

## DESIGNERS AND MANUFACTURERS' PERSPECTIVES ON INCLUSIVE/UNIVERSAL DESIGN

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### Abstract

Inclusive design in the U.K. and its U.S. counterpart, universal design, present opportunities and challenges to industry. In order to encourage manufacturers and design companies to adopt more inclusive design practices, the research has been carried out to gain an understanding of why and how companies adopt inclusive design practices, what are the barriers when implementing them and what are the key strategies for facilitating inclusive/universal design in an industrial context.

Based on interviews with a number of U.K. design consultancies and an investigation among manufacturers in the U.S., a comparison between U.K. consultant designers and U.S. consumer product manufacturers' perspectives on inclusive/universal design was made. It was found that designers are reluctant to sacrifice the aesthetics of the brand to design for inclusion, but nevertheless would like to have practical tools to help them develop more inclusive solutions. For manufacturers, the key motivation for such practices is that of government regulation and legislation requiring the accessibility of products and services.

*Keywords: reflective practice, survey, design philosophy*

## 1 Introduction

Inclusive design describes a process whereby 'designers, manufacturers and service providers ensure that their products and services address the needs of the widest possible audience' [1].

In the U.S., the term 'universal design' is most often used and is synonymous with inclusive design. Universal design refers to the process of "creating products (devices, environments, systems, and processes) which are usable by people with the widest possible range of ability, operating within the widest possible range of situations (environments, conditions, and circumstances), as is commercially practical" [2, 3].

Although inclusive/universal design promises a larger market for products that better satisfy users' needs, industry in general has been slow to adopt such practices [4]. Recent research has begun to investigate barriers to inclusive/universal design from industry [2-7]. This paper presents a comparison of perspectives on inclusive/universal design between design consultancies in the U.K. and consumer product manufacturers in the U.S.

## 2 Background

To encourage design community in adopting inclusive design, the Helen Hamlyn Research Centre (HHRC) of the Royal College of Art (RCA) organised the DBA Design Challenge in collaboration with the Design Business Association (DBA) from 2000 to 2002. Member firms of the DBA were challenged to work with the HHRC and disabled users to develop innovative solutions for new inclusive products and services for the mainstream market.

Each year four to five design companies were short-listed. By 2003, 13 design companies were involved in the DBA Design Challenges and 14 projects developed. Among the 13 design companies, nine were interviewed by one researcher from the HHRC and two researchers from the Engineering Design Centre (EDC) at the University of Cambridge. The principle aim of the interviews was to gain a better understanding of how designers perceive and respond to inclusive design.

It is interesting to make a comparison with the Universal Design Research Project (UDRP) [2, 7] in the U.S., a three-year study undertaken to understand why and how companies adopt universal design, and what factors are the most important in bringing this about. A large part of this project was the identification of key internal motivators (positive influences) and barriers (negative influences), as well as things that might be done by those outside a company (i.e. researchers, educators, advocates, consumers, and government) to assist companies interested in implementing or adopting universal design.

## 3 Methodology

The interviews of U.K. design consultancies were carried out from March to December 2002, after their participation of the DBA Design Challenge. The main areas covered by the interviews were:

- Designers and project managers' viewpoint on inclusive design;
- Differences between inclusive and existing/routine design process;
- Challenges involved in addressing the issue of inclusivity;
- Impact of inclusive design experience on future practice;
- Attitudes of design industry towards inclusive design;
- The relationship between designers, clients and users.

The UDRP team conducted telephone interviews with individuals from 26 consumer product manufacturers in its initial year. In the second year, a survey instrument (based on the first year's results) was sent to the same companies to confirm the initial results and to determine the relative importance of the factors and strategies identified. Upon receipt of the completed surveys, follow-up interviews were conducted by telephone to resolve questions or inconsistencies and to gather additional detailed information [2].

Since the two sets of research were conducted separately, using slightly different methodologies, only the comparable parts are addressed in this paper. General conclusions can be found from other publications [6, 8, 9]. Table 1 summarises the comparison of the methodology of the two research projects.

