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# The Algorithm

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Introduction

(If you are reading the PDF format—navigate the algorithms with the “Bookmarks” to the left. L1, L2, L3 correspond to levels of the algorithm. The levels are hierarchical; you can go as deeply as required to resolve your problem. Lower levels (L1, L2) have consolidated methods. If you are using the book then use the Table of Contents for the Algorithm)

All of the books in the TRIZ Power Tools book series are designed to be used as an algorithm. The algorithm can be as detailed or simple as required. This is done by going up or down in the hierarchy of the process steps. The top level (L1) of the bookmarks is the highest level. If more detail is required, the user can go to deeper levels (L2 and L3). A “Cheat Sheet” is separately provided at www.opensourcetriz.com which can be used to help the problem solver remember the details of the algorithm that are difficult to commit to memory.

Where the Book Materials Come From

Much of the material for this book was inspired by the thought leaders referenced. The original intent was to codify the insights of these thought leaders, but the exercise of codification ultimately led to the synthesis of other experimental processes. This is because codification required recognizing patterns of similarity of tools. Once this was achieved, the various tools were grouped with key decisions. Decisions require and create information which flows to the next decisions. Patterns and gaps became visible during this formative process. Experimental methods were inserted into the gaps. The proof of these experimental methods is whether they actually help the reader to identify product or process characteristics that will delight the market.

Inputs: The Target Market

Book 1, Discovering Markets, provided the input to this book: a target market segment. The market was defined as a job and a job executor. For example, pruning trees is a job. The person who prunes the tree is the job executor. The market is then described as those who perform the task of pruning trees.

For the purposes of this book, a market segment is defined by what hinders certain job executors or potential executors from getting their job done. Each type of hindrance or constraint represents different market segments. The target market may be entirely blocked from performing the job or only mildly irritated. Disposing of pruned limbs is an annoyance compared with the dangerous task of cutting the heavy fronds from the top of a high palm tree. Each market segment would benefit from some product or service which would help them to overcome the thing which is hindering them or blocking them from getting the job done.

While defining the market segments, we tried to include the broadest group of people possible so as to gain the maximum market size. This is important as finely segmenting the market may lead to identifying features which will only satisfy a small market and lead to a less sustainable business outlook.

Outputs: Products and Services that Delight the Market

In this book we are creating product services that:

1. Allow the target market to overcome the job constraints
2. Make the job simpler
3. Allow the business to overcome its constraints to profitably produce the product or service
Offerings that delight the customer are actually very rare. We know when we see such a product or service, but how to systematically achieve this has been elusive. Systematically delivering the features of products and services that will delight customers and the business is what this book is about.

Different Types of Business Innovations

In order to lay a foundation for the processes of this book we need a hypothesis of how consumer constraints and business constraints are overcome. Larry Keeley¹ of Doblin has made a study of different types of innovations and the companies that made use of them. He categorized them into ten types of innovation.

First: Business model innovations which have to do with the way that the business creates value for its customers, delivers value and makes a profit on it.

Second: Networks and alliance innovations where businesses share the costs of doing business for a piece of the action.

Third: Enabling process innovations where processes are modified or added that allow an offering to be profitably produced.

Fourth: Core process innovations where the company deviates from the industry significantly in their core processes to deliver an offering.

Fifth: Product performance innovations where the product offering performance is enhanced.

Sixth: Product systems innovations which involve platforms which link many products.

Seventh: Service innovations which enhance services already delivered.

Eighth: Channel innovations that help the means of delivering the product or service to the market.

Ninth: Brand innovations which have to do with how the business communicates its offerings.

Tenth: Customer experience innovations which have to do with how the business enhances the pleasurable experiences of the offering.

Both Larry Keeley and Clayton Christensen² have observed that historically, the most common and least profitable types of innovations are *product performance innovations*. Based on this observation, one might argue that the business should avoid product innovations and focus on creating the other types of business innovations. In support of this idea, Keeley argues that business can become more profitable if they concentrate their resources on developing a greater diversity of business innovations.

A Surer Path to Business Innovations

While we will not disagree that businesses which are characterized by these different types of innovation make more money, we assert that the path to lucrative business innovations is to focus on removing the customer and business constraints that keep the customer from getting their job done. The Theory of Constraints³ put forth by Eli Goldratt asserts that any process system is limited by bottlenecks which occur between the inputs and outputs of processes. Improving the flow of money through the bottleneck is what is required to grow a business. The bottleneck may occur at any point along the process chain. The customer can be the bottleneck if they are hampered from consuming (see

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¹ Doblin the Ten Types of Innovation—Available from the Doblin Website

² The Innovator’s Dilemma …

³ Eli Goldratt—The Goal
Discovering Markets). Processes within the business can be the constraint. In the larger picture, each type of business innovation can be framed as removing customer and business constraints that slow the flow of money through the process. Overcoming the main constraint can lead to any of the above business innovations, including the product innovations.

**Overcoming Customer Constraints**

In order to align the business to the target market needs, the first step is to ask “How can the business overcome the customer constraints on getting their job done?” The types of innovation that will naturally flow from this line of questioning are: product performance innovations; product system innovations; service innovations; channel innovations; brand innovations and customer experience innovations.

What the customer wants is to get a job done in the way that they want. For this reason, it is important that we understand the reasons that the target market cannot get the job done the way they would like. Understanding the customer, their constraints on performing the job, their environment and ways to simplify the job are the foundation for aligning the business with the market and determining the features of the offering that will delight.

Some designers and inventors would like to leave this “front end work” to marketing. While many businesses segment the work between organizations this is not a good idea. Requiring the designer to walk in the customer’s shoes creates an intuitive sense for when the offering is right. This keeps a focus on the most important features and removes the distraction and subsequent cost of developing features that the customer has no care for and will not pay for.

**Overcoming Business Constraints**

The second step is to ask “How can the business overcome its own constraints on profitably delivering the offering?”

The types of innovation that can flow from this line of question are: business model innovations, networks and alliance innovations; enabling process innovations; core process innovations and channel innovations.

Overcoming the customer constraints for serving a particular market segment may not be possible unless the business can overcome its own constraints on serving that segment. Fortunately, many of the business constraints have already been removed if we have selected a market segment that the business is willing to serve.

The business model is such a tightly wrapped and integrated package that the failure of any part may lead to the failure of the whole. Getting it right is an enormous challenge which can become even more elusive with changing economic and market conditions. A successful business model requires an offering that a large market desires. The business must be capable of financing, creating and delivering this offering to a market in a way that is acceptable to some parts of the market. All players in the value chain must be capable of sustaining a profit. All processes must be sufficiently robust to work through the inevitable disruptions. We can think of most sustainable business models as a type of secret sauce. The likelihood of failure for new products and services is normally very high. One might ask “How can I increase the probability of success?”

