

## 3.1. PROCEDURAL ASPECTS

Of the 20 Latin American countries, only 13 had citizen participation platforms until the end of 2020: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru, Dominican Republic, and Uruguay. It was considered to evaluate three web pages for each of the

50 citizen participation websites in those 20 countries: Home, Debate and Contact Us.

1. Home Page. – It is the main page of each site, where users usually enter and access important information, and leads to other sites.
2. Discussion Page. – It is essential for citizen participation platforms, since citizens will be able to propose and vote for the proposals given by them.
3. Contact Us Page. - It is visited by citizens who require help in some part of the website or require information on a process, usually consisting of a form.

Regarding the automatic evaluation of accessibility, two of more than 120 tools that the W3C updates periodically were selected (W3C, 2020). These tools allowed the 61 criteria of WCAG 2.0 to be evaluated automatically and online, while the 17 criteria added in WCAG 2.1 (for a total of 78 compliance criteria) were evaluated manually. The tools selected for the assessment where Cynthia Says and Taw:

1. Cynthia Says. - Free automatic tool that identifies errors in the content of websites. At the end of 2020, it was evaluating accessibility compliance with the Section 508 and WCAG 2.0 standards.
2. 2.Taw. - Free automatic tool that analyzes the degree and compliance of websites accessibility with respect to WCAG 2.0.

Then, the ISO 9241-151: 2008 standard was selected to perform the Usability heuristic evaluation and store the results in a form. The results of the 125 criteria associated with each of the 50 websites were then tabulated.

For both the accessibility and usability criteria, the following scale is used:

Fully compliant (2). It represents the maximum qualification in compliance with the criteria and levels.

- Partially Complies (1). Represents an average rating of compliance with the criteria and levels.
- Does not apply criteria (0). It represents a qualification that it

is not necessary to comply with the objective of the website and the criteria of the evaluators.

- Partial breaches (-1). It represents a low score in terms of meeting the success criteria.
- Fails (-2). Does not meet the success criteria.

In the 50 websites reviewed and analyzed, the following results were obtained, both for failures and for compliance with the accessibility and usability criteria:

## 3.2. ACCESSIBILITY BY LEVELS

Table 9 shows the criteria considered "not applicable" for the assessment, but they are not considered in the totals and percentages that follow.

| Priority | Valued items | | | % | | |
|---|---|---|---|---|---|---|
| | A | AA | AAA | A | AA | AAA |
| 2. Fully compliant | 417 | 51 | 154 | 16,3 | 2,6 | 6,7 |
| 1. Partially Complies | 26 | 214 | 7 | 1,0 | 10,8 | 0,3 |
| **0. Does not apply criteria** | **795** | **250** | **846** | **31,0** | **12,6** | **36,9** |
| -1. Partially breaches | 1390 | 1338 | 1589 | 54,2 | 67,2 | 69,4 |
| -2. Fails | 732 | 387 | 540 | 28,5 | 19,4 | 23,6 |
| **Total** | **2565** | **1990** | **2290** | **100,0** | **100,0** | **100,0** |

**Table 9:** Web accessibility results according to WCAG 2.1 priority conformance levels

Table 9 shows that about 16% of ratings are positive with respect to WCAG 2.1 Priority Level A, this between the "Fully compliant" and "Partially Complies" ratings. It should be noted that WCAG 2.1 Level A or Priority 1 is the most basic level of compliance, which includes the most essential success criteria for ensuring web accessibility, as outlined in the Concepts and Challenges chapter. If websites on average meet 16% of these criteria, it means that they have many barriers and difficulties for people with disabilities to access their information and functionalities. This may adversely affect the user experience, reputation, reach and social responsibility of the website. Therefore, it is recommended to follow WCAG 2.1 and reach at least level AA, which is the minimum desirable level for most

websites and the one required by many policies and legislations on web accessibility.

Table 9 also shows that about 13% of ratings are positive with respect to WCAG 2.1 Priority Level AA, this between the "Fully compliant" and "Partially Complies" ratings. If websites on average meet 13% of these criteria, it means that they have many limitations and deficiencies so that people with disabilities can access their information and functionalities properly. This can involve problems of perception, operation, understanding, and compatibility with user tools. AA is the minimum desirable level for most websites and the one required by many web accessibility policies and legislations.

The same table 9 shows that around 7% of the ratings are positive with respect to AAA WCAG 2.1 Priority Level, this between the "Fully compliant" and "Partially Complies" ratings. AAA is the highest level of compliance, which includes the most demanding success criteria to ensure web accessibility. If websites on average meet 7% of these criteria, it does not mean that everything is wrong, but that it has many opportunities and challenges for improvement so that people with disabilities can access their information and functionalities optimally. This can involve things like text spacing, hover or focus content, name tag, enhanced contrast, orientation, movement, text size, and so on.

## 3.3. ACCESSIBILITY ACCORDING TO WCAG PRINCIPLES

Table 10 shows the criteria considered "not applicable" for the assessment, but they are not considered in the totals and percentages that follow.

| Score | Principles | | | | % | | | |
|---|---|---|---|---|---|---|---|---|
| | Perceivable | Operable | Understandable | Robust | Perceivable | Operable | Understandable | Robust |
| 2. Fully compliant | 133 | 290 | 169 | 30 | 5,1 | 12,0 | 11,1 | 9,5 |
| 1. Partially Complies | 198 | 40 | 9 | 2 | 7,6 | 1,7 | 0,6 | 0,6 |
| **0. Does not apply** | **644** | **839** | **387** | **21** | **24,7** | **34,8** | **25,5** | **6,6** |
| -1. Partially breaches | 1517 | 1572 | 1034 | 194 | 58,3 | 65,3 | 68,2 | 61,2 |
| -2. Fails | 756 | 507 | 305 | 91 | 29,0 | 21,0 | 20,1 | 28,7 |
| **Total** | **2604** | **2409** | **1517** | **317** | **100,0** | **100,0** | **100,0** | **100,0** |

**Table 10:** Web accessibility results according to the principles of WCAG 2.1

Table 10 shows that close to 13% of evaluations are positive with respect to the Perceivable principle of WCAG 2.1. The Perceivable principle implies that all content on your website, including text, images, video, and audio, must be presented in such a way that it can be perceived by anyone, regardless of their abilities. A website that only meets 13% of this principle means that it has a lot of difficulties for people with disabilities to see and hear the content. This can negatively affect user understanding, interaction, and satisfaction.

Table 10 shows that close to 14% of evaluations are positive regarding the Operable principle of WCAG 2.1. The Operable principle implies that all the content on your website must be accessible through different input methods, such as keyboard, mouse, voice, or touch, and that you must provide enough time, control, and help for users. can interact with it. A website that only complies with 14% of this principle means that it has many barriers and obstacles for people with disabilities to operate the content. This can negatively affect the usability, navigation, and security of users.

Table 10 shows that close to 12% of assessments are positive regarding the WCAG 2.1 Comprehensible principle. The Understandable principle states that web content should be readable and understandable, predictable in appearance and operation, and that it should help users avoid and correct errors. If a website is only 12% compliant with this principle, it means that it is leaving out many people who might have difficulty accessing, understanding, or interacting with the content. Let's consider asking ourselves, what benefits would there be in improving the level of conformance to the Comprehensible principle of WCAG 2.1?

Table 10 shows that close to 10% of evaluations are positive with respect to the Robust principle of WCAG 2.1. The Robust principle states that web content should be designed to support different technologies and assistive devices, for example, screen readers, different browsers, operating systems, and input devices... If a website is only 10% compliant with This principle means that you are limiting access to your content to many people who might use different tools or devices to browse the web.

## 3.4. USABILITY ACCORDING TO THE GUIDELINES OF ISO 9241-151

In this section we present compliance with usability guidelines for web user interfaces on citizen participation platforms, in terms of navigation criteria, general design, content design, search and presentation, applying the ISO 9241-151 standard. Table 11 shows the criteria considered "not applicable (0)" for the assessment, but they are not considered in the totals and percentages that follow.

| Score | Guidelines | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Navigation | % | Overall Design | % | Content Design | % | Search | % | Presentation | % |
| 2 | 173 | 11,2 | 71 | 9,1 | 106 | 8,9 | 67 | 8,4 | 163 | 8,2 |
| 1 | 575 | 37,2 | 380 | 48,7 | 437 | 36,7 | 155 | 19,4 | 866 | 43,3 |
| **0** | **4** | **0,3** | **0** | **0,0** | **10** | **0,8** | **0** | **0,0** | **2** | **0,1** |
| -1 | 417 | 27,0 | 121 | 15,5 | 320 | 26,9 | 94 | 11,8 | 483 | 24,2 |
| -2 | 381 | 24,6 | 208 | 26,7 | 327 | 27,5 | 484 | 60,5 | 486 | 24,3 |
| **Total** | **1546** | **100** | **780** | **100** | **1190** | **100** | **800** | **100** | **1998** | **100** |

**Table 11:** Web accessibility results according to the guidelines of ISO 9241-151

Table 11 shows that close to 48% of the evaluations are positive with respect to the Navigation guidelines, that is, they have evaluations of 2 and 1. It means that the sites have significant room for improvement to facilitate access and recovery of the information. information from users. Among the suggested actions are o Offer efficient and flexible navigation and search mechanisms that allow users to find what they are looking for.