Table 1. The Comparison of the U.K. and U.S. investigations

<b>Methodology</b>	<b>DBA Design Challenge review (U.K. design consultancy-based)</b>	<b>Universal Design research project (U.S. manufacturer-based)</b>
<b>Research objectives</b>	To find out about what are the industrial attitudes toward inclusive design (ID), how companies implement ID projects, what tools are useful to help designers develop inclusive solutions.	To gain an understanding of why and how companies adopt universal design (UD), and what factors are the most important in making this decision; to determine external strategies for facilitating UD.
<b>Companies interviewed</b>	Eight small design consultancies and one large design firm. Specialities include product design, brand strategy, retail, workplace design and environmental design. Selection criterion based on their participation in DBA Design Challenges.	26 companies including large and small firms drawn from telecommunications, media and materials, 'edutainment,' computer, and built environment industry sectors, selection based on the panel of seventeen experts in UD.
<b>Interview methods</b>	Interviews (face-to-face) lasting for approximately 90-120 minutes, using a list of questions as a guide but not restricted by it.	60-minute telephone interview based on pre-survey responses, using an open-ended instrument developed by the project team.
<b>Interviewees</b>	One to five designers and/or project-managers.	Individuals in middle management positions, and a few executives (in small companies).

## 4 Findings in comparison

It was found that although the industrial investigations in the U.K. and in the U.S. were conducted using different methodologies, and with different audiences, they identified many common issues. The similarities included:

- the perception that the adoption and the implementation of inclusive/universal design differs between large companies and small companies, i.e. large companies predicted ID as a specialised field in the future and tend to support it from upper management and through formal product development processes; small companies regard ID as the trend for the future and tend to have champions and use informal information networks.
- time and cost were regarded as the biggest constraints on adopting inclusive design;
- most companies, whether large or small, preferred to contact specialist organisations for support and information;
- exemplars of good design were sought after by design practitioners as sources of inspiration.

Differences were also identified. The U.S. investigation concluded that legislation was the “most effective factor which resulted in significant systematic consideration of people with disabilities in the design of mainstream products” [3]. The U.K. design companies’ perception of legislation, however, is that it “only provides a basic and plain platform” [8]. This distinction may be because the provision of welfare in Britain differs from that of the United States and also because the U.S. legislation is enacted under the umbrella of civil rights.

Based on the results of both investigations in the U.K. and in the U.S., the following strategies for facilitating the adoption and successful practice of inclusive/universal design are proposed.

**Awareness of UD/ID** needs to be improved: various introductory materials should be made available and accessible to upper management and product designers. The importance of inclusive design must be fully understood.

**Design tools** need to be developed, which may include:

- resource database with appropriate background information (e.g. demographic changes);
- ideas and strategies for meeting needs and guidelines;
- procedures and methods that can be used to evaluate product designs and identify problem areas to address prior to and throughout prototyping and/or testing with consumers;
- good ID/UD examples and successful case studies;
- consensus on designs and feature sets, as deemed acceptable by consumer groups.

**Statistical/market data** needs to be generated for easy reference, especially:

- statistical and other data regarding the performance level of individuals with different types of capability losses, and the number of people that have difficulties with different product features;
- the number of people with different types of capability losses and the number of people with functional limitations that would benefit from inclusive/universal design (for example, people with minor or moderate disabilities and people disabled by the environment);
- methods of estimating the number of new customers that might be included or excluded by the outcome of a particular design decision or by an existing design solution.

In addition, the UDRP also addressed issues such as Training/Education, and Regulation/Requirements. These were not specifically studied in the review of DBA Design Challenge. However, the DBA project review provided an in-depth insight into user involvement at a practical level [8], and the designers’ preferences regarding design support tools were also made explicit through the follow-up testing, which is to be discussed in the section after.

Common issues addressed are more general in the UDRP and more specific in the DBA Design Challenge review. For example, in terms of the design tools, the conclusion of UDRP is that “*tools need to be practical and industry-specific*” [4]. The DBA review indicated that *knowledge support tools* should be “*possibilities, not rules,*” “*inspirations, not restrictive checklists,*” and “*keywords (easy and concise), not grammar (complex and elaborating),*” while *technique support tools* should cover “*usability testing,*” “*export support,*” and “*accessible references*” [6]. Table 2 compares the general findings.

