



## Universal Accessibility

**Sylvie Rocque, Jacques Langevin, Hajer Chalghoumi, Abir Gorayeb**

Groupe DÉFI Accessibilité, Université de Montréal (Canada)

### Abstract

*Universal accessibility is a major concern in developed countries, especially in cities. However, there is considerable confusion about the meaning of this concept. The definition varies from one author to another, and none covers all dimensions identified by all the texts. There are also many proposals, more or less articulated, of different types of design for its achievement. This paper proposes a formal definition of universal accessibility based on a content analysis of the most relevant references. This analysis sought to identify precisely the nature of the concept and its various dimensions. The same procedure was carried out to define the types of design contributing to the universal accessibility and to propose a classification in an evolutionary process. These clarifications are proposed as the basis for the development of an interdisciplinary, multisectoral and multidimensional approach of universal accessibility. Finally, the problems of the assessment are underlined. Those clarifications are very important in the field of education. Those clarifications open the field to all educators preoccupied by inclusive practices.*

### 1. Ambiguous concepts

Although widespread and used, the concept of universal accessibility remains unclear (Steinfeld and Danford, 1999; Iwarson and Stahl, 2003; Bringolf, 2008). The meaning of the expression is induced by the examples used to illustrate it, by the aims and values attached to it and, more generally, by the design process to achieve it, that is i.e. universal design or one of its synonyms. We identified 32 different definitions. In fact, the definition varies from one author to another.

A similar problem of diversity is also observable in the definitions of universal design, but to a lesser degree with three names used to specify it: approach, process, and designing/design.

The choice of "designing/design" could be justified insofar as it is true that universal design is a type of design. But this choice would require to precede the statement with a definition of design. Between the other two most common designations, it is "process" that is closest to the idea of creating something while avoiding the word "design".

### 2. Our proposal for universal accessibility definition

#### 2.1 Formal definition of universal accessibility

Based on an analysis of the literature and practice, we propose a formal definition that is consistent with the axiological dimension of universal accessibility and can lead to an objective assessment:

"Accessibility is the nature of a product, process, service, environment or means of access to information which, in an inclusive view, allows all users, including those that may have (or experience) limitations, to obtain by themselves equivalent results in activities."

#### 2.2 Equivalent results

We propose that obtaining equivalent results should be considered as a criterion for multidimensional assessment of universal accessibility. Indeed, there are several criteria for judging the results such as: usability including effectiveness, efficiency and satisfaction, usefulness, attractiveness (Norman, 2005), acceptability (Nielsen, 1993), learning and understanding easier, the access time, the presence of facilitators and the elimination of obstacles.

### 3. Designs for universal accessibility

Design is a discipline developed in the 20th century to the creation of objects, environments, graphic works, etc. To achieve universal accessibility, it is necessary to use particular forms of design that carry several names in the literature: universal design, design for all, inclusive design, barrier free design. Some authors

exclude recourse to specific design or rehabilitation design or assistive design (Tiresias, 2003 British Standards Institute, 2005 Dickerson, 2008), while others use these particular types of design (Keates, Clarkson, and Robinson Harrison, 2000; Pattison and Stedmon, 2006 CEBE, 2002), under the pretext that there will always be room for specific design to meet very particular needs of specific users.

### **3.1 General definition of contributory designs**

Due to the multitude of terms used to refer to these designs, we will not add to the confusion by proposing a new umbrella term. Instead, we propose a general definition and classification of these contributing designs from an evolutionary perspective.

Contributing design universal accessibility are varied and changing process for the design of products, processes, services, environments, or terms of access to information in an inclusive perspective. These processes must meet the character of universal accessibility for all users so that they achieve equivalent results in the autonomous realization of activities.

### **3.2 Three types of contributing designs**

We propose to distinguish three types of design that can contribute to achieving universal accessibility: inclusive design, specific design and interface design.

#### **3.2.1 Inclusive design**

The aim of inclusive design is to meet the needs of the largest possible number of potential users. Among the target population, inclusive design is particularly interested in users who are likely to have or experience limitations. The first stage of inclusive design is to identify all potential users, their characteristics and needs. It should also identify the specific factors of obstacle in regard to motor skills, or sensory or cognitive requested. In this context, a strategy of inclusive design may involve designing a product taking into account reference groups composed of users with specific characteristics. For example, people in wheelchairs can provide a reference group for inclusive design in relation to the motor dimension of universal accessibility.

Inclusive design is an evolving design process, in an inclusive view, that ensures that a product, process, service, environment or a means of access to information presents no obstacle and includes a set of measures providing facilitators so that the largest possible number of users can obtain by themselves equivalent results in activities.

Inclusive design has and will probably always have its limits. This is why several authors point out that the nature of accessibility can also be achieved by designing a special adaptation for personal use.

#### **3.2.2 Specific Design**

The goal of specific design is to meet the needs of users with specific characteristics for which inclusive design does not yet offer a solution. A person will experience or not limitations in the performance of an activity following the interaction between those characteristics and the environment.