Table 11 shows that close to 58% of evaluations are positive with respect to the General Design guidelines. It means that they have an acceptable level of usability, but they can still be improved, for example, by defining a design strategy focused on the needs, expectations, and characteristics of the users.

Table 11 shows that close to 47% of evaluations are positive regarding the Content Design guidelines. It means that they have an acceptable level of usability, but they can still improve, for example, by presenting the content in a clear, consistent, and adapted way to the context and purpose of a citizen participation website.

Table 11 shows that close to 28% of the evaluations are positive with respect to the Search guidelines. It means that these websites have a partially user-centric design but could improve on some key aspects to achieve better usability and user satisfaction. They have relevant and up to date content but could do with organizing it better to make it easier to navigate and search, and to avoid information overload. They have a clear structure and hierarchy, but they could offer more options and help so that users can find their way around and find what they are looking for. They have a consistent and attractive presentation of the content but could be better adapted to the different characteristics and preferences of users, as well as the different devices and technologies they use (The latter is consistent with the observations of the principle of Web Accessibility Robustness according to WCAG 2.1).

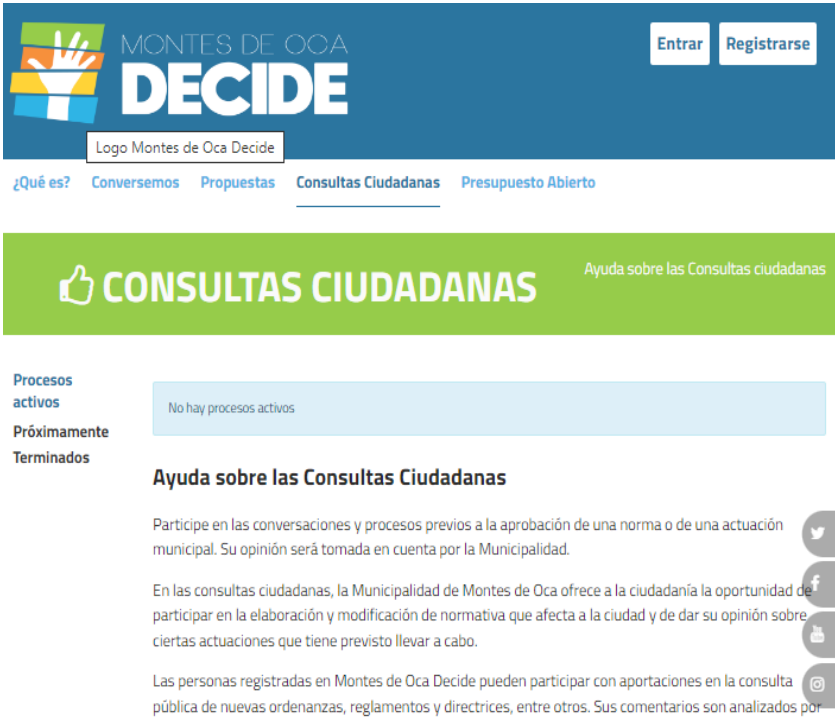



**Figure 8:** Partial site view of the help page of the citizen participation website of Montes de Oca, Costa Rica

## 3.5. WEB ACCESSIBILITY COMPLIANCE CRITERIA MOST VALUED WITH 2 POINTS

The most valued criteria of this type are listed below, those that are listed first have the most ratings:

- 2.1.1, with 110 ratings, refers to the fact that the content can be operated through a keyboard interface without requiring specific times.
- 3.3.1, with 101 estimates, indicates that websites have a default language and often add English as well.
- 2.4.2, with 86 ratings, indicates that the websites have titles that describe their purpose, as well as that they have headers to better organize the content.

## 3.6. WEB ACCESSIBILITY COMPLIANCE CRITERIA MOST VALUED WITH 1 POINT

Below are the best rated criteria of this type, those listed first have more ratings:

- 1.3.4, with 107 ratings, refers to the fact that the content can be displayed horizontally or vertically depending on the user's preference.
- 1.4.10, with 62 ratings, indicates that the website is presented without losing information.
- 2.4.6, with 16 ratings, indicates that titles and tags describe the purpose of a website. For example, descriptive headers are especially useful for users who read slower or have short-term memory limitations. These people benefit from section headings that help you "predict" what each section contains.
- 1.4.12, with 13 ratings, suggests that users can adjust the spacing of the text to make it easier to read and that when this happens, the text does not overlap, as in the following figure:


**Figure 9.** Image of a superimposed text when zooming in on a textual content

## 3.7. WEB ACCESSIBILITY COMPLIANCE CRITERIA MOST VALUED WITH -1 POINT

Below are the best rated criteria of this type, those listed first have more ratings:

- 3.2.4, with 112 ratings, ensures consistent identification of components that appear repeatedly within a set of Web pages and thus proper reading by assistive technologies.
- 2.3.1, with 112 ratings, weighs the elimination of flickering components that may affect those with photosensitive seizure disorders.
- 2.2.3, with 112 ratings, considers that websites avoid establishing time in their activities because there are people who need more time to interact with the content.

## 3.8. WEB ACCESSIBILITY COMPLIANCE CRITERIA MOST VALUED WITH -2 POINTS

Below are the best rated criteria of this type, those listed first have more ratings:

- 1.4.6, with 104 ratings, refers to websites having a contrast of at least 7: 1 in both texts and images of textual content.
- 3.3.5, with 102 ratings, promotes that websites provide texts or help options to prevent the user from making mistakes.

- 3.2.5, with 99 ratings, suggests preventing the automatic launch of new windows or submission of forms after selecting an item from a list. Such unexpected changes of context can cause difficulties for people with motor disabilities, people with low vision, blind people, and people with certain cognitive limitations.
- 1.4.3, with 99 ratings, suggests that websites have a contrast of at least 4.5:1 in both texts and images of textual content.

## 3.9. WEB USABILITY COMPLIANCE CRITERIA MOST VALUED WITH 2 POINTS

Below are the best rated criteria of this type, those listed first have more ratings:

- 9.3.8, with 46 ratings, means that websites should try to avoid horizontal scrolling.
- 8.3.10.1, with 40 ratings, promulgates avoid splash screens.
- 8.3.11, with 28 ratings, promotes avoiding unnecessary window openings.
- 10.7, with 21 ratings, promotes avoiding incorrect links.

## 3.10. WEB USABILITY COMPLIANCE CRITERIA MOST VALUED WITH 1 POINT

Below are the best rated criteria of this type, those listed first have more ratings:

- 9.3.17, with 44 ratings, refers to sites appropriately using white space in textual content.
- 10.6, with 43 estimates, promotes the use of programming technologies consistent with user tasks.
- 9.3.9, with 42 ratings, suggests using appropriate colors considering human constraints.
- 9.6.4, with 41 ratings, encourages you to take care of grammar and spelling.

## 3.11. WEB USABILITY COMPLIANCE CRITERIA MOST VALUED WITH -1 POINT

Below are the best rated criteria of this type, those listed first have more ratings:

- 8.4.15, with 30 ratings, promotes that the user be allowed to activate specific configuration.
- 7.1.4, with 29 ratings, promotes that websites are sufficiently complete so that users can obtain the information they require.
- 9.4.12, with 27 ratings, encourages links within websites to be distinguishable.
- 9.3.4, with 27 ratings, advises that sites highlight new content to users.