Table 2: general conclusions in comparison

<b>DBA Design Challenge review (U.K. design consultancy-based)</b>	<b>Universal Design Research Project (U.S. manufacturer-based)</b>
ID can be a ‘norm’ in the future, but at the moment it is still a ‘special concern.’	For both market and mandatory reasons, UD is an emerging trend.
Designers will play an important role in pushing inclusive design issues.	Human factors professional play an important role in supporting UD.
ID is strongly associated with disabled users. An inclusively designed product is not necessarily more expensive but the user involvement may cost time and money.	UD is perceived by most companies as a special interest area (i.e. people with disabilities) and adopting it will slow down the time to market and increase costs.
Legislation is a basic requirement. Incorporating inclusive design needs a radical change in attitudes towards disabled people. The business case is the major motivator for adopting ID	Government regulations are the most effective factors, which resulted in significant systematic consideration of people with disabilities in the design of mainstream products. The second major factor is high profit.

To be more specific, the barriers to inclusive/universal design identified by the U.S. manufacturers and the DBA consultant designers are presented in Table 3:

Table 3. Major barriers identified

<b>Obstacles identified by DBA design consultancies in the U.K.</b>	<b>Barriers predicted by manufacturers in the U.S.</b>
<p><b>Lack of brief asking for inclusivity:</b> Briefs are often based on outdoing what the competitor is putting out. Clients are unaware of the compelling business case.</p>	<p><b>Fears and concerns:</b> The practice of universal design will slow down time to market, the adoption of universal design would increase costs.</p>
<p><b>Cost and time constraints:</b> 2-3 months for developing a new product is typical. User study depends on what the client would like to pay for and the adoption of an inclusive approach largely depends on the manufacturer’s acceptance.</p>	<p><b>Inadequate training or resources:</b> Lack of time to learn about users and learn to practice universal design.</p>
<p><b>Designers are often driven by aesthetics:</b> Inclusively designed products are seen as “functional, but ugly” with “sexy marketing of a product for older people almost impossible to achieve”[9].</p>	<p><b>‘Lack of fit’ perceptions:</b> Universal design is often briefed as design for disability, representing a niche market.</p> <p><b>Organisation structure:</b> A change to adopt universal design is too complicated for companies of large scale and diversity.</p>

## 5 Summary of the DBA Interviews

In response to the major objectives of the DBA interviews mentioned in the methodology section, a brief summary is given below. Details besides the comparison with the UDRP can be found from the interview report [8] and other publications [6, 8-10].

- Designers and project managers regard inclusive design as a new vision, although most of them still tend to associate it with disabled people after the DBA Challenge.
- Compared with their daily routine, the difference of the DBA project is the involvement of critical/disabled users in the design process.
- Major challenges to inclusive design are the lack of creative design briefs, cost and time constraints and manufacturers' unwillingness to change, especially for mature products such as electrical kettles and milk cartons.
- Designers appreciate user-involvement in the design process and wish to consult critical users more often.
- Designers are open to the concept of inclusive design and regard it as "good design" and "about raising the level of design in general" [8].
- The current design process does not accommodate user-involvement. There is no direct contact between designers and users. However, design consultancies can influence clients' decision to a certain extent through creative interpretation of design briefs.

## 6 Designers' feedback to the inclusive design booklet

The previous sections described barriers to inclusive design from industry. Data and tools have been developed to help inclusive design practices. This section will present the feedback from designers to these data and tools.