The probability of getting the assumptions right in the early stages is greatly increased by aligning the business model to the customer needs.

Conversely, a recipe for failure is to first decide on a comfortable business model and then force the customer to conform to this model. Most established businesses attempt to enter new market segments this way. This is because changing an established business model can be very disruptive. Here is the typical business approach: First create a new product or service and then adapt it to the existing business model that worked for other markets. Notice that the

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4 For the purposes of this book, we will define business models as the integrated processes by which businesses create value, deliver it to customers, persuade customers to pay for it and then turn these payments into profit.
business is misapplying one of its “strengths” to this situation. The business has learned to meet the needs of their existing markets and market segments with the current business model, why not apply this to other markets and market segments? While this approach is very common, it is flawed because new market segments often require that their needs be met in ways that are different from existing market segments. Christensen refers to attempts to make new offerings conform to existing business models as “cramming”. The process of cramming so distorts the offering that the market cannot take full benefit.

A more enlightened approach is to recognize that new markets usually need to be served by business models which are fully aligned to their unique needs. Since changing business models is so disruptive, it is often best for incumbent companies to start entirely new businesses to provide these new offerings. This is also why it is easier for small start-up businesses to satisfy the needs of emerging markets than for established businesses. Small start-ups also have the advantage of being satisfied with small volumes and low margins.

The concept of aligning the business model to the market is very powerful because we find that the business is striving for the same goals as the target market. They want to successfully perform a job and we want them to successfully perform this job using our offering. They want to consume and we want them to consume. This may seem obvious, but ironically, many companies find themselves at odds with their own customers because they provide offerings in ways that meet their own needs rather than the needs of their customers.

**Removing the Constraint and Burdens on the Job by Simplifying it**

We will remove the constraints on the job within the context of idealizing the job. To idealize the job, we will get more out of the job or reduce its burdens. This usually involves reducing the number of elements, thus simplifying the system. Consider how the customer might react if you could help them to: make the job more convenient or simpler; increase productivity by performing additional functions; prevent or reduce harm to other objects or monitor processes taking place in the job.

Remember that these are potential functions. Later, we will consider which of these to keep in order delivering outstanding value to the potential consumer.

**Discovering Unexpected Markets**

One unintended result of this step is the discovery of unexpected markets. Alternatives to performing the function almost always introduce possibilities for performing a new job. This discovery may send us back a step.

**Start by Simplifying the Super-System (Job)**

Simplifying should always begin with the super-system. No element (including your product or process) is essential except within the context of getting their job done. The customer wants to get the job done with the lowest number of burdens and in the least complex way possible. Only the overall outcome of the job done is important.

**One Outcome May be the Loss of Your Product or Service**

If you simplify the system from the viewpoint of the customer, the most compelling outcomes may be the elimination of your system! This means that the system producer may have a conflict of interests with the market. Ultimately, we would like to be completely aligned with the market. Elimination of our system by the creation of new products that satisfy the market may be one route to satisfying this conflict of interest. If you do not take this step, then it is likely that others will. If this is too hard to stomach, then allowing your system to take on functions of other objects in the system may be easier to take.

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5 The innovator's Dilemma

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**Introduction**
Learning versus Executing

A second way to increase the probability of success is a type of business humility. Clayton Christenson describes the path to greater success as a learning model which gradually aligns customer and business needs: First, derive the assumptions which you think describes a good business model and then begin a period of learning where these assumptions are tested and verified. This period should not involve massive investment but rather creatively exploring inexpensive and rapid means for testing these assumptions. This is in stark contrast to how most new businesses immediately execute on their assumptions while skipping the learning step. Some of these businesses ultimately survive, but they will tell you that they were forced to go through the learning process anyway. In other words, they got it wrong and were lucky to have enough leeway to make it right. Most successful businesses report that it took several iterations before they got the offering right.

Working with Jobs and Functions

Throughout this book, we will be working with the concept of “Function” and “Job”, so it is important to understand the definition of these two terms as they are used in this book. Please review the book TRIZ Power Tools—Skill #2 Working with Functions

6 The Innovators Dilemma
L1-Recall the Target Market Segment

Target Market = (Job + Job Executor + Job Constraints)

You should already have this since it is an output from book 1: Discovering Markets. The market is the job that needs to be done and the group of people that execute the job. The market segment is determined by the common constraint on performing the job that the job executors share. The constraint can range from a mere irritant to completely blocking the performance of the function.

We assume that the innovator has done a good job following the algorithm of Discovering Markets so that we know the job, including any added experiences, the job executor and the constraints on performing the job.

It is also assumed that the business is willing to entertain the chosen market segment and that any business constraints have already been explored with key decision makers. This is important as the following steps require business resources to understand the target segment and to design and build prototypes.

L1-Method

Step 1: What are the jobs, including new experiences?
Step 2: Who are the job executors?
Step 3: What are the job constraints that unify the segment?
Step 4: What are the current business constraints?

Example—Nourishing Outdoor Pets

Step 1: What are the jobs, including new experiences?
There is one main job: nourishing an outdoor dog or cat.

Step 2: Who are the job executors?
The job executors are people who must nourish animals that live and feed outdoors.

Step 3: What are the job constraints that unify the segment?
The constraint on performing the job is an irritant: the food is often spoiled by various pests such as birds, ants, bacteria, etc.

Step 4: What are the current business constraints?
The business is willing to entertain this segment so long as margins in excess of 8% can be maintained and the business can do business with the target segment in the way that it is accustomed to working with current market segments.
L1-Identify and Inspect Competing Systems

A competing system is not necessarily a competitor’s product, but rather any product or service that would be used if yours was not available. A competing system for air travel is travel by car. A competing system for a game of chess might be a card game. What people think they are doing may be different from what you think they are doing. Only they can tell you what job they were trying to perform. You get this information by asking questions concerning their behavior. It is important to ask them after observing them. People may not realize what they are doing.

L1-Method

Step 1: Go to where these products or services are sold and look at the competing products. Go to several stores if possible.

Step 2: Research the various products on the internet.

Step 3: Look for products and services that are not direct competition but occupy the same time to the same ends.

Step 4: Inspect the competing systems.

L2-Store Search

If a brick and mortar store is available, examining the products up close gives so much more information. It is impossible to gain the tacit knowledge of products by looking on the internet. Not only are you able to look at the product itself, you may be able to test-drive it, look for patent information and talk to sales people and store customers to see what they think of the products (more about this in the section on interviewing) note prices and labels and look for product trends.