## 3.12. WEB USABILITY COMPLIANCE CRITERIA MOST VALUED WITH -2 POINTS

Below are the best rated criteria of this type, those listed first have more ratings:

- 9.4.8, with 48 ratings, means that websites must highlight links that have been visited previously.
- 8.5.5.1, with 47 ratings, suggests offering search suggestions to formulate a query more effectively.
- 10.1.5, with 46 ratings, suggests including features that allow changing the presentation of the text according to the language.
- 9.3.16, with 45 ratings, suggests that the option to print documents should be offered.
- 7.2.8.4, with 45 ratings, suggests making explicit the data use policy of the website.
- 8.5.2.6, with 43 ratings, suggests providing sufficient information about the search technique used for the user to correctly formulate their queries.
- 7.2.9.7, with 43 ratings, suggests whether a web user interface adapts automatically, based for example on user profiles or

monitoring behavior. The user must be able to explicitly disable automatic adaptation or switch to another user if they are authorized to do so.

- 9.4.10 with 42 ratings suggests clearly marking links that open new browser windows or pop-ups.
- 10.1.3, with 42 ratings, suggests presenting links to select different languages if available.
- 7.2.9.6, with 41 ratings, suggests that, if user profiles are automatically generated to adapt the user interface, specify what type of information is used and how it affects the use of the Web user interface.
- 8.4.13, with 39 ratings, suggests that, if a task requires a sequence of steps, a meaningful "back" function on the page should be provided.
- 8.5.2.10, with 39 ratings, suggests that, starting from a misspelled word in a query, the website presents the search results for the incorrect term, as well as a suggestion to search again with the corrected term.
- 8.5.3.1, with 35 ratings, suggests that the search results are ordered in a way that is meaningful to the user and corresponds to their information needs.
- 9.5.3, with 37 ratings, suggests providing keyboard shortcuts for important links and other interaction objects.

## 3.13. SUCCESS CRITERIA BEST ASSOCIATED WITH THE "PERCEIVABLE" WEB ACCESSIBILITY PRINCIPLE

In this section referring to the Perceptible principle, references are made to the affectation on disabilities or special conditions, from design problems in the construction of websites. The following are the conformity criteria valued with 2 points, that is, those that are best met:

- 1.4.8, with 75 ratings, suggests allowing people with low vision or visual impairment to customize the appearance of text and background to improve the readability and contrast of web content.

- 1.4.4, with 25 ratings, suggests allowing people with low vision or visual impairment to adjust text size without losing functionality or readability of web content.
- 1.4.11, with 21 ratings, suggests allowing people with low vision or visual impairment to distinguish user interface components and graphic objects from the background, ensuring a minimum contrast ratio of 3:1.

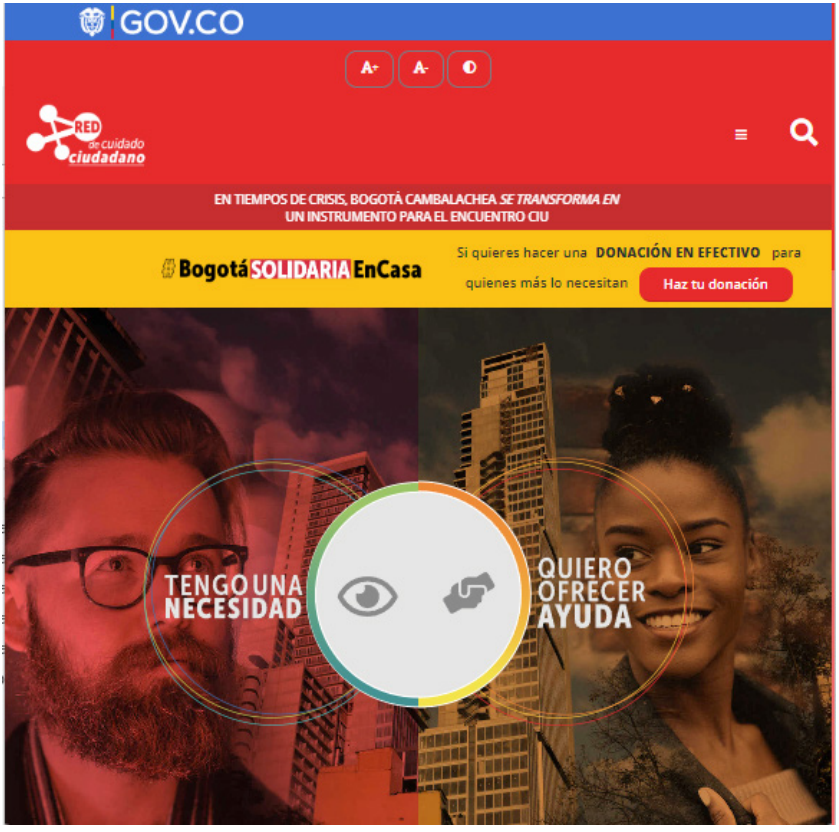



**Figure 10:** Partial view of the citizen participation platform of Bogotá (Colombia)

- 1.3.1, with 10 ratings, suggests allowing people with disabilities to access the information and relationships implicit in the visual presentation of web content, using user applications that adapt the content according to the needs of each user.
- The following are the conformity criteria valued at 1 point, i.e., those that are partially met:

- 1.3.4, with 107 ratings, suggests allowing people with visual or motor impairments to access web content regardless of screen orientation, whether vertical or landscape, unless it is essential for the use of the content.
- 1.4.10, with 62 ratings, suggests allowing people with low vision or visual impairment to access web content without losing information or functionality and without requiring two-dimensional scrolling, when resizing text or browser window.
- 1.4.12, with 13 ratings, suggests allowing people with low vision or visual impairment to adjust text spacing without losing information or functionality, improving the readability and visual comfort of web content.
- 1.3.5, with 10 ratings, suggests allowing people with disabilities to use user applications that adapt content according to their preferences or needs, by providing semantic information about the purpose of each input field that collects information about the user.

The following are the conformity criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for citizen participation website builders:

- 1.4.1, with 112 ratings, suggests allowing visually impaired or colorblind people to access the information, actions, responses, or visual elements conveyed through color by providing another way of identifying them that does not rely solely on color.
- 1.3.3, with 112 ratings, suggests providing instructions or indications that are provided to understand or operate web content, in ways to identify them that do not depend only on sensory characteristics such as shape, size, orientation, sound or color.
- 1.4.5, with 112 ratings, suggests facilitating the perception and understanding of content by people with visual, hearing, cognitive or learning disabilities, so that the text can be adapted to their needs and preferences, as well as

processed by assistive technologies such as screen readers or screen magnifiers.

- 1.4.9, with 103 ratings, suggests removing the barriers posed by text images for people with visual, hearing, cognitive or learning disabilities, as text can be adapted to their needs and preferences, as well as processed by assistive technologies such as screen readers or screen magnifiers.
- 1.3.2, with 100 ratings, suggests that the visual components of the website have a logical order defined by code. In this way, it is possible to ensure that the content can be perceived and understood in a coherent and logical way by people with visual, hearing, cognitive or learning disabilities, since the reading order coincides with the logical order of the content and no information or structure is lost.
- 1.4.12, with 96 ratings, described in the preceding section.
- 1.2.5, with 75 ratings, suggests allowing visually impaired or blind people to access visual information from video content, as the audio description narrates the important elements that are not conveyed by sound alone.
- 1.2.7, with 75 ratings, suggests allowing visually impaired or blind people to access visual information from video content that requires more time to describe, because the extended audio description pauses the video to narrate important elements that are not conveyed by sound alone. This is a AAA criterion, ideal to meet, but not yet mandatory.
- 1.2.6, with 75 ratings, AAA level criterion, suggesting providing sign language interpretation for all pre-recorded audio content.
- 1.2.3, with 75 ratings, level A criterion, suggesting providing audio description or a multimedia alternative for all pre-recorded video content that conveys important information.
- 1.2.4, with 75 ratings, level AA criterion, which suggests providing subtitles for all live audio content.
- 1.2.8, with 75 ratings, AAA level criterion, suggesting providing a textual or multimedia alternative for all pre-recorded media content that conveys important information.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or because of an inadequate application deprive users of several benefits. Addressing them correctly is a challenge for citizen participation sites:

- 1.4.6, with 104 ratings, AAA level criterion, which suggests ensuring a visual contrast between text and background in at least 7:1, except for large text, incidental text, or decorative text.
- 1.4.3, with 99 ratings, level AA criterion, which suggests ensuring visual contrast between text and background in at least 4.5:1, except for large text, incidental text, or decorative text.
- 1.1.1, with 91 ratings, level A criterion, suggesting that all non-text content have a textual alternative describing its purpose or function.
- 1.4.4, with 86 ratings and described in the preceding sections.
- 1.3.6, with 64 ratings, AAA level criterion, suggesting that the purpose of interface components and content can be determined by the information available for assistive technologies.
- 1.3.5, with 60 reviews and described in the preceding sections.
- 1.4.11, with 58 ratings and described in the preceding sections.
- 1.4.13, with 51 ratings, level AA criterion, suggesting that when additional content is displayed when hovering or moving keyboard focus over a component, certain conditions are met to avoid accessibility issues.