From September 2002 to January 2003, twenty-two booklets about inclusive design were sent to consultant designers (not necessarily from DBA member firms) and design practitioners undertaking the Research Associate Programme at the HHRC. All designers involved are familiar with the concept of inclusive design. Enclosed in the booklet is a set of sample data and tools developed by the EDC. The contents of the booklets include:

- Page 01: Design exclusion
- Page 02: Your potential market can be bigger...
- Page 03: Ergonomic considerations: is that enough?
- Page 04: What is missing from typical ergonomics data?
- Page 05: A survey of design exclusion
- Page 06: How many people have capability losses?
- Page 07: Capability losses among older users
- Page 08: Multiple capability losses among GB adult population
- Page 09: Multiple capability losses among older users
- Page 10: Case study I: design exclusion of the two kettles
- Page 11: Case study II: adapting a dexterity scale to produce assessment

Page 12: Case study III: visualising design exclusion

Page 14: Product assessment using keywords

Page 15-19: Exercise and questionnaire

Page 20: Key references

Nine designers (41% of the sample) returned the questionnaire feedback form. It was found that:

- Designers are interested in background information on inclusive design. They show interest in the concept of ‘design exclusion’ as an alternative means of talking about inclusive design. “An inclusively designed product should only exclude the users that the product requirements exclude” [4]. This definition is considered more ‘realistic’ and less dictatorial, and it helps designers identify problems.
- Designers seek good data on ergonomics and guidelines in how to use them properly, as ergonomics data are “commonly misinterpreted” or “misused.”
- For designers who have been directly involved in inclusive design projects, for example the DBA Design Challenges, measures/scales of dexterity problems are of specific interest, probably because the engagement with disabled users made designers more aware of people’s difficulties in handling everyday products.
- Hard numbers regarding capability losses and diagrams for comparison received very positive feedback. For example, Table 4 and Figure 1 showing the comparison of capability losses of the whole adult population and the older population in the Great Britain are commented “*great*,” “*very interesting*,” and “*excellent*.”

Table 4. Data regarding capability losses (based on [11])

<b>Types of capability losses</b>	<b>Persons (in 000s) (16+)</b>	<b>% of population (16+)</b>	<b>Persons (in 000s) (65+)</b>	<b>% of population (65+)</b>
<b>Locomotion</b>	6 143	13.1	3 136	33.8
<b>Dexterity</b>	3 002	6.4	1 490	16.1
<b>Hearing</b>	2 897	6.2	1 828	19.7
<b>Intellectual functioning</b>	2 507	5.3	972	10.5
<b>Seeing</b>	1 928	4.1	1 174	12.7
<b>Reach &amp; Stretch</b>	1 742	3.7	861	9.3
<b>Communication</b>	513	1.1	196	2.1

Some designers found the data “shocking,” some asked for global data, and some inquired the latest data. It is beyond our expectation that designers showed such a great interest in the data, as they are often thought to be ‘number-phobia.’ This favour of hard numbers may be related to the fact that consultant designers often need to negotiate with clients and back up their ideas with convincing materials, including concrete facts. Global data can “help designers

immensely with briefs from global companies, ” and market comparison can “help designers present a good case for the inclusive product to [their] bosses and clients.”

The diagrams (figure 1) showing multiple capability losses among adults and older people were deemed particularly interesting. The common requirements from designers are that all the charts and diagrams should be made easily accessible, so that designers can construct or reproduce them as a “good explanation and presentation tool” to their clients. Web-based, downloadable resources are preferred and highly recommended.