Method

Step 1: Go to a store that would sell products that deliver the required modification.

Step 2: Note brands and producers, Do the producers sell more than one product? Who are the main producers?

Step 3: Look for product trends

Step 4: Read the labels. What do they claim?

Step 5: Note prices
TRIZ Power Tools

Example—Pet Feeder

Step 1: Go to a store that would sell products that deliver the required modification.

-I am interested in containers that serve pet food, so I go to a pet store or the pet section of a department or grocery store.

Step 2: Note brands and producers. Do the producers sell more than one product? Who are the main producers?

I note that there are three main manufacturers that sell products in the category that I am interested in.

Step 3: Look for product trends

The trend is to combine the food bowls with large storage containers and to keep the food at a level that is comfortable for the pet.

Step 4: Read the labels. What do they claim?

One claims to slow down bugs.

Step 5: Note the price

$5.00 to $35.00

L2-Internet Product Search

In many cases you may not be able to go to the store to see the products. Even if you are able, you can often see a greater diversity of products on the internet and identify other store locations. The descriptions you get for products may vary from site to site. It may be possible to look at product specifications which is not available by going to the store. On the other hand, if you are at the store, it is often possible to go to product websites using mobile internet enabled devices to see product specifications.

Example—Pet Feeder

Step 1: Use an internet search-engine to determine which products are offered

Step 2: Refine the search by noting and using nomenclature and names that are common to the industry.

Example—Pet Feeder

Step 1: Use an internet search-engine to determine which products are offered.
Ceramic bowls are offered, which offer durability and a clean and sanitary surface.

Step 2: Refine the search by noting and using nomenclature and names that are common to the industry.

Metal bowls are offered, which provide durability and a clean surface.

**L2-Anticipate Indirect Competition**

Sometimes, it is possible to anticipate indirect competition. This is what products and services would be used if they were performing a more generalized job. A road trip is competition for an airline trip. The direct competition may be other airlines, but the more generalized job is to move a person or group from one city to another city.

**Method**

**Step 1:** Beyond the direct competitor, what products do people “hire” to get the job done? What are the alternatives?

**Step 2:** What are the strengths and weaknesses of the alternative products?

**Step 3:** Consider that DOING NOTHING could be a competitive alternative.

**Example—Pet Feeder**

**Step 1:** Beyond the direct competitor, what products do people “hire” to get the job done? What are the alternatives?

Large buckets or storage containers are used for water. Disposable containers are often used for food and water bowls.

**Step 2:** What are the strengths and weaknesses of the alternative products.

Strengths: Low cost—Disposable—The large water tubs can be filled and left for a long time. This is especially important in summer heat.—The large water tubs are difficult to knock over when full.

Weaknesses: Limited functions—Large containers require larger cleaning operations.

**Step 3:** Consider that DOING NOTHING could be a competitive alternative.

**L2-Inspect Competing Systems**

If you are currently not making this product or service, it is important to become familiar with versions that are in use. This is because you will shortly be watching people use them. More complex products require more observation. If necessary, you may need to go to where these products are sold. Don’t forget that you can observe these products in brick and mortar stores and also on the internet.
Identify and Inspect Competing Systems

Product teardowns are a common way to understand competing systems. There are two types of teardowns. The first involves understanding the user interface. Here we try to understand how the product and the users interact. This can give us valuable information concerning how a potential customer might feel while using the system. Secondly, we need to understand the function that the product plays in the super-system. What part does it play within the whole job that the market segment is trying to get done? Thirdly, we need to understand how the offering is constructed. If it is a product, how is it made? If it is a service, what are the sequence of steps that make it viable?

**Method**

**Step 1:** If necessary, go to where these products are sold. Go to stores and the internet.

**Step 2:** Carefully examine the entire system. Try to understand the functions that the product delivers in the overall job. Also understand examine the user interfaces and try to understand how the user interacts with the system.

**Step 3:** Tear down the product or deconstruct the process. Note how it is constructed and what processes were likely used to construct it.

**Step 4:** If there are known problems, observe the parts of the system that are associated with this problem.

**Example—Pet Feeding Systems**

**Step 1:** If necessary, go to where these products are sold. Go to stores and the internet.

The author chose to go to pet super-stores. A visit to pet stores is a simple and practical approach to seeing these products.

**Step 2:** Carefully examine the entire system. Try to understand the functions that the product delivers in the overall job. Also understand examine the user interfaces and try to understand how the user interacts with the system.

A variety of pet bowls were found by the pet foods. There are a variety of products which are capable of nourishing pets for short periods of time to longer times. Many of those which are capable of longer durations have large food and water compartments. The user interfaces are very simple and have not changed for decades. Feeding systems which are self-replenishing have the added dimension that they simplify the overall job by reducing the number of times that a human is required to interact with the system.

**Step 3:** Tear down the product or deconstruct the process. Note how it is constructed and what processes were likely used to construct it.

It is noted that most feeding systems are constructed from durable plastic materials. They are most likely injection molded.

**Step 4:** If there are known problems, observe the parts of the system that are associated with this problem.

Our market segment has an irritant that the existing pet containers do not adequately protect the food or water from animals, insects or bacteria.
L1-Interview for Constraints, Features & Environments

The input to this step is the target market segment (Job + Job Executor + Job Constraints). The output of this step is what the target market segment considers a job well done and the common problems or constraints.

Reaching Out to Consumers

If the target market segment is a consuming market then understanding the important competitive attributes are easier. We can watch and interview these users. We can know a lot about them. If we can interview lead users and user innovators, we can additionally understand the desired levels for many of the competitive attributes related to human factors. Most of the approaches in this section deal with consuming markets.

Reaching Out to Non-Consumers

The target market may be a non-consuming market. In their book Blue Ocean Strategy, Kim Chan and Renee Mauborgne explain that most industries create new products in the red oceans of competition. The waters are made red by the blood of competing businesses. Most marketing tools are used to devise a strategy to be better than the competition in those things that the industry normally competes in.

In contrast, Blue ocean markets are created by making the competition irrelevant. Either the market is very new, or the offering is very appealing to non-consumers. If you have discovered a new market or new market segment from the Discovery of Market step, or you have discovered potentially new and exciting functions in the Identify and Simplify Potential Functions step, then you are well on the way to creating blue ocean opportunities.

Non-consumers can be broken into two groups: those who are not aware that the function is possible and those who are aware of the function, but are blocked by their circumstances from performing the function. Each of these groups can turn into blue ocean opportunities. Whether you are dealing with new or existing markets, data has shown that the blue oceans of non-competition are extremely profitable. About 61% of the profits that companies make come from products launched in blue oceans.