The specific design is another way to prevent this interaction is unfavorable to a user into facilitating the realization of the activity by a palliative adaptation reserved to personal use. Inclusive view forced designers to ensure that the adaptation is discrete or does not ostracize the user.

The specific design is an evolutionary process for designing adaptations for the exclusive use of certain users of a product, process, service, environment or means of access to information in an inclusive view, in order to obtain by themselves equivalent results in activities.

Sometimes an adaptation conceived by specific design is incorporated to measures already used in inclusive design. This is where the interface design is utilized.

#### **3.2.3 Interface design**

The goal of interface design is to harmoniously integrate adaptations or adjustments to all measures of inclusive design to meet more potential users. The word "interface" here means the common boundary in two sets, or common to both systems allowing exchanges between these limits. In interface design, the design effort focuses on the harmonious integration of specific adaptations in an environment "for all",



ensuring that this integration preserves all the benefits in terms of equivalent results for its individual users, while not adversely affecting other.

The interface design is an evolving design process that seeks the smoothest possible integration of a specific adaptation to the use of certain users, with the set of measures already proposed by inclusive design.

In addition to these contributing designs, designers must consider the possibility that a user is accompanied (Keates et al., 2000). For example, this may result in the free access of the person accompanying the user of a service.

### 3.3 Evolutionary perspective

Each contributing design to universal accessibility is scalable, following the advancement of knowledge and technology. The three types of design proposed here are involved in a general process of continuous improvement solutions responding better to the needs of a growing number of users with varying characteristics, thus satisfying more the ideal of universal accessibility.

## Conclusion

Using an analysis including specific terminology requirements, the review of the literature has demonstrated that the concept of universal accessibility remains unclear, marked by the circumstances of its origins or defined by its social purpose, and that is sometimes confused with the process to achieve it, that is to say, the universal design. Our analysis also revealed a recent extension of what is covered by the universal accessibility, both for the population and areas of activity involved.

The definitions proposed here are more innovative because they specify the target population and the criteria and evaluation of universal accessibility requirements. In addition, three types of contributory expand design possibilities to achieve an equivalent result for all users. These proposals are based on achieving equivalent results by all users, which is a key element for the evaluation of universal accessibility. This general evaluation criterion must be specified by a set of sub - criteria such as usability, usefulness, attractiveness, acceptability, learning and understanding easier , access time, presence of facilitators and elimination of obstacle, etc. . We believe that significant efforts must be devoted to the accuracy of these criteria and the development of ways to assess in relation to motor, sensory or cognitive abilities required in the performance of activities.

## References

- [1] Bringolf, J. (2008). Universal Design: Is it Accessible? Multi (Rochester), 1(2), Spring/Summer 2008, 45-52.
- [2] CEBE, (2002), Building and Sustaining a Learning Environment for Inclusive Design. Report of Special Interest Group in Inclusive Design available from the Centre for Inclusive Design: creating a user's world Education in the Built Environment (CEBE) website at <http://cebe.heacademy.ac.uk>
- [3] Dickerson, 2008. Highlighting the different attitudes towards inclusive design: from designers, manufacturers, and end-users. IDES 4001 seminar research paper. Carleton university school for industrial design.
- [4] Iwarsson, S. & Stahl, A. (2003). Accessibility, usability and universal design—positioning and definition of concepts describing person-environment relationships. *Disability & Rehabilitation*, 25 (2), 57-66.
- [5] Keates, S., Clarkson, P.J., Harrison, L.A. and Robinson, P. (2000) Towards a practical inclusive design approach. Proceedings of CUU'00 conference (Arlington, VA, USA). ACM, New York, 45-52.
- [6] Nielsen, J. (1993). *Usability Engineering*. Morgan Kaufmann. Publishers, Inc, San Francisco, CA.
- [7] Norman, D. (2005). *Emotional design : why we love (or hate) everyday things*. New York: Basic Books.
- [8] *Design Handbook*. (pp. 1.3-1.12).New York: McGraw-Hill, 2001.
- [9] Pattison, M., and Stedmon, A. (2006). Inclusive design and human factors; designing mobile phones for older users *Psychology Journal*, 4(3), 267-284.
- [10] Rocque, S., Langevin, J., Chalghoumi, H. and Ghorayeb, A. (2001). Accessibilité universelle et designs contributifs dans un processus évolutif. *Journal of Human Development, Disability and Social Change*, 19(3), 3-24.



- [11] Steinfeld, E and Danford, G.S. (1999). Theory as a basis for research on enabling environments. In: E Steinfeld, GS Danford (eds). Enabling Environments. Measuring the Impact of Environment on Disability and Rehabilitation. New York: Kluwer Academic/Plenum Publishers, 1999.
- [12] Tiresias.org (2003). Guidelines Inclusive design. Retrieved the 20th September 2010 from <http://www.tiresias.org/research/guidelines/inclusive.htm>