# Categorization and Comparison of Accessibility Testing Methods for Software Development

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# Abstract

- There are many ways to test accessibility and universal design, from checklists and rules to automated testing to human testing with testers drawn from various user groups. Determining how an assessment technique pertains to impairments and obstacles. However, is not simple

- In order to provide better overview of cognitive barriers and testing methods. The W3C cognitive barriers are expanded from one to four categories. The emphasis is on software development teams, including coders and testers, and the tools that can support and facilitate their work processes

# Introduction

▶ Accessibility testing aims to evaluate if a solution can be used by people with various impairments. However, it can be challenging to conduct such testing efficiently during software development due to issues such as costs, integration, and lack of training. Despite this, companies acknowledge the importance of accessibility and want more focus on it. To ensure high accessibility, it's necessary to conduct user testing with a variety of users. There are many methods, guidelines, and approaches to accessibility testing, and this paper provides an overview of techniques and tools. The focus is on testing methods that can be conducted by all members of a software development team, categorized based on the barriers they cover.

# Population targeted

- Targeted Users:
  - Developers.
  - Testers.

- We present an overview of multiple existing accessibility testing methods and what kind of barriers they cover. Finally, we present a recommendation on how to select a collection of accessibility testing methods in order to cover the broadest range of disabilities. Our focus is tools that can empower and ease work processes of software development teams, including both developers and testers.

# Barrier Groups:

► If we are going to describe, evaluate and discuss testing methods for accessibility, we need to have consistent categorization of the various function barriers. We therefor consider function barrier categories from a testing point of view, and not from a medical point of view. We also focus on testing digital solutions and not physical environments, and this will also impact on our categorization.

► The W3C group has categorized disabilities into five groups, even though they point out that the list is not intended to be an exhaustive listing of all disabilities and barriers. Their focus is web accessibility barriers that people commonly experience

- Auditory

- Cognitive, learning, and neurological

- Physical

- Speech

- Visual

# Barrier Groups:

▶ The merging of functions into categories are based on similarities of barriers that are created. For example, a page that requires five successive, correct, operations creates barriers because it requires attention that can last for all five operations and a memory of several earlier operations. Hence, attention and memory is grouped in one category.

• **Auditory** : Barriers created by content that is accessible by audio only. This is related to variations in hearing.

• **Attention and memory:** Barriers created by content containing complex or long-time operation sequences or invasive sensory content. Relates to variations in attention and concentration. Operations that require sustaining, shifting, dividing and sharing attention and concentration are included in this category, as well as long- and short-term memory-based operations.

# Barrier Groups:

- **Higher level logic:** Barriers created by complex content containing complex comprehension or problem-solving tasks. Relates to variations in control and content of thought, decision-making, abstract thinking, planning and carrying out plans.

- **Language and numbers:** Barriers created by dense textual or numerical content, difficult terms, use of inaccessible representation such as fonts, and/or a lack of alternative styling mechanisms. Relates to variations in recognition and use of terms, signs, symbols and other components of language, and approximation and manipulation of mathematical symbols and processes.

- **Physical:** Barriers created by content that contains one-mode-only operations, such as navigation by mouse only. Relates to variations of muscular control or strength, sensation, joint flexibility, pain related to movement, physical variations of body.

# Barrier Groups:

- **Speech:** Barriers created by content that requires operation by speech such as voice recognition software. Relates to variations in speech production.

- **Visual:** Barriers created by content that is accessible by visual means only. Relates to variations in vision.

# Testing Methods

- In terms of software development, how much time it takes to conduct a test is vital since accessibility testing is often neglected because of constrained resources. It has therefore categorized methods based on their cost in terms of how long they take to complete on average and how different they are. There are studies that have tried to categorize cost , and we have based our work on a similar definition with low, medium, high. Low typically means that a testing method can test a single webpage in less than 5 minutes, while medium between 5 and 30 minutes depending on how well the tester knows the method. High means more than 30 minutes for a single webpage.

# Testing Methods

| Abbrv. | Cost | Description |
|--------|------|-------------|
| Auto | Low | A tool or program that will automatically assess an ICT solution and provide a report of all its findings. A popular example is the Wave automatic checker. |
| Check | Medium | A checklist or guideline for assessing barriers, like the WCAG standard. |
| Sim | Low | Simulation using either wearables or use of tools that simulate a barrier. A popular example is the Cambridge Simulation Glasses. |
| AT | Medium | Use of assistive technology that is normally used by a person to overcome or help with a barrier. The most typical example is a screenreader. |
| Exp | High | Walkthrough methods that typically requires an expert or someone proficient with the method. Walkthrough includes usability inspection methods like heuristic evaluation and personas testing. |

# Strengths and Weaknesses

▶ **Strengths**

❑ In this paper, Authors have compared numerous accessibility testing methods for software development.

❑ Consistent categorization of the various function barriers.

▶ **Weaknesses**

❑ In this paper authors have mentioned that they have not verified that the accessibility testing methods cover the barriers that they claim to test for, and they are just trusting the documentation for each of the methods.

❑ Also, the category "Cost" for method types is set only from an experience point of view, with further influences from another research. The proper estimation and exact quantification of cost is outside the scope of this work.

# Major Findings

- Barrier Groups
- Testing Methods

# Conclusion

- This work discusses how barriers can be categorized based on existing classifications and argues for subdividing the cognitive group into smaller categories to benefit testing. Various accessibility testing methods for software development are compared and categorized into five method types, with an analysis of their coverage of different barrier categories. The goal is to provide an overview for software development teams to decide which method to use, and to prioritize training multiple team members in different expert methods that cover all barriers. However, further studies are needed to develop more testing methods, particularly for cognitive barriers related to memory, numbers, and higher-level logic, and to improve how barriers within the cognition domain are categorized.

# Thank You