



A Guide to

Evaluating the Universal Design Performance of Products

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This document contains the designers' version of the Universal Design Performance Measures for Products. These Performance Measures are intended to guide the development of more universally usable products.

The Performance Measures are based on the Principles of Universal Design (The Center for Universal Design, 1997), beginning with the initial, overall concept of Equitable Use (Principle One) and proceeding to the physical detail of Size and Space for Approach and Use (Principle Seven). Depending on the nature of the product, some Principles may not apply, and it may sometimes be more effective to apply them out of order.

The value of these Performance Measures lies in each data point, which identifies a specific strength or weakness that is important for some portion of the user population. These Measures are not intended to be used as a "score sheet" to calculate overall totals or averages as a measure of a product's usability. Such absolute values are meaningless in universal design. Rather, this chart provides a type of graphic profile of usability features

The Universal Design Performance Measures for Products are useful for:

- Identifying potential areas for improvement for a product;
- Comparing relative strengths of similar products; and
- Identifying particular strengths of a product such as for marketing purposes.

Users of these Performance Measures should keep in mind:

- The wording in the Performance Measures is intentionally generic to apply to many types of products; not all Measures apply to all products and some interpretation may be required to apply some of the Performance Measures.
- The quality of the results achieved applying the measures may depend on the knowledge base of the respondent. Each measure represents the needs of some individuals and background knowledge of a diversity of human needs is useful when using these Performance Measures.
- It is important to apply the Performance Measures separately to each phase of use of the product, such as reading and opening the package, reading and understanding the instructions, using the product, maintaining the product, disposal, etc.

The Performance Measures are not intended to serve as a substitute for user testing or a method of empathizing with users who have disabilities – closing your eyes is not the same as being blind. However, this tool may help to identify needs for user testing and to develop effective and appropriate testing procedures.

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The Center for Universal Design (1997). The Principles of Universal Design. Raleigh, NC: North Carolina State University.



Evaluating the Universal Design Performance of Products

Universal Design

Universal design is the design of all products and environments to be usable by everyone regardless of age, ability or situation. Achieving usability by people of all ages, abilities, and situations is very difficult, but it is a goal well worth striving for. As universal design performance is increased, so are usability, safety and marketability for all users.

The Principles of Universal Design

The Principles of Universal Design and their guidelines were developed by a working group* of architects, product designers, engineers, and environmental design researchers as part of a project coordinated by the Center for Universal Design at North Carolina State University. The seven Principles that describe characteristics that make designs universally usable are:

1. **Equitable Use**
2. **Flexibility in Use**
3. **Simple and Intuitive Use**
4. **Perceptible Information**
5. **Tolerance for Error**
6. **Low Physical Effort**
7. **Size and Space for Approach and Use**

The seven Principles of Universal Design and their 29 associated guidelines are shown on page 6.

* Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, Gregg Vanderheiden

Evaluating Universal Design

The purpose of the Universal Design Performance Measures in this document is to provide a procedure for evaluating how well products satisfy the Principles of Universal Design and their guidelines. The Performance Measures were developed with the input of product designers, marketing professionals, and persons with disabilities. Five different drafts were initially reviewed by a group of 28 consumers with disabilities, 18 professional product designers, and 12 marketing managers from across the U.S. A group of 78 families, diverse in age and abilities, geographic and socio-economic status, as well as in attitudes toward universal design, then tested the Performance Measures using an assortment of four commercially available household products.

Using Universal Design Performance Measures

The Universal Design Performance Measures are not intended to be used as a “scoring” device, nor as a substitute for real-world testing by individuals with personal experience of aging or disability. Product developers with some knowledge of the issues involved in aging and disability will find this tool helpful in:

- Evaluating product usability throughout its life cycle: packaging, instructions, set-up, use, maintenance, and disposal;
- Developing product testing and focus group methodologies for use with individuals of diverse ages and abilities;
- Promoting the universal design features of products to potential customers;
- Identifying universal design features of products for design competitions and award programs.



Using the Universal Design Performance Measures for Products

The pages inside contain the Universal Design Performance Measures, a set of 29 statements that guide assessment of the usability of products by people with a diverse range of capabilities and in a wide variety of circumstances.

By marking the appropriate boxes to indicate how much you agree or disagree with each statement, universal design characteristics of products can be identified ("Agree") as well as those that are not as universally usable ("Disagree"). Characteristics that are considered very difficult to use ("Strongly Disagree") represent significant barriers for some potential users. Some Performance Measures may be considered "Not Applicable" to a given product.

You may also find it helpful to write comments in the space provided along the right side of the chart about specific aspects of each product that are particularly usable or unusable.

In the example below, the "X" and "O" symbols represent assessments of different products. You may find it useful to "connect the dots" (omitting those Measures that are Not Applicable) to create a graphic map of your assessment of each product against all the Performance Measures. The shape of each line will indicate an overall trend and emphasize particular strengths and weaknesses of that product. The resulting line will make it easier to compare different characteristics of the same product as well as the same characteristic of comparable products.

