

# Universal Design (UD) Advisor System Creating a Means for Employees with Disabilities To Participate in the Evaluation of UD Products

**Maho Horiguchi, Kenji Ido, Kaoru Nishida, Shuji Takahashi**

*Toshiba Corporation, 1-1, Shibaura 1-Chome, Minato-ku, Tokyo*

---

## **ABSTRACT**

The Toshiba Group practices universal design (UD) that is based on Voice of Customer, or VOC, but to strengthen our VOC collecting activities, we started a “Universal Design Advisor System” in 2007. Under this system, Toshiba Group employees with disabilities help to develop and evaluate UD products, regardless of the department to which they belong. This system promotes UD evaluation internally and helps expand the range of activities of Toshiba Group personnel. The Toshiba Group will continue to improve the system and develop it so that it contributes to the Group’s manufacturing.

## **Keywords**

persons with disabilities; product evaluation; diversity

## **1. Foreword**

The architect Ronald Mace proposed the term and concept of universal design (UD) in the 1980s in the United States. UD refers to the design of products, services, buildings, spaces and so on that are usable by as many people as possible, regardless of whether they have disabilities, and whatever their age, sex, nationality, race, etc.

To create products that are easier to use for as many people as possible, one has to understand the characteristics and requirements of various users. To do that, it is important to gather the Voice of Customer (VOC) and evaluate design proposals. Users include all types of people, including senior citizens, persons with disabilities, children and pregnant women. This paper describes an overview and a recent case study from Toshiba’s “UD Advisor System,” which lets employees with disabilities from within Toshiba evaluate products as a means to collect VOC more quickly and easily from persons with disabilities. The paper also discusses issues that have appeared in the use of the system and the outlook for the future .

## **2. UD in the Toshiba Group**

This section provides a brief overview of UD in the Toshiba Group. The Toshiba Group handles products from a variety of fields: home appliances, digital products, social infrastructure systems including public service equipment and medical systems. The UD Promotion Working Group includes members from across the Toshiba Group who represent Toshiba’s various business areas. The working group establishes the norms relating to UD at Toshiba—the UD philosophy, vision and guidelines (Fig. 1)—and has adopted a human-centered design process as provided by ISO 13407 (JIS Z8530) for its UD processes.

A human-centered design process is an all-purpose process of manufacturing, which begins with problems that become apparent from user opinions and the context of use, then generates, evaluates and verifies design proposals, and repeats this cycle until the needs of the user or organization are

satisfied (Fig. 2). One rule, moreover, is that development members from engineering, design, sales, product planning, etc., take part in the development process regardless of their type of job. Toshiba believes, also, that to discover the problems that make up the starting point of UD development, it is important to obtain VOC from varied users, including persons with disabilities, and that making it easier to receive VOC from persons with disabilities can help advance UD at Toshiba.

**Toshiba Group Universal Design Philosophy**

We create products attuned to people's aspirations. Toshiba Group contributes to realization of a society where everyone can live at ease and in comfort regardless of age, gender and abilities.

**Toshiba Group Universal Design Vision**

Transforming "can't use" to "able to use", "hard to use" to "easy to use", Toshiba's universal design aims to create products accessible and safe to use for everyone. With the perpetual drive for innovation, Toshiba continues to explore ways to create more convenient and easier to use products which, in our hope, will meet even greater number of peoples' standard for "want to use".

**Toshiba Group Universal Design Guidelines**

- Intuitive use
- Simple use
- Low physical effort
- Equitable use
- Safety and minimal anxiety

(The Guidelines consists of the above five main principles and 15 sub principles.)