How do we create blue ocean opportunities? We must reach out to non-consumers and understand their constraints. This is more difficult than exploring consuming markets because we have to rely on the expressed feelings of wanting to perform a job rather than the actions that prove the intention to do the job. In other word, actions speak louder than words.

Understand the Whys

In order to create products and services and services for the chosen market segment, we have understood the job to be done and the constraints on doing the job. In order to more fully satisfy the market needs, it is important to understand why thy chosen market segment wants to get the job done. This allows us to fill in many of the gaps of understanding and empathize with our chosen market segment. Better yet, we are now able to convey the Whys of the offerings so that the market knows that we understand and respect their desires. In the best case, this market segment can reach out to each other in promoting the offering.
If we are trying to meet the needs of several market segments, the reasons for performing the job may be different for each segment. In this case, we will be helping them to achieve their several ends by giving them a common means to do this.

Relating to the target market segment and making sure that you relate to their needs can have a magnet effect on the markets that you are serving. When leaders are able to articulate the whys of what they are trying to accomplish then people who also sympathize with these causes will have more passion to jump onboard. This will all come to fruition after the offering has come to market and advertising helps the market know that you are ready to serve them. At this stage, it is mostly important to understand the deeper needs of the consuming segment.

Competitive Alternatives

Competitive alternatives are all of the different ways that people perform jobs, not just competitor’s products. These alternatives may be entirely different from the common industry options. It is important to identify these alternatives, because this is what non-consumers may be relying on. A scrapbook is a competitive alternative for a PDA. A pencil and paper is used in place of money-management software. A movie is a competitive alternative for a dinner date.

Competitive Attributes

Competitive attributes are the product features and functions that people use to decide between competitive alternatives. These same factors are often used when trading up or down. Industries typically assume that certain competitive attributes are those that the market uses to decide. Often, the process that the industry uses to determine the competitive attributes is to provide a certain product or service feature which some of the market uses and then decide that it is worth competing in. Unfortunately, some market segments could not care less about certain product features.

A Job Well Done

Because market segments exist that have experience performing the job, we can get a good idea as to what these people consider a job well done. This understanding can come from observing existing products or services; talking to those purchasing and selling products; watching and then interviewing people as they use products and services. At the same time we can get an idea of the various competing systems and the features that they have which improve the job experience.

In order to understand what a job well done will look like in the future, we can talk to Lead Users and User Innovators. Lead users have so much experience with getting the job done that they have developed a keen sense of when the job is performed to levels slightly lower than the highest level. People who perform a job infrequently or never are usually easy to satisfy and do not have strong opinions yet. Thus, lead users can give us a view into the future as to the attributes that many people will eventually appreciate. We will act on the assumption that market segments that are constrained or blocked will eventually have similar opinions to lead users when a job is well performed. The main risk is that the performance or features may go beyond the target market requirements.

A Job Poorly Done

Because most users have a sense of when a job is well done, they also have a sense of what is hindering them or distasteful about the job. These same process steps can give us double duty. They can show us what the ideal job might look like and the features of current products and services that they find distasteful.
A Job Not Done

While Lead Users and even infrequent users may be good to help us understand future desirable features, they are not particularly good at helping us to understand why people are hampered or blocked from performing the function. As far as they are concerned, everyone should want to perform the job and find joy in the process. To understand why people do not consume, we need to converse with those who are experts on this subject. We need to talk to those who would like to perform the job but cannot. This is a difficult task since the best way to tell if someone wants to perform a task or a job is to see them actually performing it. There are no guarantees that a person who aspires to a task will really want to perform it when the way is made clear.

The Product Life Cycle

We will be interviewing for constraints, features and environments throughout the product life cycle. For this purpose, the product life cycle map\(^7\) is included on the next page. It’s use is common through all of the more detailed steps.

\(^7\) What is Outcome Driven Innovation (ODI) by Anthony W. Ulwick March 15 2009
Interviewing the Right People—go to where they are

One of the difficulties to this step is making sure that you are talking to the right market segment and getting appropriate feedback. Once you walk out the front door and begin talking to people, you will find that it is not always easy to find the hypothesized target market. You will likely begin by talking to people that are not in the target market and you will get information that is biased towards the segment that they represent. This information can be misleading, so be careful. It can take time and effort to gain access to the hypothesized target market segment.

Incremental Price based on Context

The incremental price is the price that a person or organization is willing to pay for an added feature or function. How much a person is willing to pay for an added feature or function must be made within the context of the jobs that are to be done. One part of the context is the main function that is being performed. If the added function or feature is not related to the main function, it must be done in relation to the main function and in the context of the situation. For instance, the ability to listen to a podcast in the context of driving a car or being a passenger in a car is different than simply listening to one on your computer. The main function of the car is to move people. The user experience or function of listening to a podcast is added incrementally to moving people and in the context of being a driver or passenger.

Focus Groups

Like every other type of market feedback, focus groups can be used in ways that enlighten or darken understanding around the offering. If the offering is to be used in public settings or in groups, then group feedback is appropriate.

Several years ago, IDEO did a special for Nova in which they developed a shopping cart. During prototyping, they tried out their prototypes in public. Let’s imagine a couple of situations and ask ourselves which one would give the best feedback. A) A single shopping cart is introduced to a group to examine. B) A single shopping cart is introduced into a store for anybody to use. C) A single shopping cart is used in a store by someone who has agreed to try it out. D) Half of the shopping carts are replaced by prototype parts. E) Almost all of the shopping carts are replaced by the prototype. F) Notice that in each instance, different group dynamics come into play. For instance, if all of the shopping carts were replaced but one or two, most of the people would be forced to use the new carts and those choosing to use the standard cart would be considered unusual in the setting. We could ask the solitary users why they chose the standard cart why they chose against social pressure. It is likely that we would learn something about the features of the prototype cart that were detestable to some of the target market. This would be valuable information. Likewise, we could watch the rest use the new prototype cart and gain a lot of information from them.

On the other hand, if we simply used one prototype cart, group pressure might cause people to not use a lone prototype. Those choosing the single shopping cart would be under similar social pressure to not use the lone prototype cart. If it were commonly chosen among a group of shopping carts, this could be good information. On the other hand, if it were never chosen, this could be an indication that group dynamics are selecting for conformity which could be misleading.

