The goal of marketing (believe it or not) is to obtain competitive advantage by meeting consumer wants and needs more effectively than competing firms. If the needs are known, engineers can apply their skills to developing products that satisfy the needs. If the needs are not known, they must be uncovered by marketers—and engineers!

Consider the following need-elicitation methods. They have been derived from both marketing and engineering. (Enlightened engineers understand the advantages of incorporating the consumer viewpoint into product design.)

### Voice of the Customer Table

The most basic approach is to interview customers directly and ask them to articulate a list of their desires. This approach is used by engineers who have a consumer orientation and is perfectly consistent with the marketing concept. The unique aspect of a VoC Table is that it attempts to document needs in a way that reflects the usage context:

<table>
<thead>
<tr>
<th>Customer Need</th>
<th>Product Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>When</td>
<td>Where</td>
</tr>
</tbody>
</table>

---

**Stylized VoC Table:**

<table>
<thead>
<tr>
<th>Customer Need</th>
<th>Product Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>When</td>
<td>Where</td>
</tr>
</tbody>
</table>
Problem Detection Analysis

Problem detection analysis is guided by the simple insight that consumers have greater mental access to their problems than to the benefits they seek. If you ask people what they want in a product, they are likely to provide known answers, top-of-mind answers, and/or logical answers. An alternative approach is to ask people to describe the problems they experience with the product. Problems are more episodic and specific and may paint a very different picture of product adequacy and therefore the opportunity for product improvement.

Product/Service Biggest Problems | Most Desired Benefits
--- | ---
Dog Food | 1. expensive  
2. bad smell  
3. single size can  
4. does not clean teeth  
5. does not chew like a bone | 1. balanced diet  
2. nutrition  
3. vitamins  
4. tastes good (to dog)  
5. easy to prepare

Banking | 1. slow service  
2. too complicated  
3. lines are too long  
4. can’t get a loan | 1. modern  
2. innovative  
3. friendly  
4. low interest rates

Lead-User Analysis

Another “consumer-driven” method for determining customer needs is called lead-user analysis. Lead-user analysis reverses the normal flow of thinking about new products, because the product idea sprouts from the consumer. In the best case of lead-user analysis, the user actually develops the product and the marketer adopts and adapts the consumer’s innovation. The frequency with which this paradigm is followed varies widely. In highly technical fields, it can be quite frequent (e.g., >75% in the scientific instrument field).

3M
Empathic Design

There is some controversy over the wisdom of relying on consumers for new product ideas, especially through the use of traditional marketing research techniques that attempt to capture consumer needs. Empathic design is one approach for overcoming these problems. Empathic design does not rely on direct consumer response to questions about needs and wants. Instead, it relies on a deep understanding of unarticulated user needs. New product concepts are based on actual observed consumer behavior via direct interaction between users and those who have a deep understanding of the firm's technological capabilities.

Contextual Inquiry

In the extreme, empathic design is a purely observational technique. Researchers from the TQM tradition refer to a related technique known as "contextual inquiry." Engineers liken contextual inquiry to traditional one-on-one interviews with the exception that the interviews are performed in the context of the customer's activities. This difference creates the potential to generate much more concrete and detailed data than mere out-of-context questioning.

"The only way to come up with new ideas for things that people can use is to stick your nose into their work, even if they're waving scalpels."

--A director of research at Hewlett-Packard

Black & Decker perceived a void in the marketplace in the upper end of the do-it-yourself (DIY) market. This is the mid-price segment in between the low-priced $35 per unit products and the pricey professional lines which are aimed at contractors and other professionals. The customers in this category, the "power DIYers," tend to tackle major projects; they want more capabilities than the standard tools offer; they are price-sensitive; and their numbers have grown significantly over the past few years.

To understand the voice of these customers, Black & Decker developed a panel of fifty DIYers who owned more than six power tools each. For four months, these consumers were questioned about the tools they used and why they had picked particular brands. B&D marketing executives hung out with them in their homes and around their workshops. They watched how the 50 used their tools and asked why they liked or disliked certain ones, how the tools felt in their hands, and even how they cleaned up their work space when they were finished. The B&D people tagged along on shopping trips too, monitoring what the DIYers bought and how much they spent.

