EXHIBIT 5-3
Mission statement for the cordless screwdriver.

Mission Statement: Screwdriver Project	
Product Description	• A handheld, power-assisted device for installing threaded fasteners
Benefit Proposition	• Drives screws more quickly and with less effort than by hand
Key Business Goals	• Product introduced in fourth quarter of 2010 • 50% gross margin • 10% share of cordless screwdriver market by 2012
Primary Market	• Do-it-yourself consumer
Secondary Markets	• Casual consumer • Light-duty professional
Assumptions	• Handheld • Power-assisted • Nickel-metal-hydride rechargeable battery technology
Stakeholders	• User • Retailer • Sales force • Service center • Production • Legal department

been identified correctly is whether customers like the team's first prototypes. Nevertheless, in our opinion, a structured method for gathering data from customers remains useful and can lower the inherent risk in developing a radically new product. Whether or not customers are able to fully articulate their latent needs, interaction with customers in the target market will help the development team build a personal understanding of the user's environment and point of view. This information is always useful, even if it does not result in the identification of every need the new product will address.

Step 1: Gather Raw Data from Customers

Consistent with our basic philosophy of creating a high-quality information channel directly from the customer, gathering data involves contact with customers and experience with the use environment of the product. Three methods are commonly used:

1. *Interviews:* One or more development team members discusses needs with a single customer. Interviews are usually conducted in the customer's environment and typically last one to two hours.

2. *Focus groups:* A moderator facilitates a two-hour discussion with a group of 8 to 12 customers. Focus groups are typically conducted in a special room equipped with a two-way mirror allowing several members of the development team to observe the group. In most cases, the moderator is a professional market researcher, but a member of the development team sometimes moderates. The proceedings are usually video recorded. Participants are usually paid a modest fee ($50 to $100 each) for their attendance. The total cost of a focus group, including rental of the room, participant fees, video recording, and refreshments, is about $5,000. In most U.S. cities, firms that recruit participants, moderate focus groups, and/or rent facilities are listed in directories under "Market Research."

EXHIBIT 5-4
Comparison of
the percentages
of customer
needs that are
revealed for
focus groups
and interviews
as a function of
the number of
sessions. Note
that a focus
group lasts two
hours, while an
interview lasts
one hour.

Source: Griffin and
Hauser, 1993
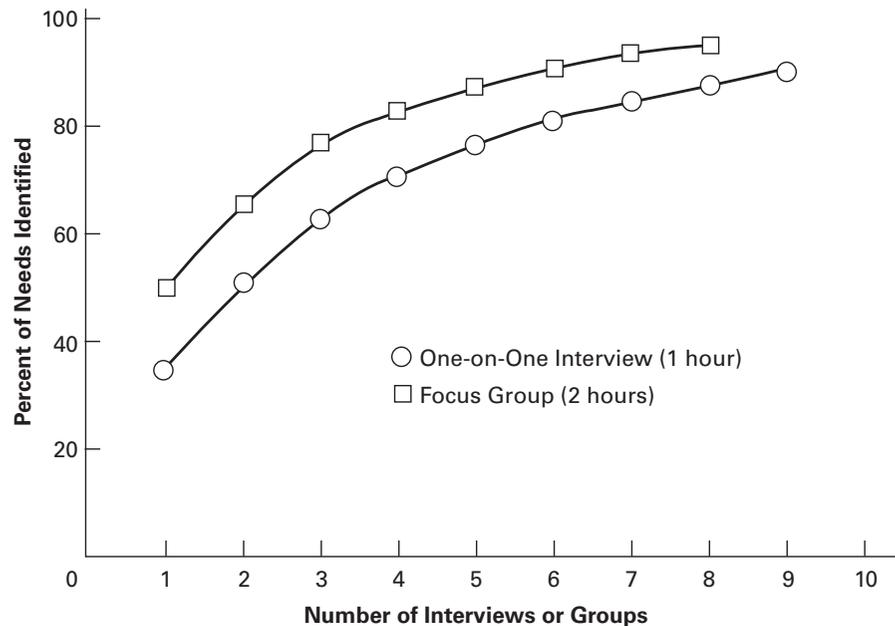
3. *Observing the product in use:* Watching customers use an existing product or perform a task for which a new product is intended can reveal important details about customer needs. For example, a customer painting a house may use a screwdriver to open paint cans in addition to driving screws. Observation may be completely passive, without any direct interaction with the customer, or may involve working side by side with a customer, allowing members of the development team to develop firsthand experience using the product. Ideally, team members observe the product in the actual use environment. Procter & Gamble, for example, observes thousands of customers every year in their homes or workplaces to better understand their needs. For some products, such as do-it-yourself tools, actually using the products is simple and natural; for others, such as surgical instruments, the team may have to use the products on surrogate tasks (e.g., cutting fruit instead of human tissue when developing a new scalpel).