## 3.14. SUCCESS CRITERIA BEST ASSOCIATED WITH THE "OPERABLE" WEB ACCESSIBILITY PRINCIPLE

In this section referring to the Operable principle, references are made to the priority level of each conformity criterion, to illustrate the importance of meeting them in the design and construction of web user interfaces. The following are the conformity criteria valued with 2 points, that is, those that are best met:

- 2.1.1, with 110 ratings, level AA criterion, which suggests that all web content functionality is operable via the keyboard without requiring specific keystroke times.
- 2.4.2, with 86 ratings, level A criterion, suggesting that each web page have a title, even defined by code, describing its topic or purpose.
- 2.4.10, with 53 ratings, AAA level criterion, suggesting that sections of web content have descriptive headings that facilitate navigation and understanding.
- The following are the compliance criteria valued with 1 point, that is, those that are partially met:
- 2.4.6, with 16 ratings, level AA criteria, suggesting that titles and tags describe the theme or purpose of the web content components.
- 2.5.1, with 12 ratings, A-level criteria, suggesting that all functionality that can be operated with a pointer gesture can also be operated with a single pointer without path-based gestures.

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of citizen participation websites:

- 2.1.3, with 112 ratings, Level A criteria, which suggests that if a keyboard-based interface can cause an action, then that action can be undone, aborted, or confirmed via the keyboard.
- 2.3.2, with 112 ratings, AAA level criteria, which suggests that nothing flashes more than three times per second.
- 2.2.3, with 112 ratings, AAA level criteria, which suggests that there are no time limits on completing tasks, except when they are essential or when the time limit can be adjusted, extended, or disabled.
- 2.3.1, with 112 ratings, Level A criteria, which suggests that nothing flashing more than three times per second in a range of colors could cause photosensitive seizures.

- 2.4.7, with 111 ratings, Level AA criteria, which suggests that any UI component that receives keyboard focus has a visible focus indicator.
- 2.2.1, with 111 ratings, level A criteria, which suggests that, for each time limit established by the content, the user can adjust, extend, or deactivate it.
- 2.3.4, with 111 ratings, AAA level criteria, which suggests that interruptions can be postponed or suppressed by the user, except when they are urgent.
- 2.5.6, with 107 ratings, AAA level criteria, referring to concurrent input mechanisms, suggests ensuring that people can use and switch between different input modes when interacting with web content. These can be a combination of mechanisms such as a keyboard or keyboard-like interfaces and pointing devices such as a mouse, stylus, or touch screen.
- 2.4.6, with 94 ratings and described in the preceding sections.
- 2.5.3, with 82 evaluations, level A criteria, referring to the use of the label in the name of the object. The intent of this Success Criterion is to ensure that the words that visually label a component are also the words programmatically associated with the component. This helps ensure that people with disabilities can rely on visible labels to interact with components and have a better experience.
- 2.2.5, with 77 ratings, level AA criteria, which suggests that when a session expires, the user can continue the activity without data loss after re-authentication. This success criterion benefits people who may require additional time to complete an activity, for example, people with cognitive limitations who are slow readers and require more time to read and answer a quiz.
- 2.5.5, with 71 ratings, AAA level criteria, which suggests ensuring that the target sizes, for example, a button, icon, and so on. be large enough for users to easily activate, even if the user is accessing content on a small touchscreen device, has limited dexterity... objects must be at least 44 by 44 CSS pixels in size.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to inadequate application, deprive users of various benefits. Addressing them correctly is a challenge for citizen participation sites:

- 2.1.4, with 96 ratings, Level A criteria, which suggests that if web content implements keyboard shortcuts that use only letters, numbers, punctuation, or symbols, then one or more of the following conditions are met: can be deactivated, can be reassigned, or are activated only by a modifier key.

## Accesibilidad

La accesibilidad web se refiere a la posibilidad de acceso a la web y a sus contenidos por todas las personas, independientemente de las discapacidades (físicas, intelectuales o técnicas) que puedan presentar o de las que se deriven del contexto de uso (tecnológicas o ambientales).

Cuando los sitios web están diseñados pensando en la accesibilidad, todos los usuarios pueden acceder en condiciones de igualdad a los contenidos, por ejemplo:

- Proporcionando un texto alternativo a las imágenes, los usuarios invidentes o con problemas de visión pueden utilizar lectores especiales para acceder a la información.
- Cuando los vídeos disponen de subtítulos, los usuarios con dificultades auditivas pueden entenderlos plenamente.
- Si los contenidos están escritos en un lenguaje sencillo e ilustrados, los usuarios con problemas de aprendizaje están en mejores condiciones de entenderlos.
- Si el usuario tiene problemas de movilidad y le cuesta usar el ratón, las alternativas con el teclado le ayudan en la navegación.

### "Atajos" de teclado

Para poder navegar por este sitio web de forma accesible, se han programado un grupo de teclas de acceso rápido que recogen las principales secciones de interés general en los que está organizado el sitio.

| Tecla | Página |
|---|---|
| 0 | Inicio |
| 1 | Debates |
| 2 | Propuestas |
| 3 | Votaciones |
| 4 | Presupuestos participativos |
| 5 | Procesos legislativos |

**Figure 11:** Partial capture of a page from the website corresponding to Quito, Ecuador (https://decide.quito.gob.ec/accessibility). The site supplies accessibility information, in this case, keyboard shortcuts

- 2.5.2, with 86 ratings, A-level criteria, which suggests meeting at least one of the following for features that can be operated with a single pointer: no pointing change occurs, pointing change can be reversed, the change occurs upon completion of the pointer action, or an accessible alternative way to perform the function is provided.
- 2.4.4, with 82 ratings, A-level criteria, which suggests that the purpose of each link can be determined from the link text or the context of the link text.
- 2.4.10, with 56 ratings and described in the preceding sections.

## 3.15. SUCCESS CRITERIA BEST ASSOCIATED WITH THE "UNDERSTANDABLE" WEB ACCESSIBILITY PRINCIPLE

The following are the conformity criteria valued with 2 points, that is, those that are best met:

- 3.1.1, with 101 ratings, suggests that the primary language of each web page should be specified by a code that follows a recognized standard.
- 3.2.2, with 48 ratings, suggests that when a component receives focus, it should not initiate any context switching, such as opening a new window or going to another page.
- 3.3.2, with 15 ratings, suggests that when prompting the user for information, clear and appropriate labels or instructions should be provided for each input field.

The following are the compliance criteria valued with 1 point, that is, those that are partially met:

- 3.3.1, with 2 ratings, suggests that if a user input error occurs, you should identify and describe the problem in easily noticeable text.
- 3.3.3, with 2 ratings, suggests that if an input error can be automatically detected and corrected, a correction suggestion should be provided to the user before they submit the information.
- 3.3.4, with 2 evaluations, suggests that for web pages that require confirmation or the sending of legal, financial, or personal user information, mechanisms should be provided to avoid, review and correct errors before completing the process. Users with disabilities may be more prone to errors, for example, people with reading disabilities can transpose numbers and letters… people with motor disabilities may accidentally press keys.

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of citizen participation websites:

- 3.2.3, with 112 ratings, suggests that navigation mechanisms that are repeated across multiple web pages within a set of web pages should appear in the same relative order each time they are presented. This is a great help to users who interact with repeated content on web pages so that they can "predict" the location of the content they are looking for and find it more quickly when they search for it again.
- 3.1.2, with 112 ratings, suggests that when the language of a part of the content is different from the main language of the page, the language of that part should be specified using a code that follows a recognized standard, to allow readers to screen or other assistive technologies can correctly express the information to the user.
- 3.1.3, with 112 ratings, suggests providing a definition or explanation for unusual words or phrases, idioms, slang, acronyms, or abbreviations that may be ambiguous to some users.
- 3.1.4, with 111 ratings, suggests providing an expanded form or description for abbreviations that may be confusing or unfamiliar to some users.
- 3.3.4, with 85 ratings and described in the preceding sections.
- 3.3.1, with 85 ratings and described in the preceding sections.
- 3.3.3, with 80 ratings and described in the preceding sections.
- 3.3.6, with 76 ratings, suggests providing context-sensitive and sensitive help for users who need additional assistance to understand or complete the tasks required by the content.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to inadequate application, deprive users of various benefits. Addressing them correctly is a challenge for citizen participation sites:

- 3.3.5, with 102 ratings, suggests providing information about expected formats, values, units, or requirements for input fields that accept free input from the user.
- 3.2.5, with 99 ratings, suggests that context switches should

only occur after deliberate user action and not because of a change in focus, selection, or input.

