The Principles of Universal Design - Automobile Applications

<table>
<thead>
<tr>
<th>Principle</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Equitable Design</td>
<td>Brands stigmatized for allegedly targeting specific audiences (e.g. Buick being perceived as a car only for elderly consumers)</td>
</tr>
<tr>
<td>2. Flexibility in Use</td>
<td>Customizable interior ambient lighting</td>
</tr>
<tr>
<td>3. Simple and Intuitive Use</td>
<td>Failure to meet this principle as a cause for the poor initial reception of the BMW iDrive system</td>
</tr>
<tr>
<td>4. Perceptible Information</td>
<td>Causes with universal pictorial cues as opposed to verbal/written cues</td>
</tr>
<tr>
<td>5. Tolerance for Error</td>
<td>Vehicle lane change assist systems</td>
</tr>
<tr>
<td>6. Low Physical Effort</td>
<td>Power steering that is adaptive to road conditions</td>
</tr>
<tr>
<td>7. Size and Space for Approach and Use</td>
<td>Easy ingress/egress from a vehicle</td>
</tr>
</tbody>
</table>

**The Reluctance to Adopt Universal Design**

**The Principal-Agent Problem**

- Principals (shareholders) hire agents (management) to deliver on the principals' goals
- Principals and agents have conflicts of interest, where agents are only interested in short-term profits and not long-term growth
- Results in companies diverting time and resources to strategies that only maximize short-term profit

Introduction/Motivation

- Today's forces of population aging will favor increasingly high median age populations in 2030
- Designers need to consider ways to meet needs of aging populations with dignity by applying methods of universal design
- Despite imminent market forces from older populations and inherent benefits for all consumers, industry has taken few steps to incorporate methods of universal design

**Vision for Universal Design in 2030**

- Greater role in the design process from social media
- Application of multiattribute decision theory methods
- Increased sales/revenue
- Heightened product experience
- Increased popularity
- Information from social media
- Inspiration for universal design tools

Key Features

- Should resemble Pugh's Total Design, defining steps from identifying a need to the production and sales of a given product
- Emphasis on incorporating the Principles of Universal Design from the beginning of the process
- Should provide ways to quantitatively measure accessible or usable quality
- Offer ways to market goods
- Should serve as a guideline to companies, without constraining creativity

A Comprehensive Method for Universal Design

- Major goal for academia to organize universal design tools and methods into a standardized, comprehensive approach to universal design

Influences of the Comprehensive Method

- Will serve as an educational tool to designers and management alike
- Could help unify different schools of thought (i.e. Universal Design, Inclusive Design, Design for All) under one comprehensive paradigm for product design
- Integration into academic curricula can help increase awareness of the methods of universal design

**Applying Multiattribute Decision Making Methods to Extract Market Needs from Social Media**

- Aim to apply the Hypothetical Equivalents and Inequivalents Method (HEIM) to demonstrated consumer preferences from social media to determine optimal weighting of product attributes considered

Conclusion

- Demographics of 2030 will require companies to adopt universal design practices to remain competitive
- The Caveat of Informality, coupled with the Principal-Agent Problem remain two major obstacles to the adoption of universal design
- Academia must develop a comprehensive method to universal design, giving companies proper guidance to adapt their design practices
- Part of the comprehensive method will include applying multiattribute decision making methods to gauge true consumer needs and preferences in real time

Identifying the Attributes

- Need to develop intelligent data mining techniques
- Example includes the development of AI software to determine what information is reliable
- Challenge of how to sample populations

Establishing Hypothetical Equivalents/Inequivalents

- Who or what represents the decision maker?

Potential Benefits

- Social media represents an abundance of unbiased consumer preferences
- Process would be automated, allowing designers to track preferences in real time