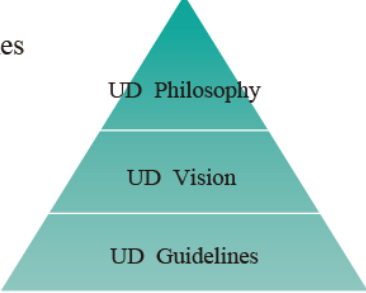


Fig. 1: Norms of UD in the Toshiba Group

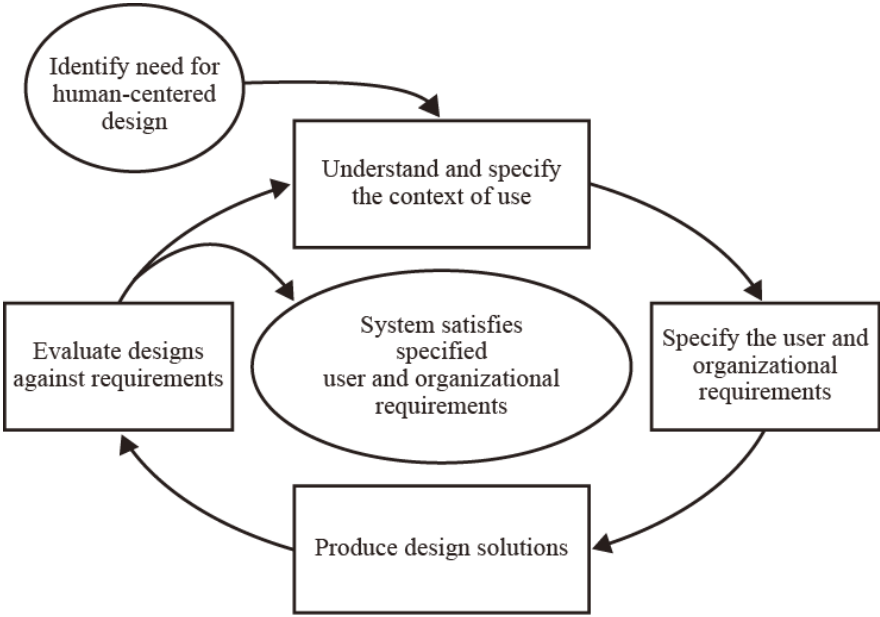


Fig. 2: The human-centered design process as provided by ISO 13407 (JIS Z8530)

### **3. Background to start of system**

The Toshiba Group has collected VOC from a variety of users, including senior citizens and persons with disabilities, in keeping with the human-centered design process concept. In the past, when Toshiba was doing product evaluation to gather VOC from persons with disabilities, it would ask an outside organization to introduce participants, or invite acquaintances of employees to be participants. However, finding people to help evaluate products and then going through the intermediation procedures took some time, and in some cases Toshiba was unable to assemble enough participants in time for product development, which has to be done quickly. Also, the development staff who do the product evaluation did not always have a good understanding of the evaluation process using persons with disabilities as participants, making it difficult to do UD evaluations and studies. These issues made it necessary for the product development site to have an environment for product evaluation in which it is quick and easy to work with persons with disabilities as participants.

At the same time, many employees with disabilities were already working in the Toshiba Group, and among them were individuals who wished to use their experience and opinions as persons with disabilities to help improve Toshiba Group products.

The UD Advisor System was designed primarily to create an environment in which the Toshiba Group could conduct product evaluations with persons with disabilities as participants expand the range of activities for Group personnel.

The Diversity Development Division, part of the Human Resources Group, designed the system. The Diversity Development Division works to create a corporate climate that respects employee diversity and lets each employee fully realize his or her aptitudes and abilities. Because one of the main purposes of the system was to expand the range of activity of employees with disabilities, the system was set up so that the activities of UD Advisors are treated as work time.

### **4. Overview of Universal Design Advisor System**

The system started up in FY2007, and by FY2009 about 70 individuals from Toshiba Group companies throughout Japan had registered as advisors.

To register, the person has to meet the following four criteria.

- (1) The person must be a Toshiba Group employee.
- (2) The person must have a physical disability.
- (3) The person must voluntarily wish to participate.
- (4) The person must get approval from his or her superiors.

The major activities of UD Advisors is responding to questionnaires and evaluating products; these are done for example by email or post or by using actual products and prototypes (Fig. 3).

The procedure for actually asking UD Advisors to do an evaluation is that the UD Promotion Working Group secretariat, which runs the system, takes the request from product development staff and then, as needed, makes a request to the UD Advisor and that person's superior. Participation in product evaluation is voluntary, and the decision whether or not the person will participate takes into account such factors as the person's regular job and physical condition, and also depends on getting approval from each of the person's superiors.

One of the characteristics of this system is that initiatives transcend the boundaries of departments and Group companies. Participants help to improve Toshiba Group products, regardless of the person's department or Group company. One advantage to asking employees to do product evaluation as part of their jobs is that there is no intermediary and the person requesting the evaluation can directly contact the participants; this means that the process from request to actual evaluation is quicker. Moreover, by starting up the system within the Toshiba Group, it was found easier and more familiar to do UD evaluation with persons with disabilities as participants. Another advantage is that this arrangement simplifies confidentiality agreements and other procedures when Group secrets are involved. One other aspect that led to the launch of the system is the promotion of diversity within the Toshiba Group. Employees who have registered as UD Advisors expand their range of activities, by using their experience and opinions as persons with disabilities, to go beyond their departmental boundaries and get involved in Toshiba Group product development.