- 3.3.2, with 55 ratings and described in the preceding sections.
- 3.2.2, with 35 ratings and described in the preceding sections.

## 3.16. CONFORMITY CRITERIA THAT REPRESENT CHALLENGES IN ACCORDANCE WITH THE WEB USABILITY GUIDES "NAVIGATION"

This section is built based on ISO 9241:151. Emphasis is placed on the criteria that have most reported problems, that is, those heuristically valued with -1 and -2 points. Note that the beneficial argument of each exposed criterion is similar in many cases to what is described for certain web accessibility criteria.

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of usable citizen participation websites:

- 8.4.15, with 30 reviews, suggests that navigation steps that require the selection of a setting or option should be explicitly enabled by the user, unless the selection will trigger a navigation. Because users could confuse the selection of an option with the activation of a navigation step.
- 8.3.4, with 26 ratings, suggests that the navigation structure should be organized based on the concepts that are significant and relevant to the user. This criterion benefits users by reducing their cognitive load.
- 8.4.5, with 24 evaluations, suggests that the interface should be consistent within the same website, that is, that the visual, auditory, and functional elements remain the same or similar on all pages. This criterion benefits users by reducing cognitive load, facilitating learning and memorization, increasing confidence and satisfaction, as well as preventing errors and confusion.
- 8.4.6, with 23 ratings, suggests that viewing multiple levels at the same time helps users understand the navigation structure and access the desired content more quickly if they are not cognitively or perceptually overloaded.

- 8.4.9, with 22 ratings, suggests providing cross-links to potentially relevant pages in the navigation structure, preventing overloading the user with too many links.
- 8.3.3, with 21 evaluations, suggests that if the navigation structure is complex, favor broad navigation structures because they offer a greater number of possible links. In this case, it should be preferred to the deep ones that require many navigation steps. Of course, the navigation links must be logically grouped and labeled in a meaningful way.
- 8.4.14, with 21 ratings, suggests that if the pages are long, they should be subdivided into meaningful sections and that these be made available via links within the page… at the top of the page.
- 8.2.5, with 20 ratings, suggests reducing the number of navigation steps necessary to reach a certain content, considering different mental models, navigation strategies, and user tasks.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to an inadequate application, deprive users of various usability benefits:

- 8.4.10, with 49 ratings, suggests making dynamic navigation links obvious.
- 8.4.13, with 39 ratings and described in the preceding sections.
- 8.4.8, with 36 ratings, suggests providing an independent navigation view or overview of the site's structure, using the well-known "site map" resource.
- 8.3.6, with 25 ratings, suggests that if users navigate between different pages belonging to the same multi-step task, they should be given step-by-step instructions, clear indications of where the user is in the task, skip to the previous steps and correct your entries.
- 8.4.7, with 22 ratings, suggests that navigation overviews be provided in deeply nested navigation structures. The partitioning of the overall structure must be semantically

significant, and the placement of navigation components must be consistent throughout the website.

- 8.4.14, with 20 ratings and described in the preceding sections.
- 8.4.9, with 20 ratings and described in the preceding sections.

## 3.17. CONFORMITY CRITERIA THAT POSE CHALLENGES IN ACCORDANCE WITH THE WEB USABILITY GUIDES "GENERAL DESIGN"

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of usable citizen participation websites:

- 10.10, with 21 reviews, suggests that objects embedded in a web, such as a media player, provide a user interface that meets the same usability and accessibility requirements as the web user interface in which they are embedded. This criterion benefits users by satisfying their needs, motivation, and sense of control.
- 10.1.2, with 16 ratings, suggests that, if appropriate for the task, information about the geographic context of the website be provided, e.g., international phone codes.
- 10.1.4, with 14 reviews, suggests making the currency format, measurements, dates, times explicit... especially when the website has an international scope.
- 10.4, with 12 ratings, suggests that the name of the URL used to access the website meets the user's expectations.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to an inadequate application, deprive users of various usability benefits:

- 10.1.5, with 46 ratings and described in the preceding sections.
- 10.1.3, with 41 ratings and described in the preceding sections.
- 10.1.4, with 29 ratings and described in the preceding sections.
- 10.2, with 27 ratings, suggests providing enough help

information when certain functionality is not obvious.

- 10.3.1, with 24 reviews, suggests that the interface should be designed in a way that avoids or minimizes user errors, using constraints, validations, confirmations, defaults, and other techniques. This approach benefits users by reducing frustration, stress, and time lost due to errors, as well as improving the quality and reliability of information entered or processed.
- 10.1.2, with 19 ratings and described in the preceding sections.
- 10.8, with 15 ratings, suggests that web user interfaces should be designed to be as robust as possible in the face of changing technology… Design thinking about addressing technology with a certain time in the market and on the other design content to be usable with future technologies.

## 3.18. CONFORMITY CRITERIA THAT POSE CHALLENGES IN ACCORDANCE WITH THE WEB USABILITY GUIDES "CONTENT DESIGN"

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of usable citizen participation websites:

- 7.1.4, with 29 ratings, suggests that the content of a website is complete enough with respect to the purpose of the site and the typical information needs of the user. Containing all or most of the content relevant to your task, contributing to the perceived integrity of the site, and even via hyperlinks to other websites containing that content.
- 7.1.2, with 27 evaluations, suggests that the interface should be consistent with other similar or familiar interfaces for the user, that is, that it follow the conventions, standards, and norms established for the type of application, domain, or conceptual model. For example, in the conceptual model of an online store, Bordeaux red wines are a subcategory of red wines, which are a subcategory of wine, and so on.

This criterion benefits users by facilitating the transfer of knowledge and skills between different interfaces, as well as increasing the expectation and consistency of the interaction.

- 7.1.3, with 24 ratings, suggests that the content provided should be appropriate to the different objectives, prior knowledge, and preferences for the purpose of the web application as well as its target audience. For example, a citizen participation site for the description and support in internal processes and in the exchange of knowledge between citizens in a project X.
- 7.2.4, with 23 ratings, suggests that when the validity or relevance of the content depends on time, as is the case of the websites studied, updated content is shown to the user.
- 7.1.6, with 21 ratings, suggests that content units have an appropriate level of detail, for example, a news article about new municipal policies is rendered as a short headline, multi-line summary, or multi-page.
- 7.2.5, with 19 ratings, suggests that the date and time of the last content update be available for all pages of the website.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to an inadequate application, deprive users of various usability benefits:

- 7.2.8.4, with 43 ratings and described in the preceding sections.
- 7.2.9.7, with 43 ratings and described in the preceding sections.
- 7.2.9.6, with 41 ratings and described in the preceding sections.
- 7.2.5, with 25 ratings and described in the preceding sections.
- 7.2.9.4, with 19 evaluations, suggests that the interface be dynamically adaptable to the characteristics and profiles of the user, the system, or the environment, using techniques such as personalization, adaptation, or adaptability. This criterion benefits users by providing a more appropriate, efficient, and satisfactory interaction for each situation or context, while improving their orientation and spatial awareness within the website.

- 7.2.3.3, with 19 reviews, suggests that when presenting time-dependent media objects, such as animations or scrolling text, users should have functions to pause or stop the display of those media objects. Sometimes not all-time dependent media objects can be stopped, especially if the timing aspect is inherent to the task being performed. This criterion benefits users by allowing them to adapt the interaction to their needs, preferences, and pace, as well as recover from possible errors or context changes.


**Figure 12:** Websites from Argentina, the text where it reads "Platform for citizen participation in..." is an animation in which citizens can only see, but not control in any way

- 7.2.8.2, with 18 ratings, suggests considering whether a company policy statement should be readily available on the website. We believe that this is appropriate for citizen participation websites.

## 3.19. CONFORMITY CRITERIA THAT REPRESENT CHALLENGES IN ACCORDANCE WITH THE WEB USABILITY GUIDES "SEARCH"

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of usable citizen participation websites:

- 8.5.3.2, with 13 ratings, suggests that if search results are ordered according to predefined internal ranking mechanisms, users are provided with sufficient information to understand

the effect of this ranking on their tasks and search needs. information. For example, works for sports, health, streets, or lifestyle. Works for amounts of money required, among others.