In each case, different group dynamics come into play. What is most important is to recognize that the most useful information comes from using the offering in the most likely setting that it will be used so that the appropriate group dynamics come into play. Using groups to simulate group games would be appropriate. Using the prototype in situations similar to the above situations needs to be carefully thought through to make sure that the right thing is being measured.
L1-Method

Step 1: Go to where the target market is

Step 2: Identify competing systems, including indirect competition

Step 3: Observe existing competing products or services for yourself

Step 4: If possible talk to those that purchase and sell these products and services

Step 5: Observe people using these systems and then interview them to help you understand what constitutes a job well done. Try to do this in as many environments as possible and performing different missions.

Step 6: Clarify the reasons that the market segments want to perform the job to be done. If there are several segments then explain the reasons for each segment.

L2-Interview Non-Users if Market Segment is Blocked

Non-Users do not perform the function at all, even with an alternative product. Interviewing non-users is tricky business because it is difficult to know whether they would consume if they had the opportunity. Also, if they wouldn’t immediately consume, who is to say that they wouldn’t eventually consume if they saw others performing the job?

Method

Step 1: Go to where the market segment is

Step 2: Determine how much they already know about the job and products available to those who are consuming. Chances are good that if they know something then they are interested in performing the job. “Do you know what is out there that does this job? What have you heard about them? Which are the most popular and what are people saying about these products? What are the strengths and weaknesses of the competing products? What are you waiting for?”

Step 3: Determine why they want to perform the job.

Step 4: Potential Environments: “Where would you most likely be using the product or service? What environments affect the competitive attributes of the product?” Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions,

Step 5: Job well done: “How would you know when the job is done correctly?”

Step 6: Competitive attributes: “What factors would you be looking for to determine which products you might want to purchase? “
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Step 7: Non-commercial alternatives: “What products do you currently do to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative.

Step 8: Have them sign a non-disclosure agreement.

Step 9: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 10: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 11: Get feedback on new potential functions.

Step 12: Have them sign your patent log that they understand the idea.

Step 13: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L2-Observe and Interview Users of Alternative Products or Services

The market may not be completely blocked if the potential markets are performing the function with alternative products or services. If the price is too high, consumers often find a way to get the job done, even if it has great disadvantages. For instance, an alternative flying a family on vacation is to travel by car. This is the alternative service. The function of transporting the family is performed, but just by an alternative method. When it comes to entertainment, there may be many alternatives which are similar.

Method

Step 1: Determine what the alternative product or service is and go to where people are using the alternative product or service to observe and interview. Remember that alternative offerings help the user to perform the same function as the system that you are promoting. It may use a different technology.

Step 2: Watch people using the alternative system. If possible, watch them in ways that will not influence how they use the system. Look for instances where the users are using the alternative product for a job that is difficult or clumsy to do. Watch the job being performed in as many different circumstances or missions as possible. Watch people during as many of the life cycle jobs as possible. Note unexpected behaviors.

Step 3: Interview people who use the alternative system after observing them. Ask about unexpected behaviors that you observed. “I noticed that you use this a little differently than other people. Why do you use this product or process in this manner?”

Step 4: Try to determine the job: “What are you trying to accomplish?” (What job have you “hired” this product to do?) “Do you use the system for other unusual purposes or jobs?”
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Step 5: Determine why they want to perform the job.

Step 6: Missions: “What are the different operating missions? What do you do when it is non-operational or failing??”

Step 7: Potential Environments: “Where would you most likely be using the alternative product or service? What environments affect the competitive attributes of the product?”

Step 8: Job well done: “How would you know when the job is done correctly?”

Step 9: Competitive attributes: “What factors would you be looking for to determine which products you might want to purchase?”

Step 10: Have them sign a non-disclosure agreement.

Step 11: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 12: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 13: Have them sign your patent log that they understand the idea.

Step 14: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L2-Personally Use or Simulate the Product or Service Missions

Now we come to the point of empathy. If possible, it helps us to develop a perspective of what people are going through as they use your product or service. We need to become avid users of our own products so that we can see what is wrong with them. If possible, we should consider performing the job under a variety of environments and missions, especially problematic missions. Use it in the wind, in the rain, under water. Use it on every mission that you can think of.

It is more ideal to observe real users with products or services. Unfortunately, this is not always possible. Such cases might occur when jobs or experiences are completely new. In these cases, it may be wise to simulate the job as much as possible to understand the customer experience. In order to do this, it may be necessary to prototype the job as much as possible.

Prototypes can be very simple or complex, depending on what you are using them for. The author has observed situations where prototypes were created which were much more expensive than necessary. At this stage, the prototype should be as simple as possible in order to give insights to the product developer, rather than convincing potential customers, financers or licensees that the ideas are good.
Method

Step 1: Try to determine the variety of jobs or missions that the target market would want to accomplish. What jobs might the target market “hire” this product to do?

Step 2: For each of these jobs, consider the chain of jobs through the product life cycle. Using the template for life-cycle jobs, create a unique map of the offering life cycle for the core job.

Step 3: Identify the potential failure modes.

Step 4: Put yourself into the user’s shoes. Walk the processes. Use or simulate use of the product or service in a variety of jobs or missions through the product life cycle. Look for problematic or clumsy jobs and missions. Note your own unexpected behaviors. What did I do when it was non-functional or failed?

Step 5: Environments: Try to perform the job in a variety of environments that the target market would have to deal with. What environments affect the competitive attributes of the product? Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions,

Step 6: Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought?

Step 7: Competitive Attributes: “What factors was I looking for to determine which product I wanted to purchase or use? What factors would I consider when contemplating trading up or down?” At the same price, Identify four things that I would like to see improved at the expense of four things that I see much less value in? What four things would I be willing to sacrifice if I could get it at a third the price? What compromises are you always forced to make? Which missions is the product least suited?

Step 8: How people measure the competitive attributes? What senses did you use and what do they have to say about the different choices?” Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Step 9: Non-commercial alternatives: “What non-commercial products have I used to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative.
It is usually necessary to go to the field to determine the competitive attributes. Go to where consumers must make decisions about what they want to purchase and talk to those selling the product. Most sales people and many shoppers will be happy to talk about those products that are selling quickly. The larger the shelf space, the higher the probability that this product is being sold in larger amounts. Sales people can give an idea of competitive attributes because of the questions that people ask them.

Gift givers generally do not use the product, but often account for the majority of revenue at many retail businesses. It is sad to think that the concerns and needs of the end user are not always considered by those giving gifts. They are mostly trying to maximize the glee from the gift receiver at the lowest cost possible. It would not be uncommon for a gift giver to know nothing of the product. Neither can it be guaranteed that the final user has any say as to whether the final product will meet their needs. Nevertheless, it is necessary to understand what they are looking for.