Fig. 3: A UD Advisor who is a wheelchair user evaluating products (usability of rice cookers)

## 5. Results and case studies

Between FY2007 and FY2009, a total of 15 studies and evaluations were performed under the system, with a total of 193 participants in these activities. This section discusses a 2009 vacuum cleaner evaluation as a case study.

For developing the next generation of products, product planning staff and designers themselves evaluated vacuum cleaners on the market by actually using them. As they did so, they added a UD Advisor with a visual impairment (low vision) and another with a hearing impairment to the evaluating members to take the standpoint of a user with a disability, and they intended to observe how a variety of users used vacuum cleaners and uncover and organize the issues and items to study (Fig. 4).

About 10 people participated in this evaluation: product planning staff, designers, ergonomics staff, UD Advisors (one with a visual impairment and one with a hearing impairment) and others. Each person used several market vacuum cleaners in a model room that recreated an actual living environment, helped identify concerns relating to ease of use and functionality, and observed others using the products.

Thanks to participation by the UD Advisors, the evaluation resulted in finding development points to consider which product planners and designers might not have noticed by themselves. To give one example, several times during the evaluation the hearing impaired UD Advisor continued to use the vacuum, not noticing that the vacuum cleaner had come unplugged. The vacuum cleaner came unplugged when the participant pulled it around while vacuuming, and the participant did not notice the motor noise stopping when this happened. Moreover, while operating the vacuum cleaner, it is thought that its vibration while vacuuming becomes lost in the user's own motion, so that it is difficult for the user to notice the vibration stopping. Toshiba products of the time used LED lamps in the main body (see Fig. 5 for names of vacuum cleaner parts) of the vacuum cleaner to indicate that the power is on, the relative strength of operation, and so on, but now the members realized there was a need for some way of indicating the vacuum cleaner's status in a place more visible to the eye while vacuuming, such as on the floor nozzle or telescopic tube. On the other hand, observation of the visually impaired UD Advisor using the vacuum cleaner revealed that it was difficult to find, for example, the switch to extend and retract the telescopic tube if it was the same color as the surrounding area.

Vacuum cleaners launched in 2010 featured a number of improvements made possible by the above results and further study. For example, LEDs, etc., that indicate the vacuum cleaner's operating status were located on the grip and telescopic tube, which are close to the eyes and easy to see while vacuuming. Also, the switch for extending and retracting the telescopic tube was made into a different color than the surrounding area, increasing its visibility. These features make the vacuum cleaner easier to use, not just for persons with disabilities, but for a variety of users.

In this case study, the process from request to evaluation took place rapidly, and the participating UD Advisors made comments such as "It means a lot to me to have a place where I can offer my opinions" and "Being able to interact with people in jobs different from my usual one helps me to expand my

knowledge and is very educational.” These comments suggest that the system achieved some success in fulfilling its purposes.



Fig. 4: Evaluating a vacuum cleaner with a UD Advisor



Fig. 5: The vacuum cleaner with names of individual parts (model shown: VC-3000X)

## **6. Issues and future outlook**

Since the start of the system, a variety of activities have taken place besides the case study described above, but because registration in the UD Advisor System is limited to Toshiba Group employees, there tends to be some skewing in terms of the types and extent of disability. A variety of circumstances make it impossible to recruit enough people to participate at times, because participation in evaluations is voluntary and employees work in many places, among other reasons. Also, in some cases, product evaluation by third parties, not Group employees, is required. In light of these points, it seems VOC could be collected more effectively by using both employee UD Advisors and outside persons with disabilities as participants, each according to the objective.

Hereafter, the Toshiba Group will promote use of the system at a higher level than before by first enhancing publicity for the system within the Group to make more employees familiar with it. The Group will also create new means of collecting and using VOC, such as by creating settings where participants can express their opinions at any time, not just after a request has been made. By creating means for UD Advisors, who have registered in the system with the desire to participate, to more easily express their opinions, Toshiba expects to be able to discover latent needs. For the UD Advisors, moreover, an environment that makes it easy to express an opinion will be an effective way to increase desire to take part in activities and will also promote diversity.

## **7. Conclusion**

With the system entering its fourth year in 2010, it is desirable that the system should be run and used more and more effectively hereafter. This system, in which the Toshiba Group transcends department boundaries to work together, increases UD awareness and UD product development capacity within the Toshiba Group and helps to build better products. At the same time, it creates a new setting for eager employees to be active, which further invigorates the Toshiba Group organization and its personnel. The Toshiba Group looks forward to making more improvements to the system and further expanding these activities.

## **References**

Ido Kenji, Horiguchi Maho. 2010. "Toshiba Group's Approach to Universal Design". TOSHIBA REVIEW 55(2) 2-6

ISO 13407:1999 Human-centred design processes for interactive systems