Some practitioners also rely on written surveys for gathering raw data. While a Web-based survey is quite useful later in the process, we cannot recommend this approach for initial efforts to identify customer needs; text-based surveys simply do not provide enough information about the use environment of the product, and they are generally ineffective in revealing unanticipated needs.

Research by Griffin and Hauser shows that one 2-hour focus group reveals about the same number of needs as two 1-hour interviews (Griffin and Hauser, 1993). (See Exhibit 5-4.) Because interviews are usually less costly (per hour) than focus groups and because an interview often allows the product development team to experience the use environment of the product, we recommend that interviews be the primary data collection method. Interviews may be supplemented with one or two focus groups as a way to allow top management to observe a group of customers or as a mechanism for sharing a common customer experience (via video) with the members of a larger team. Some practitioners believe that for certain products and customer groups, the interactions among the participants of focus groups can elicit more varied needs than are revealed through interviews, although this belief is not strongly supported by research findings.

Choosing Customers

Griffin and Hauser also addressed the question of how many customers to interview in order to reveal most of the customer needs. In one study, they estimated that 90 percent of the customer needs for picnic coolers were revealed after 30 interviews. In another study, they estimated that 98 percent of the customer needs for a piece of office equipment were revealed after 25 hours of data collection in both focus groups and interviews. As a practical guideline for most products, conducting fewer than 10 interviews is probably inadequate and 50 interviews are probably too many. However, interviews can be conducted sequentially and the process can be terminated when no new needs are revealed by additional interviews. These guidelines apply to cases in which the development team is addressing a single market segment. If the team wishes to gather customer needs from multiple distinct segments, then the team may need to conduct 10 or more interviews in each segment. Concept development teams consisting of more than 10 people usually collect data from plenty of customers simply by involving much of the team in the process. For example, if a 10-person team is divided into five pairs and each pair conducts 6 interviews, the team conducts 30 interviews in total.

Needs can be identified more efficiently by interviewing *lead users* and/or extreme users. According to von Hippel, lead users are customers who experience needs months or years ahead of the majority of the market and stand to benefit substantially from product innovations (von Hippel, 1988). These customers are particularly useful sources of data for two reasons: (1) they are often able to articulate their emerging needs, because they have had to struggle with the inadequacies of existing products, and (2) they may have already invented solutions to meet their needs. By focusing a portion of the data collection efforts on lead users, the team may be able to identify needs that, although explicit for lead users, are still latent for the majority of the market. Developing products to meet these latent needs allows a firm to anticipate trends and to leapfrog competitive products.

Extreme users are those who use the product in unusual ways or who have special needs. For example, extreme users of the screwdriver might be people who have limited vision or dexterity or those who use the tool professionally every day. Extreme users can help the team identify needs that may be felt less acutely by the mainstream market, but are nevertheless important opportunities for competitive advantage. For example, entrepreneur Sam Farber created the original Good Grips vegetable peeler in response to the needs of his wife who suffered from arthritis. Her extreme needs proved to be a reflection of the latent need for more ergonomic kitchen tools among mainstream users.

The choice of which customers to interview is complicated when several different groups of people can be considered "the customer." For many products, one person (the buyer) makes the buying decision and another person (the user) actually uses the product. A good approach is to gather data from the end user of the product in all situations, and in cases where other types of customers and stakeholders are clearly important, to gather data from these people as well.

A customer selection matrix is useful for planning exploration of both market and customer variety. Burchill suggests that market segments be listed on the left side of the matrix while the different types of customers are listed across the top (Burchill et al., 1997), as shown in Exhibit 5-5. The number of intended customer contacts is entered in each cell to indicate the depth of coverage.

For industrial and commercial products, actually locating customers is usually a matter of making telephone calls or sending e-mail. In developing such products within an

EXHIBIT 5-5
Customer selection matrix for the cordless screwdriver project.