PRINCIPLE ONE EQUITABLE USE		Not Applicable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comments
1A.	All potential users could use this product in essentially the same way, regardless of differences in their abilities.			O	X			
1B.	Potential users could use this product without feeling segregated or stigmatized because of differences in personal capabilities.			O		X		O: The voice output needs a headphone jack. X: The headphone jack could be better integrated into the overall design.
1C.	Potential users of this product have access to all features of privacy, security, and safety, regardless of personal capabilities.	O X						
1D.	This product appeals to all potential users.				O X			

Universal Design Performance Measures for Products

VERSION 1.0

PRINCIPLE ONE EQUITABLE USE		Not Applicable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comments
1A.	All potential users could use this product in essentially the same way, regardless of differences in their abilities.							
1B.	Potential users could use this product without feeling segregated or stigmatized because of differences in personal capabilities.							
1C.	Potential users of this product have access to all features of privacy, security, and safety, regardless of personal capabilities.							
1D.	This product appeals to all potential users.							

PRINCIPLE TWO | FLEXIBILITY IN USE

2A.	Every potential user can find at least one way to use this product effectively.							
2B.	This product can be used with either the right or left hand alone.							
2C.	This product facilitates (or does not require) user accuracy and precision.							
2D.	This product can be used at whatever pace (quickly or slowly) the user prefers.							

PRINCIPLE THREE SIMPLE AND INTUITIVE USE		Not Applicable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comments
3A.	This product is as simple and straightforward as it can be.							
3B.	An untrained person could use this product without instructions.							
3C.	Any potential user can understand the language used in this product.							
3D.	The most important features of this product are the most obvious.							
3E.	This product provides feedback to the user.							

PRINCIPLE FOUR | PERCEPTIBLE INFORMATION

4A.	This product can be used without hearing.							
4B.	This product can be used without sight.							
4C.	The features of this product can be clearly described in words (e.g., in instruction manuals or on telephone help lines).							
4D.	This product can be used by persons who use assistive devices (e.g., eyeglasses, hearing aids, sign language, or service animals).							

PRINCIPLE FIVE | TOLERANCE FOR ERROR

		Not Applicable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Comments
5A.	Product features are arranged according to their importance.							
5B.	This product draws the user's attention to errors or hazards.							
5C.	If the user makes a mistake with this product, it won't cause damage or injure the user.							
5D.	This product prompts the user to pay attention during critical tasks.							

PRINCIPLE SIX | LOW PHYSICAL EFFORT

6A.	This product can be used comfortably (e.g., without awkward movements or postures).							
6B.	This product can be used by someone who is weak or tired.							
6C.	This product can be used without repeating any motion enough to cause fatigue or pain.							
6D.	This product can be used without having to rest afterward.							

PRINCIPLE SEVEN | SIZE AND SPACE FOR APPROACH AND USE

7A.	It is easy for a person of any size to see all the important elements of this product from any position (e.g., standing or seated).							
7B.	It is easy for a person of any size to reach all the important elements of this product from any position (e.g., standing or seated).							
7C.	This product can be used by a person with hands of any size.							
7D.	There is enough space to use this product with devices or assistance (e.g., wheelchair, oxygen tank, or service animal).							

THE PRINCIPLES OF UNIVERSAL DESIGN

Version 2.0 - 4/1/97

Compiled by advocates of universal design: Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden

UNIVERSAL DESIGN

The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

PRINCIPLE ONE | EQUITABLE USE

The design is useful and marketable to people with diverse abilities.

- 1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
- 1b. Avoid segregating or stigmatizing any users.
- 1c. Make provisions for privacy, security, and safety equally available to all users.
- 1d. Make the design appealing to all users.

PRINCIPLE TWO | FLEXIBILITY IN USE

The design accommodates a wide range of individual preferences and abilities.

- 2a. Provide choice in methods of use.
- 2b. Accommodate right- or left-handed access and use.
- 2c. Facilitate the user's accuracy and precision.
- 2d. Provide adaptability to the user's pace.

PRINCIPLE THREE | SIMPLE AND INTUITIVE USE

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

- 3a. Eliminate unnecessary complexity.
- 3b. Be consistent with user expectations and intuition.
- 3c. Accommodate a wide range of literacy and language skills.
- 3d. Arrange information consistent with its importance.
- 3e. Provide effective prompting and feedback during and after task completion.

PRINCIPLE FOUR | PERCEPTIBLE INFORMATION

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

- 4a. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
- 4b. Maximize "legibility" of essential information.
- 4c. Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
- 4d. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

PRINCIPLE FIVE | TOLERANCE FOR ERROR

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

- 5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- 5b. Provide warnings of hazards and errors.
- 5c. Provide fail safe features.
- 5d. Discourage unconscious action in tasks that require vigilance.

PRINCIPLE SIX | LOW PHYSICAL EFFORT

The design can be used efficiently and comfortably and with a minimum of fatigue.

- 6a. Allow user to maintain a neutral body position.
- 6b. Use reasonable operating forces.
- 6c. Minimize repetitive actions.
- 6d. Minimize sustained physical effort.

PRINCIPLE SEVEN | SIZE AND SPACE FOR APPROACH & USE

Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

- 7a. Provide a clear line of sight to important elements for any seated or standing user.
- 7b. Make reach to all components comfortable for any seated or standing user.
- 7c. Accommodate variations in hand and grip size.
- 7d. Provide adequate space for the use of assistive devices or personal assistance.