

# Adopting User-Centered Design for the Translating of Barrier-Free Design Codes/Regulations

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**Abstract.** Over the past few decades, barrier-free design codes/regulations have been integrated into many countries' national regulations. The existing guidelines, however, have been criticized for being too abstruse and professional for practical use by the general public. As a result, the aim of this research is to analyse the existing presentation of building codes and barrier-free design regulations, including the full variety of characteristics, behaviors and requirements, and identities of environments in order to translate the information within barrier-free design codes/regulations into suitable presentations that match the users' requirements and special needs. In addition, suggestions for the presentation of codes/regulations are provided in this study.

**Keywords:** barrier-free design codes/regulations, user-centered design, design for all.

## 1 Introduction

In order to provide accessible and safe environments that adequately address best practice concerns for people with disabilities, barrier-free design codes/regulations are proposed as guidelines for assisting designers and builders in complying with the construction requirements while avoiding errors and costly renovations [1]. Over the past few decades, these types of codes and guidelines have been integrated into many countries' national regulations [2]. The existing guidelines, however, have been criticized for being too abstruse and professional for practical use by the general public [3]. As a result, the aim of this research is to analyse the display of barrier-free design codes/regulations, including the extent to which they address users' needs and possess the characteristics for translating the information into a suitable presentation matching the users requirements as well as any special requirements. We consider the development, display, classification of disabilities, and characteristics of barrier-free environments as defined within the guidelines as attributes of this analysis.

## 2 Existing Presentation of Building Codes and Barrier-Free Design Regulation

### 2.1 Barrier-Free Design Codes/Regulations vs. Displays

In this research project, we present the development of barrier-free design codes/regulations step by step, beginning first with texts and lists, then progressing to

descriptions with dimensional pictures, and finally including pictures of actual environments and situations. The display of existing design codes can be divided into four types, as follows:

**Text:** Text is the main format for communicating barrier-free design codes/regulations, including the types of barrier-free environments, dimensional data, the principles of accessible design, and the facilities inherent to barrier-free environments [1, 3-11].

**Tables:** The tables list the differences in design principles or facilities within the same projects and environments. For example, Table 221.2.1.1 in the ‘2010 ADA Standards for Accessible Design’ is a formal type of table found in barrier-free design codes/regulations. It indicates the minimum number of required wheelchair spaces in assembly areas in relation to the total number of seats [5]. Table 3.8.2.1 of the Barrier-free Design Guide is similar [1].

**Dimensional Pictures:** For supporting the text description of barrier-free design codes/regulations, dimensional pictures present the visual forms of barrier-free design, environments and facilities. They also include the patterns of disabled users and anthropometry data, to explain how users will interact with the barrier-free facilities and the specific actions that will take place within the environment. For example, the picture of ‘2010 ADA Standards for Accessible Design’ [5] is a formal dimensional picture with a display of the accessible range of a wheelchair user’s arms. In creating the barrier-free facilities, designers must follow the guidelines of the height range.

**Pictures of real environment:** To support the text descriptions and explanations, some barrier-free design codes/regulations have implemented pictures of actual environments and scenarios, documenting users’ activities. These are meant to ensure that readers will understand and apply the guidelines to real situations exactly, by comparing the pictures to the information contained in the text. According to the research, the use of such images will help developers to manage the fluidity of design [12]. Publications such as the Singapore “Universal Design Guide 2007” and the Taiwanese “Inclusive Design: Designing and Developing Accessible Environments” are existing codes that include pictures of scenarios within actual environments for supplying clearer introductions and explanations of barrier-free design [3, 8].

**Enhancing descriptions with digital media:** Utilizing pictures of dimensions and scenarios within the context of real environments is an existing trend in the presentation of existing barrier-free design codes/regulations. However, in addition to using scenario pictures, we can also utilize digital media to ensure that the translation of guidelines is more appropriate and specific to readers’ needs and to an understanding for the general public. For instance, users can find scenario videos and animation addressing workplace safety and equipment operation in digital media formats on Institution of Occupational Safety and Health Web sites [13]. Similar presentations can be found on the official site of the Workplace Safety and Health Council [14].

## 2.2 Barrier-Free Design Codes/Regulations vs. User's Needs and Characteristics

Today, with a significant proportion of the population aging, the "World Population Aging 2009" report of the Department of Economic and Social Affairs at the United Nations states that "At the world level, the number of older persons is expected to exceed the number of children for the first time in 2045." This report also indicates that the percentage of elderly people will increase to 22 percent of the world population by the middle of this century [15]. Therefore, including elders as one of the user types in guidelines has been a trend in the recent years. As seen in publications such as the Singapore "Universal Design Guidelines 2007" and the United Kingdom's "The Building Regulation 2010", this principle has been implemented in many codes/regulations of barrier-free design [4, 8]. However, the existing codes/regulations are still questioned, because "often people with disabilities are presented as being members of a homogenous group having exclusively mobility impairments and, in conclusion, all their interests and requirements being the same [2]." Thus, the regulations must include the full variety of handicapped individuals who may interact with the environments in question, dividing the users' needs extensively and definitely [3].

As noted, the existing barrier-free design codes/regulations address many types of disabilities with detailed definitions. We can see that the elderly, people with impaired sight or hearing, and wheelchair users are the main categories of handicapped individuals. For translating the information contained in the barrier-free designs/regulations, the presentations must not only include the needs and characteristics of these users, but also must display the activities and behaviors of people with disabilities, so that the information in the guidelines will be applied suitably according to the exact requirements and actions of people with disabilities.

## 2.3 Barrier-Free Design Codes/Regulations vs. Spaces and Environments

For designing and planning spaces with friendly accessibility to disabled people, many countries have implemented barrier-free design codes/regulations into their national building guidelines [16]. In terms of spaces and environments, these guidelines tend to focus on the barrier-free design of new construction and the redesign of existing buildings. Some of these regulations also focus on the maintenance of historic architecture. Thus, for translating the barrier-free design codes/regulations into a form that can be understood by the general public, it is necessary for the presentation of guidelines to include the various forms of building design, and match the actual environments of readers as closely as possible.

## 3 Conclusion

For achieving the goal of matching users' actual needs and the concept of "Access-for-all", we have analyzed the existing "barrier-free design codes/regulations", including the full variety of characteristics, behaviors and requirements, and identities of environments in order to translate the information within barrier-free design codes/regulations into suitable presentations that match the users' requirements and

special needs. According to the analysis of existing design codes/regulations, we suggest that these guidelines must include the following:

- To divide and consider the users' needs extensively and definitely, the presentation of codes must match the full variety of handicapped individuals' traits and behaviors, including for those of impaired hearing and sight, as well as those of wheelchair users. Additionally, for we are in an aging period, with the special needs and comprehensive disabilities of elders, the presentation of codes/regulations must take their needs into account.
- The design of content presentation must be based on the reality of the environment. Especially in terms of architecture and space, the translating must include the local building patterns, styles, and cultural characteristics, and strive to match the recognition of the general public, thereby making the application of design codes/regulations apt for the design of real environments.
- Adopting scenario design to simulate the real dwelling environments and facilities matching the design codes/regulations while also containing digital media for translating the guidelines to help the users of barrier-free environments and their families, friends and caregivers to obtain the required information and apply the regulations to real environments.

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