**Method**

*Step 1: Go to where these products are sold.*

*Step 2: Talk to sales people customers and gift givers (if possible): “What are the strengths and weaknesses of the competing products? What are you looking for?” If they are buying a gift “What did they ask for?” or “What are you looking for in this kind of gift?”*

*Step 3: Determine why they are buying the gift.*

*Step 4: Ask sales people “Which are the most popular and what are people saying about these products?”*

*Step 5: Environments: “Where are most of the people (or you) using the product or service? What environments affect the competitive attributes of the product?” Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions,*

*Step 6: Missions: “What are the different operating missions? What do you do when it is non-operational or failing?”*

*Step 7: Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought?*

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8 Stephen Key—One Simple Idea—McGraw Hill page 40 “Ask the store manager or store clerks which products are new, which are selling well, and which are duds. Take note of products customers are drooling over and buying—and which they’re passing over.”
Step 8: Competitive Attributes: “What factors were you looking for to determine which product you wanted to purchase? “What factors would you consider when considering trading up or down?” At the same price, identify four things that you would like to see improved at the expense of 4 things that you see much less value in? What four things would you be willing to sacrifice if you could get it at a third the price? What compromises are you always forced to make? For what particular missions is our offering least suited?”

Step 9: How people measure the competitive attributes? What senses did you use and what do they have to say about the different choices? Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Step 10: Non-commercial alternatives: “What are you currently using? Beyond the direct competitor, what products do people (or you) “hire” to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative.

Step 11: Have them sign a non-disclosure agreement.

Step 12: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 13: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 14: Have them sign your patent log that they understand the idea.

Step 15: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L2-Interview Owners

Here we make a distinction between owners and users. We will get the most out of watching users, but in their absence or with products that are infrequently used, we may have to satisfy ourselves with owners. We consider an owner to be a non-using user. If you can get an owner to use the system then it is better. These interviews are for non-users.

Method

Step 1: Go to where the owners are.

Step 2: Try to determine the job: “What are you trying to accomplish?” (What job have you “hired” this product to do?) “Do you use the system for other unusual purposes or jobs?”

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9 Kevin P. Coyne, Patricia Gorman Clifford, and Renée Dye Breakthrough Thinking from Inside the Box
Step 3: Determine why they want to perform the job.

Step 4: Missions: “What are the different operating missions? What do you do when it is non-operational or failed?” Using the template at the first of the chapter, create a unique life cycle map for these products. Discuss as many of the life cycle jobs as possible.

Step 5: Evidence of competing systems: Look about for competing systems. “What are you currently using and what other ways have you attempted to get the job done? What are the strengths and weaknesses of the competing products? Which are the most popular and what are people saying about these products?”

Step 6: Environments: “Where are you using the product or service? What environments affect the competitive attributes of the product?” Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions.

Step 7: Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought?

Step 8: Competitive Attributes: “What factors were you looking for to determine which product you wanted to purchase? “What factors would you consider when considering trading up or down?” At the same price, Identify four things that you would like to see improved at the expense of four things that you see much less value in? What four things would you be willing to sacrifice if you could get it at a third the price? What compromises are you always forced to make? For what particular missions are the current offerings least suited?”

Step 9: How people measure the competitive attributes? What senses did you use and what do they have to say about the different choices?” Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Step 10: Non-commercial alternatives: “What non-commercial products have you used to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative.

Step 11: Have them sign a non-disclosure agreement.

Step 12: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

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Step 13: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 14: Have them sign your patent log that they understand the idea.

Step 15: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L2-Observed (or Simulate) Users then Interview

Watching users is a basic tenant of “Design Thinking”. The sequence of action is to watch and then ask. The longer you watch, and the more that you question, the more you will learn. What people think they are doing may be different from what you think they are doing. Only they can tell you what job they were trying to perform. You get this information by asking questions concerning their behavior. It is important to ask them after observing them. People may not realize what they are doing.

In order to understand what is hampering a person or organization from doing their job, we need to watch the job performer in action, during each part of the life cycle. It is also important to watch the system in operation where the “mission” is varied. Sometimes, you can find that while existing products are good for one mission, they are poor for others.

Because this is a time intensive step, we may want to limit the number of target market segments that we will study.

Method

Step 1: Go to where people are using the product or service to observe and interview.

Step 2: Watch people using the system. If possible, watch them in ways that will not influence how they use the system. Look for instances where the users are using the product for a job that is difficult or clumsy to do. Watch the job being performed in as many different circumstances or missions as possible. Using the template at the first of the chapter, create a unique life cycle map for these products. Watch people during as many of the life cycle jobs as possible. Note unexpected behaviors.

Step 3: Interview people who use the system after observing them. Ask about unexpected behaviors that you observed. “I noticed that you use this a little differently than other people. Why do you use this product or process in this manner?”

Step 4: Try to determine the job: “What are you trying to accomplish?” (What job have you “hired” this product to do?) “Do you use the system for other unusual purposes or jobs?”

Step 5: Determine why they want to perform the job.

Step 6: Missions: “What are the different operating missions? What do you do when it is non-operational or failing??”

Step 7: Evidence of competing systems: Look about for competing systems. “What are you currently using and what other ways have you attempted to get the job done? What
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are the strengths and weaknesses of the competing products? Which are the most popular and what are people saying about these products”?

Step 8: Environments: “Where are you using the product or service? What environments affect the competitive attributes of the product?” Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions.

Step 9: Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought?

Step 10: Competitive Attributes: “What factors were you looking for to determine which product you wanted to purchase? “What factors would you consider when considering trading up or down?” At the same price, Identify four things that you would like to see improved at the expense of 4 things that you see much less value in? What four things would you be willing to sacrifice if you could get it at a third the price? What compromises are you always forced to make? For what particular missions is our offering least suited?

Step 11: How people measure the competitive attributes? What senses did you use and what do they have to say about the different choices?” Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Step 12: Non-commercial alternatives: “What non-commercial products have you used to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative.

Step 13: Have them sign a non-disclosure agreement.

Step 14: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 15: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 16: Have them sign your patent log that they understand the idea.

Step 17: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

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Example—Pet Feeding System

Step 1: *Go to where people are using the product or service to observe and interview.*

In this case, we will be observing common users of pet bowls in the outside environment. Any person with an outside pet is a good candidate. Visiting owner’s homes is a good proposition.

Step 2: *Watch people using the system. If possible, watch them in ways that will not influence how they use the system. Look for instances where the users are using the product for a job that is difficult or clumsy to do. Watch the job being performed in as many different circumstances or missions as possible. Watch people during as many of the life cycle jobs as possible. Note unexpected behaviors.*

It is interesting to note that during summer many pet owners fill large buckets of water each day for their pets. Lugging these large containers around can be clumsy.