- 8.5.2.9, with 10 ratings, suggests that the interface provide shortcuts to activate the search using.
- 8.5.4.5, with 8 ratings, suggests that the entered query be displayed on the search results page. This helps users in detecting errors or problems in the formulated query.
- 8.5.2.10, with 8 ratings and described in the preceding sections.
- 8.5.2.4, with 8 ratings, suggests providing advanced search features, in addition to a simple search, where appropriate.
- The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to an inadequate application, deprive users of various usability benefits:
- 8.5.5.1, with 47 ratings and described in the preceding sections.
- 8.5.3.1, with 39 ratings, suggests allowing the user to sort search results if required.
- 8.5.2.10, with 39 ratings and described in the preceding sections.
- 8.5.4.2, with 37 ratings, suggests that the user can select the scope of the search if necessary.
- 8.5.5.3, with 35 ratings, suggests that if the volume of results is large, users should have a mechanism to refine their search based on those results.

## 3.20. CONFORMITY CRITERIA THAT POSE CHALLENGES IN ACCORDANCE WITH THE WEB USABILITY GUIDES "PRESENTATION"

The following are the success criteria valued at -1 point, so their inadequate application deprives users of several benefits and addressing them well is a challenge for builders of usable citizen participation websites:

- 9.3.4, with 27 ratings, suggests that appropriate means be used to draw the user's attention to things that are new or significantly changed. content if This is relevant to the user's task.
- 9.3.6, with 26 ratings, suggests that the length of a page be selected to support the main purpose and use of the page. For example, home pages are often short, longer pages may be more appropriate for when users want to read the content without interruption, or when the page needs to match a paper counterpart.
- 9.4.2, with 25 ratings, suggests that the links are easily recognizable by the user. Link identification can be supported by a variety of techniques, such as underlining and color coding the text, highlighting the link, or placing the link in a group of navigation elements.
- 9.4.13, with 24 reviews, suggests that text link names should be long enough to be understood, but short enough to avoid wrapping.
- 9.3.12, with 24 reviews, suggests providing text-only alternatives for when stylesheets or frames are disabled for various reasons.
- 9.6.5, with 24 ratings, suggests identifying the primary natural language used in a web page by appropriate techniques such as HTML markup. This allows, for example, assistive technologies to determine the language of a text and translate it appropriately.
- 9.3.1, with 22 ratings, suggests that each page display a descriptive title and, if applicable, also its last update.

The following are the conformity criteria valued with -2 points, they are criteria that are generally not applied on websites or, due to an inadequate application, deprive users of various usability benefits:

- 9.4.8, with 48 ratings, suggests that if the standard presentation of browser links is modified or bypassed, for example by using graphics as links, and these have been previously visited by the user, they should be marked using an appropriate technique as color coding of that link.
- 9.3.16, with 45 ratings and described in the preceding sections.
- 9.4.10, with 42 ratings and described in the preceding sections.

- 9.4.9, with 38 ratings, suggests clearly marking links that open new browser windows or popup windows.
- 9.5.3, with 37 ratings, suggests providing keyboard shortcuts for important links and other interaction objects.
- 9.3.5, with 36 ratings, suggests that if a page's content is only valid for a certain period, it should be made available through the appropriate means.

## 3.21. PARETO DIAGRAM TO ILLUSTRATE WEB ACCESSIBILITY AND WEB USABILITY PROBLEMS

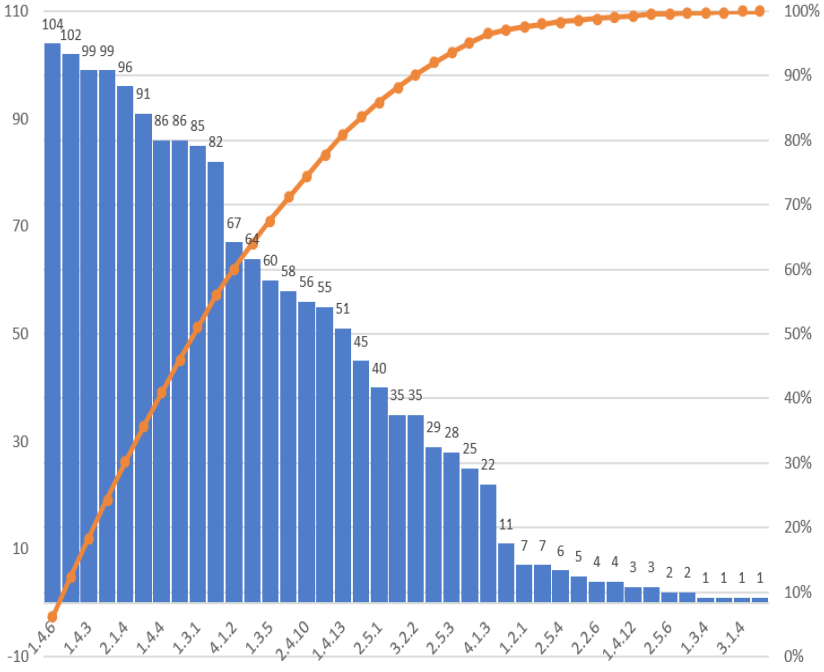



**Figure 13:** Pareto Diagram – Accessibility

The previous Pareto diagram represents the results of the web accessibility evaluation, where the codes that are observed on the X axis show the valued conformity criteria; in which it is identified that 80% of the most common errors that generate web accessibility difficulties are concentrated in non-compliance with criterion 2.5.2. towards the remaining ones on the side of the left line of the Pareto chart.

**Table 12:** Description of the criteria that present more accessibility error

| Code and criteria | Principle | Description |
|---|---|---|
| 1.4.6: Contrast (Enhanced). | Perceivable | Visual presentation of text and text images has a contrast ratio of at least 7:1 |
| 3.3.5: Help. | Understandable | Context-sensitive help is provided. |
| 1.4.3: Contrast (Minimum). | Perceivable | The visual presentation of text and text images has a contrast ratio of at least 4.5:1. |
| 3.2.5: Change on Request. | Understandable | Context changes are initiated only at the request of the user or failing that, a mechanism is provided available to disable such changes. |
| 2.1.4: Character Key Shortcuts. | Operable | A keyboard shortcut is provided in content using only letters (including uppercase and lowercase), punctuation marks, numbers, or symbols. |
| 1.1.1: Non-text Content. | Perceivable | Text alternative is if serves the equivalent purpose of non-text content. |
| 1.4.4: Resize Text. | Perceivable | Text resizing without assistive technology is allowed up to 200 percent without loss of content or functionality. Except for subtitles and text images. |

| Code and criteria | Principle | Description |
|---|---|---|
| 1.3.1: Info and Relationships. | Perceivable | All information, structure, and relationships conveyed through the presentation are determined programmatically. |
| 2.4.4: Link Purpose (In Context) | Operable | Users are helped to understand the purpose of each link so that they can decide if they want to follow the link. |
| 4.1.2: Name, Role, Value | Robust | Role, state, and value information is provided on all UI components. This allows compatibility with assistive technology, such as screen readers, magnifying glasses, and speech recognition software, used by people with disabilities. |
| 1.3.6: Identify Purpose. | Perceivable | It ensures that the purpose of many elements on a page is determined programmatically, so that user agents can extract and present that purpose to users using different modalities… On the web it happens that what is familiar to a user may not be familiar to another. |
| 1.3.5: Identify Input Purpose. | Perceivable | The specific type of data expected in each Field is programmatically declared, making it easier to fill out forms, especially for people with cognitive disabilities. |
| 1.4.11: Non-text Contrast. | Perceivable | Active user interface components (i.e., controls) and significant graphics are intended to be distinguishable by people with low (moderate) vision. |

| Code and criteria | Principle | Description |
|---|---|---|
| 2.4.10: Section Headings. | Operable | The intent of this Success Criterion is to provide headings for sections of a website, for example, when the page is organized into sections, in long documents these are often divided into a variety of chapters, with chapters having subtopics and subtopics they are divided into several sections, sections into paragraphs, and so on. Where such sections exist it will be necessary to provide by programming code headers that introduce them. |
| 3.3.2: Labels or Instructions. | Understandable | Providing clear, unambiguous instructions and labels, including examples of data formats, helps all users, especially those with cognitive or language issues. |