This plus other research convinced Black & Decker executives that they could give these customers everything they wanted, and more. The product: the Quantum line of power tools. The B&D CEO noted: "The whole point behind this product line was to have it driven to market by what the consumers really wanted." Financial analysis estimated that the Quantum product line should generate between $30 and $40 million in sales in its first year in existence.
Affinity Diagrams

Contextual-inquiry can create a massive amount of data in the form of customer remarks. An affinity diagram is a coherent hierarchical clustering of customer needs that is built from the bottom up based on an intuitive assessment of the relationships among those needs. The underlying rationale is that creativity is sparked in ways that would not occur just by reacting to individual remarks. An engineer may find it easy to provide a “quick fix” to an isolated consumer need but at the expense of missing the big picture.

The unique aspects of the affinity process is that it is intensely inductive and “data-driven.” The latter helps designers avoid the contaminating effects of their preconceptions and biases.

Method

- Strictly due to tradition, affinity diagrams are constructed from sticky notes. Each remark is written on a separate note.
- Pick one note, place it on the wall, and then look for other notes that go with it (and hence the term “affinity”). There is no justification of why notes go together. In fact, there is a prescription to avoid creating categories that are very familiar.
- Some advocate that initial groupings be limited to four notes or less in order to force the team to make more distinctions.
- Label each grouping with a term that describes their theme.
- Group the groupings under a higher-order group, using a different color of sticky note.
- Group the higher-order groupings, using a different color label. Continue until a coherent hierarchical structure is formed.

Concept Engineering

Concept Engineering is a fairly elaborate and structured process that has been devised to generate new product designs. However, its essence can be captured in the video example. Note how the other methods discussed thus far (i.e., lead-user analysis, problem detection analysis, affinity diagrams, and empathic design or contextual inquiry) are embedded within this technique.
Redesigning Product/Service Development

The Design Process: Two Points

(1) Consistent with the discussion thus far, marketing is a proponent of ‘user-centered design.’ This simple notion is that design begins with the user rather than with technology. It requires that developers understand the tasks that consumers wish to achieve with the product. With difficult-to-use products, UCD is especially important because engineers and designers lack empathy. Designers are not typical users! Designers are proficient with the product. Designers cannot predict problems and misinterpretations. This situation is known as the “Curse of Knowledge.”

Example:

A study of a cell phone instruction manual examined how long it would take novices to complete a particular set of cell phone operations. Beforehand, three groups of people were asked to predict how long it would take the novices. These three groups consisted of cell phone experts, moderate users, and novices. Results of actual time spent by the novices showed that novices took 31.5 minutes to complete the tasks. The predictions made by each group were as follows:

<table>
<thead>
<tr>
<th></th>
<th>Expert Predictions</th>
<th>Moderate Predictions</th>
<th>Novice Predictions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13 minutes</td>
<td>22 minutes</td>
<td>17 minutes</td>
</tr>
</tbody>
</table>
The need-elicitation process provides the designer with a possible set of improvement ideas. However, all consumer needs cannot be satisfied, and the design process itself often requires trade-offs among possible design attributes. For both reasons it is critical to know how consumers perceive the relative importance of potential product features and the trade-offs they would be willing to make. In fact, a leading cause of new product failure is misassessment or insensitivity to the trade-offs inherent in a product’s design.

The traditional method of assessing attribute importance is the rating scale:

Price: Not Important ______________ Important

This method is simple to administer but inadequate on several counts.

Conjoint Analysis

Conjoint requires consumers to make judgments about constellations of attributes and then uses mathematical algorithms to “uncover” the consumers’ values. For example:

<table>
<thead>
<tr>
<th></th>
<th>$80,000</th>
<th>$160,000</th>
<th>$240,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Discriminability of Ratings
- Attribute versus Level of an Attribute
- Isolated Attributes versus Trade-offs

Questions?