Step 3: *Interview people who use the system after observing them. Ask about unexpected behaviors that you observed. “I noticed that you use this a little differently than other people. Why do you use this product or process in this manner?”*

“Why do you fill large buckets of water each day?” Answer “The water seems to stay cleaner for longer. Also, the dog has difficulty dumping the water--It is too heavy.” This is an interesting observation since the playful nature of some dogs was not anticipated.

Step 4: *Try to determine the job: “What are you trying to accomplish?” (What job have you “hired” this product to do?) “Do you use the system for other unusual purposes or jobs?”*

The users are trying to hydrate and feed their pets. Beyond this, it appears that many owners personify their pets. “We are trying to keep the pet as comfortable as possible while we are away at work or running errands. We consider our pet to be a member of the family.”

Step 5: *Determine why they want to perform the job.*

The owners feel a duty or love for their animals. Sometimes they feel guilt that they live outdoors and want them to be as happy and comfortable as possible.

Step 6: *Missions: “What are the different operating missions? What do you do when it is non-operational or failing??”*

Different missions might be considered feeding different species of pets. Different sizes of animals may need to be accommodated. Failure of the system is not allowed unless the owner is negligent. It would be preferable that the watering system be tolerant of an owner’s negligence.

Step 7: *Evidence of competing systems: Look about for competing systems. “What are you currently using and what other ways have you attempted to get the job done? What are the strengths and weaknesses of the competing products? Which are the most popular and what are people saying about these products?”*
At one home, an unusual pet watering system is noted which is comprised of a valve operated by a rod which protrudes from the nozzle. The pet moves the rod and water comes out, but only for the duration of the movement.

Strengths: The pet plays with the product. There appears to be an additional benefit of amusement and play for the pet.

Weaknesses: “Why do you set this on the lawn rather than the patio?” Answer: “There is constant or intermittent leakage that damages the concrete.”

Step 8: Environments: “Where are you using the product or service? What environments affect the competitive attributes of the product?”

Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions,

This system is used outdoors and must be very reliable as owners sometimes leave their pets alone. The feeding system is sometimes used on very cold or very hot days. If it is cold enough, the water freezes. When it is very hot, the water putrefies. The system may be used over surfaces that can be damaged or stained by food and water spills. Since pets are notorious for this, it may be necessary to prevent spills or remedy them.

Step 9: Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought?

“There is clean and healthy food and water in the container when the pet needs it. There is no mess around the feeder. The pet appears healthy.” It is easy for the human to perform the setup and use of the feeding system and there is little need to check on it. The constraints are still around the issues of cleanup and protecting the food from bacteria, animals and insects.

Step 10: Competitive Attributes: “What factors were you looking for to determine which product you wanted to purchase? “What factors would you consider when considering trading up or down?” At the same price, Identify four things that you would like to see improved at the expense of 4 things that you see much less value in? What four things would you be willing to sacrifice if you could get it at a third the price? What compromises are you always forced to make? For what particular missions is our offering least suited?

Factors looking for: price, size, durability, color, styling, ease of cleaning

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Trading up or down: pet feeders are not traded up or down
Four things improved: price, ease of cleaning, durability
Four things that have less value: styling, color
Willing to sacrifice: styling and color
Compromises: none
Offering is least suited: The mission for whom it is least suited is for dogs that drink inside. The water is scattered everywhere, especially for large dogs.

*Step 11:* How people measure the competitive attributes? What senses did you use and what do they have to say about the different choices? Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Price: price tag
Size: visual volume
Durability: material (steel versus plastic)
Color: visual
Styling: angles and curvature
Ease of cleaning: surface texture of material (shiny versus rough)

*Step 12:* Non-commercial alternatives: What non-commercial products have you used to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative.

Large buckets or storage containers are used for water. Disposable containers are often used for food and water bowls.

Strengths: Low cost—Disposable—The large water tubs can be filled and left for a long time. This is especially important in summer heat.—the large water tubs are difficult to knock over when full.

Weaknesses: Limited functions —Large containers require larger cleaning operations.

*Step 13:* Have them sign a non-disclosure agreement.

*Step 14:* Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

*Step 15:* Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

*Step 16:* Have them sign your patent log that they understand the idea.
Step 17: *Industry Competitive attributes:* After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

**L2-Observe and then Interview Lead Users and User Innovators**

Lead users and User Innovators\(^\text{13}\) are people who want to do the job at a high level of performance. They are often setters of market trends. They are extremely valuable because they already are aware of the quirks of the products on the market and how to modify them to make them useful for their own job. These are the people to consult when we want to understand the level of performance (one of the competitive attributes) that people may want in the future. These can be the ultimate Jury Riggers or simply push your products to the extreme. Lead users and user innovators have two characteristics: First, they are not satisfied with the product as it is. The product is not sufficiently adaptable to their needs. They have gone beyond the average use of the product or service and are striving for a very high level of performance. Second, they have the capability and resources to modify the product to meet their needs. One interesting aspect of lead users is that they may not only indicate a new market, but they may also be identifying new products for use in that market. Lead users and user innovators often have the desire to freely share what they have created with a larger community. The modifications are valuable within their own sphere and the free sharing gives them collateral to further meet their needs within the larger community. Another interesting characteristic of lead users is that they may be trying to do a different job than you think they are.

Good examples of lead users and user innovators come from the sports, entertainment and surgical industries. In the sports industry, mountain bikes were created by user innovators long before they were adopted into the larger industry. In the world of entertainment, the modification of musical instruments and audio equipment has been rampant for many years. In the area of surgery, many surgical instruments are inexpensive to modify. Consequently, many surgeons have patents from instruments that they have modified to perform their jobs much better.

Yet-to-be-accomplished is collaboration between established companies and user innovators. It is entirely possible for industries to provide resources to these people and then allow them to innovate, with the potential of buying the resulting business at a future date. This type of collaboration can be good for the user innovator and the business.

We should note that Lead Users may not be a good source for understanding competitive factors (for a certain market segment) beyond understanding what “good” performance constitutes. For instance, the level of performance desired by some market segments may not be very high; however, lead users give us valuable insight into what constitutes a high level of performance. In this context, Lead Users give us a good idea of what may be required for “good performance” in the future for a given market segment.

**Method**

*Step 1:* Is the job-to-be-done performed with products or services that can be modified by individuals that have common resources? If so, then there are probably lead users and user innovators who are trying to modify these products.