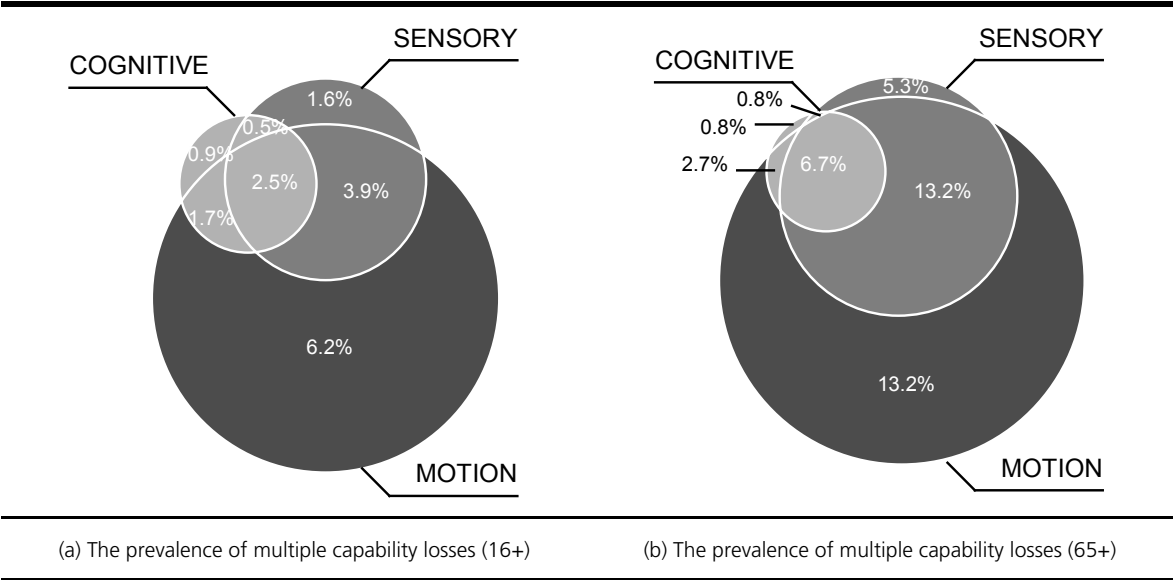


Figure 1. Multiple capability losses (based on [11])

Regarding the case studies, most designers considered the ideas were excellent. However, it was found that the visualisation needs improvement. The abstract charts (such as bubble diagrams) proved to be difficult for designers to understand. One designer could not figure out what the bubbles are on the charts. One designer commented “I had to work hard to understand the point.” A designer with engineering background, though, found the case studies and the visualisation were “excellent.”

In general, the booklet received positive feedback from designers. The following are some comments from them:

- “[The booklet is] good because not too text heavy and ‘accessible’ for designers who are busy or under deadline pressure.”
- “Generally I felt the document presented a very valuable and fresh way of looking at the issues. The idea of readily digested information and tools in relation to designing for inclusivity is excellent.”
- “A very interesting document. I think it should be sent to hundreds of design agencies so they are aware of how many people are currently excluded and work on how they can improve this status!”

In the attached questionnaire, the designers were asked to rate the relative importance of a set of tools for inclusive design, from their own point of view and from their design commissioners’ point of view. The two sets of scores were marked differently and it seemed that designers were far more interested in the tools than their clients.



Barriers to inclusive design, as predicted by the designers, include:

- general lack of awareness of importance [of inclusive design]
- [lack of] creative briefs that do not make it a special issue
- no empathy with disabled users
- no client incentive/direction
- budget limitation
- time scale involved
- [inclusive design is] not embedded in design education
- difficult to market [inclusive design]
- designing for inclusivity is widely seen as compromising ‘design’ interests
- other specific limitations such as the filling line constraint for packaging design

Most of the above barriers are consistent with the barriers identified in the interview with the DBA design consultancies.

The typical barrier to inclusive design from designers’ point of view is that “*if a design has to be inclusive for everyone then it could affect the aesthetics of the brand. If a brand’s beauty is jeopardised designers will feel reluctant to do it.*” Sadly designing for inclusivity is widely seen as compromising design interests.

## 7 Further work

Since the UDRP targeted manufacturers in the U.S., and our investigation focused on design consultancies in the U.K., it would be worthwhile investigating manufacturers’ attitudes to inclusive design in the U.K. as well, and comparing them with those in the U.S. and elsewhere.

The designers involved so far are all consultant designers who know about inclusive design. In order to get a more general perspective from the design community in the U.K. as a whole, there is a need to include in-house designers and designers who are not yet familiar with inclusive design.

Two surveys have been planned to identify general barriers to inclusive design from U.K. industry. 146 manufacturers and retailers of consumer products, ranging from small to large size, have been sent questionnaires. In the meantime, 177 industrial design consultancies have been selected for the other survey. The construction of the questionnaires is partly based on the findings presented in the previous sections. The result of the surveys will help identify a conclusive set of industrial barriers to inclusive design and justify any possible bias in the findings incurred by the relatively small sample presented in this paper.

The second version of the inclusive design booklet will take into account of designers’ feedback obtained. The strategies will be tailored to overcome the barriers identified. The validation work will be done by follow-up interviews with selected manufacturers, retailers and design companies.

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