	Lead Users	Users	Retailer or Sales Outlet	Service Centers
Homeowner (occasional use)	0	5	2	3
Handy person (frequent use)	3	10		
Professional (heavy-duty use)	3	2	2	

existing firm, a field sales force can often provide names of customers, although the team must be careful about biasing the selection of customers toward those with allegiances to a particular manufacturer. The Web or a telephone directory can be used to identify names of some types of customers for some classes of products (e.g., building contractors or insurance agents). For products that are integral to a customer's job, getting someone to agree to an interview is usually simple; these customers are eager to discuss their needs. For consumer products, customers can also be located by making telephone calls or e-mail inquiries. However, arranging a set of interviews for consumer products generally requires more inquiries than for industrial or commercial products because the benefit of participating in an interview is less direct for these customers.

The Art of Eliciting Customer Needs Data

The techniques we present here are aimed primarily at interviewing end users, but these methods do apply to all of the three data-gathering modes and to all types of stakeholders. The basic approach is to be receptive to information provided by customers and to avoid confrontations or defensive posturing. Gathering needs data is very different from a sales call: the goal is to elicit an honest expression of needs, not to convince a customer of what he or she needs. In most cases customer interactions will be verbal; interviewers ask questions and the customer responds. A prepared interview guide is valuable for structuring this dialogue. Some helpful questions and prompts for use after the interviewers introduce themselves and explain the purpose of the interview are:

- When and why do you use this type of product?
- Walk us through a typical session using the product.
- What do you like about the existing products?
- What do you dislike about the existing products?
- What issues do you consider when purchasing the product?
- What improvements would you make to the product?

Here are some general hints for effective interaction with customers:

- *Go with the flow.* If the customer is providing useful information, do not worry about conforming to the interview guide. The goal is to gather important data on customer needs, not to complete the interview guide in the allotted time.

- *Use visual stimuli and props.* Bring a collection of existing and competitors' products, or even products that are tangentially related to the product under development. At the end of a session, the interviewers might even show some preliminary product concepts to get customers' early reactions to various approaches.
- *Suppress preconceived hypotheses about the product technology.* Frequently customers will make assumptions about the product concept they expect would meet their needs. In these situations, the interviewers should avoid biasing the discussion with assumptions about how the product will eventually be designed or produced. When customers mention specific technologies or product features, the interviewer should probe for the underlying need the customer believes the suggested solution would satisfy.
- *Have the customer demonstrate the product and/or typical tasks related to the product.* If the interview is conducted in the use environment, a demonstration is usually convenient and invariably reveals new information.
- *Be alert for surprises and the expression of latent needs.* If a customer mentions something surprising, pursue the lead with follow-up questions. Frequently, an unexpected line of questioning will reveal *latent needs*—important dimensions of the customers' needs that are neither fulfilled nor commonly articulated and understood.
- *Watch for nonverbal information.* The process described in the chapter is aimed at developing better physical products. Unfortunately, words are not always the best way to communicate needs related to the physical world. This is particularly true of needs involving the human dimensions of the product, such as comfort, image, or style. The development team must be constantly aware of the nonverbal messages provided by customers. What are their facial expressions? How do they hold competitors' products?

Note that many of our suggested questions and guidelines assume that the customer has some familiarity with products similar to the new product under development. This is almost always true. For example, even before the first cordless screwdriver became available, people installed fasteners. Developing an understanding of customer needs as they relate to the general fastening task would still have been beneficial in developing the first cordless tool. Similarly, understanding the needs of customers using other types of cordless appliances, such as electric razors, would also have been useful. We can think of no product so revolutionary that there would be no analogous products or tasks from which the development team could learn. However, in gathering needs relating to truly revolutionary products with which customers have no experience, the interview questions should be focused on the task or situation in which the new product will be applied, rather than on the product itself.

Documenting Interactions with Customers

Four methods are commonly used for documenting interactions with customers:

1. *Audio recording:* Making an audio recording of the interview is very easy. Unfortunately, transcribing the recording into text is very time consuming, and hiring someone to do it can be expensive. Also, audio recording has the disadvantage of being intimidating to some customers.

2. *Notes:* Handwritten notes are the most common method of documenting an interview. Designating one person as the primary notetaker allows the other person to concentrate on effective questioning. The notetaker should strive to capture some of the wording

of every customer statement verbatim. These notes, if transcribed immediately after the interview, can be used to create a description of the interview that is very close to an actual transcript. This debriefing immediately after the interview also facilitates sharing of insights between the interviewers.

3. *Video recording:* Video recording is almost always used to document a focus group session. It is also very useful for documenting observations of the customer in the use environment and/or using existing products. The video recording is useful for bringing new team members "up to speed" and is also useful as raw material for presentations to upper management. Multiple viewings of video recordings of customers in action often facilitate the identification of latent customer needs. Video recording is also useful for capturing many aspects of the end user's environment.