**Source:** (W3C, 2018)

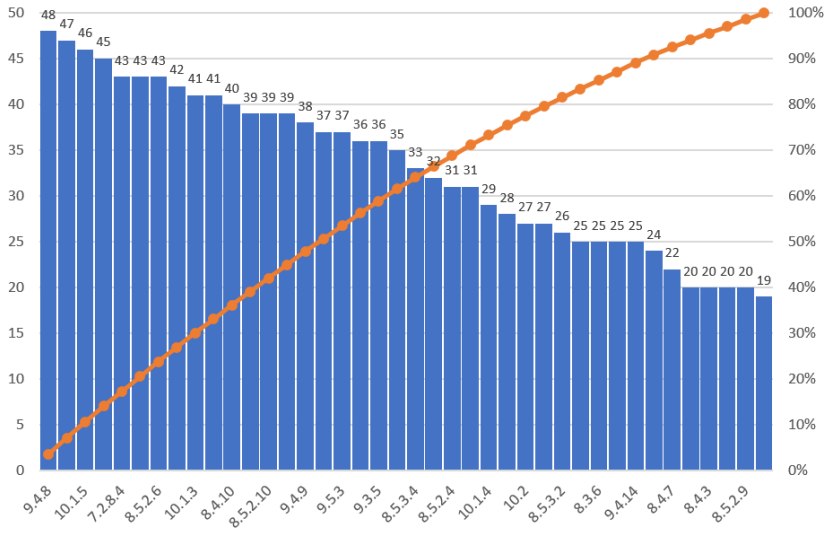



**Figure 14:** Pareto Diagram – Usability

The previous Pareto diagram represents the results of the web usability evaluation, where the codes that are observed on the X axis correspond to their codes in the ISO 9241-151:2008 standard or its equivalent INTECO 19241-151:2018. The diagram identifies 80% of the most common errors that generate web usability difficulties, which are concentrated in non-compliance with criterion 9.4.9. toward the remainders on the left side of the line on the Pareto chart. Table 13 shows a brief description of each of these criteria.

**Table 13:** Identification of the criteria that present more usability errors.

| Code and Criteria | Guidelines | Description |
|---|---|---|
| 9.4.8: Highlight previously visited links. | Presentation | |
| 8.5.5.1: Provide advice for unsuccessful searches. | Search | ... Offer search suggestions to formulate a query more effectively. |
| 10.1.5: Present text in different languages. | General design | ... Include features that allow you to change the layout of the text according to the language. |
| 9.3.16: Provide a printed version of the page. | Presentation | ... In a format that is acceptable to the user. |
| 7.2.8.4: Clarify whether storage exists on the user's machine. | Content design | Explain the policy of use of these data or programs. |
| 7.2.9.7: Allows you to disable the automatic adaptation of the user. | Content design | ... Or disable your switch to another user if the business logic dictates it. |
| 8.5.2.6: Describe the search technique used. | Search | ... when it is considered relevant for the user. |

| | | |
|---|---|---|
| 9.4.10: Identify links that open new windows. | Presentation | ... They must be clearly distinguishable from other controls. |
| 10.1.3: Identify supported languages on the site. | General design | ... In addition, the links to select them must be clearly presented. |
| 7.2.9.6: Report on automatically generated profiles. | Content design | ... And specify what type of information is used and how it affects the use of the Web user interface. |
| 8.4.10: Clearly identify dynamic links. | Navigation | Make dynamic navigation links evident. |
| 8.4.13: Provide a backspace function. | Navigation | ... If a task requires a sequence of steps. |
| 8.5.2.10: Provide error-tolerant search mechanisms. | Search | Offer options of the type “You meant” and show possible results before the correction of the error. |

| | | |
|---|---|---|
| 8.5.3.1: Sort the search results. | Search | … In correspondence with the information needs of the user. |
| 9.4.9: Mark links to special targets. | Presentation | Clearly mark links that open new browser windows or pop-ups. |
| 8.5.4.2: Select the scope of a search. | Search | The user should be able to select the scope of the search if necessary. |
| 9.5.3: Provide keyboard shortcuts. | Presentation | Keyboard shortcuts should be provided for important and interactive links. |
| 8.4.8: Provide a site map. | Navigation | A separate navigation view or overview of the site structure should be provided. |
| 9.3.5: Allow the display of the temporary state of the system. | Presentation | That is, the period of validity of the information submitted when it is of a temporary nature. |
| 8.5.5.3: Allow search redefinition. | Search | That is, redefine a search based on results from a preliminary search. |

| | | |
|---|---|---|
| 8.5.3.4: Allow sorting or filtering search results. | Search | … Sort or filter search results through different criteria. |
| 8.5.5.2: Allow repeat searches. | Search | The page that displays the results should contain an option to search again unless the search requires a specific search page. |
| 8.5.2.4: Provide advanced searches. | Search | Provide advanced search functions, plus simple search when appropriate. |
| 8.5.2.8: Clarify the size of the search field. | Search | The field to enter the query should be large enough to fully display a typical query. |
| 10.1.4: Display appropriate formats for units of measure or currency. | General design | Explain format of currencies, measurements, dates, times... especially when the website has an international reach. |
| 10.2: Provide help. | General design | … Especially when a functionality is not obvious. |
| 9.4.3: Distinguish adjacent links to each other. | Presentation | … |

**Source:** Elaboration from (INTECO, 2018; J. Pincay - Ponce et al., 2020)

# IV
# BY WAY OF ENDING

This book reflects on the challenges and challenges of digital inclusion in Latin American portals of citizen participation. It exhorts the development of computer skills, but above all, of human values that lead to understanding and distinguishing whether the internet offers many opportunities for people with disabilities or not. It is that, if websites are not created with a view to complying with accessibility and usability, there is a high probability of excluding a segment of the population, this being a great problem for the objective of these virtual media.

For the evaluation of accessibility, three pages were chosen for each website: The home page, Debate and Contact. From each page it was valued that: (1) The home page informs the citizen what the platform is about and what actions they can take. (2) The debate page allows the citizen to interact with the government, exchange ideas, proposals, and information. (3) The contact page allows the citizen to communicate with the technical support of the platform or the administrative part of the government. Some websites do not contain these three pages or, for example, on the home page they include contact information or debate spaces.

It is possible that developers are unaware of the care of accessibility and usability of websites, or simply take more time to implement these solutions in their developments.

The websites exhibit certain strengths regarding accessibility, which are concentrated on the Operable Principle. They usually offer operation by means of the keyboard, they stand out in positive aspects such as language change, guiding titles for web page readers and contrast in many of their visual presentations.

The websites exhibit certain strengths regarding usability,

which are concentrated on the Navigation Criteria. They tend to avoid horizontal scrolling, avoid unnecessary welcome screens, support common web programming technologies, and avoid opening unnecessary windows.

The weakness of websites with respect to web accessibility lies in the Perceptible Principle. Although in several websites the color contrast is taken care of, this does not happen in all cases. Few sites offer complete access to options such as aids, keyboard shortcuts, text size change, pointer cancellation, among others.

The weakness of websites with respect to usability is concentrated on the Navigation Criteria since many do not highlight previously visited links. They do not provide support related to Search Criteria, such as unsuccessful searches of the type you meant.

At the end of 2020 and the first months of 2021, when this evaluation was completed, the results showed that the Paraguayan website was the platform that most complies with web accessibility standards and the site that least complies with the WCAG 2.1 recommendations is the Public Companies of Medellín – Colombia. Regarding the evaluation of web usability, the platform that best meets the criteria proposed by the ISO 9241-151 standard is the Colombia - Sogamoso - Boyacá platform, while the Chilean platform is the website that least meets the guidelines. web usability. Annex 1 offers a particular overview of the valuation for each website on those dates.

The authors consider that the most common problems can be addressed in future redesigning of websites. We also believe that it is possible that the scarcity of citizen participation in government platforms is partially due to non-compliance with web accessibility and usability standards in online citizen participation platforms … there are difficulties to interact on these sites … it is urgent to review the designs because it is expected that the technological skills of the population and even their schooling are not always of the highest qualifications.

If a citizen participation site has usability weaknesses, as we have seen, it can negatively affect the user experience and satisfaction, as well as the quality and quantity of contributions

that citizens can make. This can lead to mistrust, frustration, and disinterest on the part of citizens, reducing the potential of such initiatives to improve development outcomes, transparency, accountability, and social inclusion. In addition, it can create barriers or inequalities for those who have difficulties in accessing or using digital technologies, such as people with disabilities, older people, people with low educational attainment or people living in rural or remote areas.

For these reasons, it is essential to correct the usability failures that a citizen participation site may have, following an iterative and participatory process that involves users from the beginning to the end. In this way, it can be ensured that the site meets the requirements and expectations of users, and that it offers them a positive, motivating, and meaningful experience. Thus, greater citizen participation can be encouraged, which in turn can contribute to improving the quality of democracy, sustainable development, and social welfare.