4. *Still photography:* Taking photographs provides many of the benefits of video recording, but is usually less intrusive and therefore easier to do while observing customers in the field. Additional advantages of still photography are ease of display of the photos, excellent image quality, and readily available equipment. The primary disadvantage is the relative inability to record dynamic information.

The final result of the data-gathering phase of the process is a set of raw data, usually in the form of *customer statements* but frequently supplemented by video recordings or photographs. A data template implemented in a spreadsheet is useful for organizing these raw data. Exhibit 5-6 is an example of a portion of such a template. We recommend that the template be filled in as soon as possible after the interaction with the customer and edited by the other development team members present during the interaction. The first column in the main body of the template indicates the question or prompt that elicited the customer data. The second column is a list of verbatim statements the customer made or an observation of a customer action (from a video recording or from direct observation). The third column contains the customer needs implied by the raw data. Some emphasis should be placed on investigating clues that may identify potential latent needs. Such clues may be in the form of humorous remarks, less serious suggestions, frustrations, nonverbal information, or observations and descriptions of the use environment. The symbol (!) is used in Exhibit 5-6 to flag potential latent needs. Techniques for interpreting the raw data in terms of customer needs are given in the next section.

The final task in step 1 is to write thank-you notes to the customers involved in the process. Invariably, the team will need to solicit further customer information, so developing and maintaining a good rapport with a set of users is important.

Step 2: Interpret Raw Data in Terms of Customer Needs

Customer needs are expressed as written statements and are the result of interpreting the need underlying the raw data gathered from the customers. Each statement or observation (as listed in the second column of the data template) may be translated into any number of customer needs. Griffin and Hauser found that multiple analysts may translate the same interview notes into different needs, so it is useful to have more than one team member conducting the translation process. Below we provide five guidelines for writing need statements. The first two guidelines are fundamental and are critical to effective translation; the remaining three guidelines ensure consistency of phrasing and style across all team members. Exhibit 5-7 provides examples to illustrate each guideline.

Customer:	Bill Esposito	Interviewer(s):	Jonathan and Lisa
Address:	100 Memorial Drive	Date:	19 December 2010
	Cambridge, MA 02139		
Telephone:	617-864-1274	Currently uses:	Craftsman Model A3
Willing to do follow-up?	Yes	Type of user:	Building maintenance

Question/Prompt	Customer Statement	Interpreted Need
Typical uses	I need to drive screws fast, faster than by hand.	The SD drives screws faster than by hand.
	I sometimes do duct work; use sheet metal screws.	The SD drives sheet metal screws into metal duct work.
	A lot of electrical; switch covers, outlets, fans, kitchen appliances.	The SD can be used for screws on electrical devices.
Likes—current tool	I like the pistol grip; it feels the best.	The SD is comfortable to grip.
	I like the magnetized tip.	The SD tip retains the screw before it is driven.
Dislikes—current tool	I don't like it when the tip slips off the screw.	The SD tip remains aligned with the screw head without slipping.
	I would like to be able to lock it so I can use it with a dead battery.	The user can apply torque manually to the SD to drive a screw. (!)
	Can't drive screws into hard wood.	The SD can drive screws into hard wood.
	Sometimes I strip tough screws.	The SD does not strip screw heads.
Suggested improvements	An attachment to allow me to reach down skinny holes.	The SD can access screws at the end of deep, narrow holes.
	A point so I can scrape paint off of screws.	The SD allows the user to work with screws that have been painted over.
	Would be nice if it could punch a pilot hole.	The SD can be used to create a pilot hole. (!)

EXHIBIT 5-6 Customer data template filled in with sample customer statements and interpreted needs. SD is an abbreviation for screwdriver. (Note that this template represents a partial list from a single interview. A typical interview session may elicit more than 50 customer statements and interpreted needs.)

- *Express the need in terms of* **what** *the product has to do, not in terms of how it might do it.* Customers often express their preferences by describing a solution concept or an implementation approach; however, the need statement should be expressed in terms independent of a particular technological solution.
- *Express the need as specifically as the raw data.* Needs can be expressed at many different levels of detail. To avoid loss of information, express the need at the same level of detail as the raw data.
- *Use positive, not negative, phrasing.* Subsequent translation of a need into a product specification is easier if the need is expressed as a positive statement. This is not a rigid guideline, because sometimes positive phrasing is difficult and awkward. For example, one of the need statements in Exhibit 5-6 is "the screwdriver does not strip screw heads." This need is more naturally expressed in a negative form.