Due to the characteristics of citizen participation sites and coinciding in many aspects with what has been indicated for Usability, it is very important that these types of sites are accessible to all people, regardless of their abilities or limitations, following web accessibility standards. such as those mentioned (WCAG), which provide principles, guidelines, and criteria to create more accessible web content for people with disabilities.

If a citizen engagement site has web accessibility weaknesses, it can also negatively affect user experience and satisfaction, as well as the quality and quantity of user contributions. This can generate exclusion, discrimination and inequality for those people who have difficulties accessing or using web content, such as people with visual, hearing, motor, cognitive or language disabilities. In addition, it can affect compliance with the principles and objectives of citizen participation, such as transparency, accountability, inclusion, diversity, and participatory democracy.

For these reasons, it is essential to correct web accessibility failures that a citizen participation site may have, following an iterative and participatory process that involves users from the

beginning to the end.

It is important to highlight that the evaluations obtained for this study were carried out with automatic tools such as Cinthya Says for what is WCAG 2.0, while the criteria added in WCAG 2.1 were observed heuristically. The usability evaluations were carried out heuristically based on ISO 9241-151: 2008 standard, with the support of an electronic form that allowed improving and accelerating the subsequent analysis.

In summary, the problems found are obvious reasons for the exclusion of people with disabilities in citizen participation platforms, given that their interaction with these sites is hampered by non-compliance with the rules; this even implies that these sites are abandoned due to inadequate design, causing as a result the failure of the objectives for which they are implemented.

The online citizen participation platforms analyzed must be redesigned based on the problems found in the evaluation related to the guidelines for the accessibility of content on the web (WCAG 2.1) or by the ISO 9241-151 standard, in order not to limit the access of users with disabilities to these websites. In addition, it is also convenient to carry out periodic heuristic evaluations by experts to obtain better results.

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# ANNEXES

# ANNEX 1. NORMA ISO 9241 - 151: 2018

## ISO 9241-151: 2008. NAVIGATION

| Code | Description |
|---|---|
| 8.2.1 | Making navigation self-descriptive |
| 8.2.2 | Showing users where they are |
| 8.2.3 | Supporting different navigation behaviors |
| 8.2.4 | Offering alternative access paths |
| 8.2.5 | Minimizing navigation effort |
| 8.3.2 | Choosing suitable navigation structures |
| 8.3.3 | Breadth versus depth of the navigation structure |
| 8.3.4 | Organizing the navigation in a meaningful manner |
| 8.3.5 | Offering task-based navigation |
| 8.3.6 | Offering clear navigation within multi-step tasks |
| 8.3.7 | Combining different ways to organize navigation |
| 8.3.8 | Informative home page |
| 8.3.9 | Directly accessing relevant information from the home page |
| 8.3.10.1 | Avoiding unnecessary splash screens |
| 8.3.10.2 | Skipping splash screens |
| 8.3.11 | Avoiding opening unnecessary windows |
| 8.4.2 | Providing navigation overviews |
| 8.4.3 | Maintaining visibility of navigation links |
| 8.4.4 | Consistency between navigation components and content |
| 8.4.5 | Placing navigation components consistently |

| Code | Description |
|---|---|
| 8.4.6 | Making several levels of navigation visible |
| 8.4.7 | Splitting up navigation overviews |
| 8.4.8 | Providing a site map |
| 8.4.9 | Providing cross linking to potentially relevant content |
| 8.4.10 | Making dynamic navigation links obvious |
| 8.4.11 | Linking back to the home page or landmark pages |
| 8.4.12 | Going back to higher levels |
| 8.4.13 | Providing a “step back” function |
| 8.4.14 | Subdividing long pages |
| 8.4.15 | Explicit activation |
| 8.4.16 | Avoiding dead links |
| 8.4.17 | Avoiding incorrect links |

## ISO 9241-151: 2008. GENERAL DESIGN

| Code | Description |
|---|---|
| 10.1.2 | Showing relevant location information |
| 10.1.3 | Identifying supported languages |
| 10.1.4 | Using appropriate formats, units of measurement or currency |
| 10.1.5 | Designing presentation of text in different languages |
| 10.2 | Providing help |
| 10.3.1 | Minimizing user errors |
| 10.3.2 | Providing clear error messages |
| 10.4 | URL names |

| Code | Description |
|---|---|
| 10.5 | Acceptable download times |
| 10.6 | Using generally accepted technologies and standards |
| 10.7 | Supporting common technologies |
| 10.8 | Making Web user interfaces robust |
| 10.9 | Designing for input device independence |
| 10.10 | Making the user interface of embedded objects usable and accessible |

## ISO 9241-151: 2008. CONTENT DESIGN

| Code | Description |
|---|---|
| 7.1.2 | Designing the conceptual model |
| 7.1.3 | Appropriateness of content for the target group and tasks interface look and feel |
| 7.1.4 | Completeness of content |
| 7.1.5 | Structuring content appropriately |
| 7.1.6 | Level of granularity |
| 7.2.2 | Independence of content, structure, and presentation |
| 7.2.3.1 | Selecting appropriate media objects |
| 7.2.3.2 | Providing text equivalents for non-text media objects |
| 7.2.3.3 | Enabling users to control time-dependent media objects |
| 7.2.4 | Keeping the content up to date |
| 7.2.5 | Making the date and time of the last update available |
| 7.2.6 | Enabling communication with the website owner |
| 7.2.7 | Accepting online user feedback |
| 7.2.8.1 | Providing a privacy policy statement |

| Code | Description |
|---|---|
| 7.2.8.2 | Providing a business policy statement |
| 7.2.8.3 | User control of personal information |
| 7.2.8.4 | Storing information on the user's machine |
| 7.2.9.2 | Taking account of the users' tasks and information needs |
| 7.2.9.3 | Making individualization and adaptation evident |
| 7.2.9.4 | Making user profiles evident |
| 7.2.9.5 | Allowing users to see and change profiles |
| 7.2.9.6 | Informing about automatically generated profiles |
| 7.2.9.7 | Switching off automatic user adaptation |
| 7.2.9.8 | Providing access to complete content |

## ISO 9241-151: 2008. SEARCH

| Code | Description |
|---|---|
| 8.5.2.1 | Providing a search function |
| 8.5.2.2 | Providing appropriate search functions |
| 8.5.2.3 | Providing a simple search function |
| 8.5.2.4 | Advanced search |
| 8.5.2.5 | Full-text search |
| 8.5.2.6 | Describing the search technique used |
| 8.5.2.7 | Availability of search |
| 8.5.2.8 | Search field size |
| 8.5.2.9 | Shortcut to search function |
| 8.5.2.10 | Error-tolerant search |
| 8.5.3.1 | Ordering of search results |

| Code | Description |
|---|---|
| 8.5.3.2 | Relevance-based ranking of search results |
| 8.5.3.3 | Descriptiveness of results |
| 8.5.3.4 | Sorting or filtering search results |
| 8.5.4.1 | Scope of a search |
| 8.5.4.2 | Selecting the scope of a search |
| 8.5.4.3 | Providing feedback on the volume of the search result |
| 8.5.4.4 | Handling large result sets |
| 8.5.4.5 | Showing the query with the results |
| 8.5.5.1 | Giving advice for unsuccessful searches |
| 8.5.5.2 | Repeating searches |
| 8.5.5.3 | Refining searches |

# ANNEX 2. TABLE OF COMPARISON OF THE RESULTS OBTAINED FROM ACCESSIBILITY AND USABILITY

The following table globally is all the evaluation results of the 50 sites, so each color symbolizes a value.

Note: The blue color is the highest value, that is, 100% of the criteria belonging to each principle based on the evaluation conducted and found in that qualification parameter. The low blue color is a high value, that is, 75% of the criteria belong to each principle based on the evaluation conducted and that meet that qualification parameter. The white is an average value, that is, 50% of the criteria belonging to each principle based on the evaluation conducted and that meet that qualification parameter. Low red is a low value, that is, 25% of the criteria belonging to each principle based on the evaluation conducted and that meet that qualification parameter. Red is a minimum value, that is, 0% of the criteria belonging to each principle based on the evaluation conducted and found in the qualification parameters.

# DIGITAL INCLUSION:

## The challenge of web usability and accessibility of Latino Citizen Participation Portals

EDICIONES GESICAP

The purpose of this book is to supply an assessment in terms of usability and accessibility of citizen participation websites in Latin America. To establish the progress made against the goals, that is, the challenges to comply with the idealistic guidelines of inclusion and usability from a technological perspective. The study context is Latin America, and its unit of analysis is the online platforms implemented by governments for citizen participation.

ISBN: 978-9942-626-16-5