*Step 2:* Identify lead users or user innovators. This is often accomplished via internet searches and blogs. These people are often well connected and can identify others that are

\(^{13}\) *Democratizing Innovation* by Eric Von Hippel
trying to accomplish the same things. One connection can lead to others. Sometimes a lucky break occurs and someone will tell you about ad hoc modifications that they have made to your product.14

Step 3: Make contact with the lead user or user innovator and arrange to watch them at work if possible.

Step 4: Spend time with them and watch them performing their job under as many different missions as possible. If possible, watch them in ways that will not influence how they use the system. Look for instances where the users are using the product for a job that is difficult or clumsy to do. Watch the job being performed in as many different circumstances or missions as possible. Using the template at the first of the chapter, create a unique life cycle map for these products. Watch people during as many of the life cycle jobs as possible. Note unexpected behaviors.

Step 5: Interview people who use the system after observing them. Ask about unexpected behaviors that you observed. “I noticed that you use this a little differently than other people. Why do you use this product or process in this manner?”

Step 6: Try to determine the job: “What are you trying to accomplish?” (What job have you “hired” this product to do?) “Do you use the system for other unusual purposes or jobs?”

Step 7: Determine why they want to perform the job.

Step 8: Missions: “What are the different operating missions? What do you do when it is non-operational or failing??”

Step 9: Evidence of competing systems: Look about for competing systems. “What are you currently using and what other ways have you attempted to get the job done? What are the strengths and weaknesses of the competing products? Which are the most popular and what are people saying about these products? Lead users may have tried many different products. Try to understand the differences between them; the strengths and the weaknesses.

Step 10: Environments: “Where are you using the product or service? What environments affect the competitive attributes of the product?” Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions.

Step 11: Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought? This is where lead users will shine. It is likely that they have very strong notions about what they like and don’t like.
Step 12: Competitive Attributes: “What factors were you looking for to determine which product you wanted to purchase? “What factors would you consider when considering trading up or down?” At the same price, Identify four things that you would like to see improved at the expense of 4 things that you see much less value in? What four things would you be willing to sacrifice if you could get it at a third the price? What compromises are you always forced to make? For what particular missions is our offering least suited? Again, these are good questions for lead users, due to the large amount of experience that they have. They will likely have strong opinions and their feelings about strengths and weaknesses portend what users will likely think in the future, especially when they have more experience.

Step 13: How people measure at each stage of the life cycle: “How would you measure the ease of transport, setting up, powering, adjusting, using, stowing, storage, cleaning up messes, accidents, disposing? What senses did you use and what do they have to say about the different choices?” Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Step 14: Non-commercial alternatives: “What non-commercial products have you used to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?” Consider that doing nothing is a true alternative. User innovators may shine with these questions since they have been modifying non-standard equipment.

Step 15: Have them sign a non-disclosure agreement.

Step 16: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 17: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 18: Have them sign your patent log that they understand the idea.

Step 19: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L2-Observe and Interview Installers

Now we come to the point of empathy. If possible, it helps us to develop a perspective of what people are going through as they use your product or service. We need to become avid users of our own products so that we can see what is wrong with them. If possible, we should consider performing the job under a variety of environments and missions, especially problematic missions. Use it in the wind, in the rain, under water. Use it on every mission that you can think of.

15 Kevin P. Coyne, Patricia Gorman Clifford, and Renée Dye  Breakthrough Thinking from Inside the Box
It is more ideal to observe real users with products or services. Unfortunately, this is not always possible. Such cases might occur when jobs or experiences are completely new. In these cases, it may be wise to simulate the job as much as possible to understand the customer experience. In order to do this, it may be necessary to prototype the job as much as possible.

Prototypes can be very simple or complex, depending on what you are using them for. The author has observed situations where prototypes were created which were much more expensive than necessary. At this stage, the prototype should be as simple as possible in order to give insights to the product developer, rather than convincing potential customers, financers or licensees that the ideas are good.

**Method**

**Step 1:** Is the job-to-be-done performed with products or services that require professional installation? If so, then installers may have good information on how users will react to the products and services. This is true because they get called back and hear many comments when things do not work well.

**Step 2:** Identify installers. This is often accomplished via internet searches and blogs.

**Step 3:** Make contact with the installers and arrange to watch them at work if possible.

**Step 4:** Spend time with them and watch them installing products. If possible, watch them in ways that will not influence how they install the system. Look for instances where it is clumsy to install. Note unexpected behaviors.

**Step 5:** Interview the installers after observing them. Ask about unexpected behaviors that you observed. “I noticed that you did this a little differently than other installers. Why do you install this product or process in this manner?”

**Step 7:** Missions: “What are the different operating missions? What do you do when it is non-operational or failing??”

**Step 8:** Evidence of competing systems: This is a great opportunity to find out about different products that the installers have experience with. “What other products do you install? What are the strengths and weaknesses of the competing products? Which are the most popular and what are people saying about these products?”

**Step 9:** Environments: “What environments affect the competitive attributes of the product?” Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions,

**Step 10:** Job well done and constraints on performing the job: “How do I know when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment? Is this changing your idea of the constraints or are you looking at a different market segment than you thought? This is where installers may get good feedback from users, especially those that are unhappy with the installations.

**Step 11:** Competitive Attributes: “What factors do people appear to be choosing between when choosing the products to install?”
TRIZ Power Tools

Step 12: How people measure at each stage of the life cycle: “How would you measure the ease of transport, setting up, powering, adjusting, using, stowing, storage, cleaning up messes, accidents, disposing? What senses did you use and what do they have to say about the different choices?” Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

Step 13: Non-commercial alternatives: “What non-commercial products have you seen used to get the job done? What are the strengths and weaknesses of the non-commercial alternative products?”

Step 14: Have them sign a non-disclosure agreement.

Step 15: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 16: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 17: Have them sign your patent log that they understand the idea.

Step 18: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L2-Interview Repair and Maintenance People

This is a good way to see the numerous ways that our products can be abused or wear out or operate incorrectly. But, be cautious, repair centers often make it appear as if reliable products are unreliable when you see many broken pieces about. The interviews are similar to those used when talking to the installers.
Method

Step 1: Visit a repair facility. It is best to visit in person rather than call.

Step 2: Talk to service and repair people. They can tell you what commonly goes wrong. They may also give you clues to the unusual ways that people abuse the products.

Step 3: Spend time with them and watch them repairing products. “What are common problems with these products?”

Step 4: Evidence of competing systems: This is a great opportunity to find out about different products that the repair personnel have experience with. “What other similar products do you repair? What are the strengths and weaknesses of the competing products?”

Step 5: Environments: Repair people may have a sense of how the products appear to be abused. “How do people appear to be abusing or misusing these products?”

Step 6: Have them sign a non-disclosure agreement.

Step 7: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 8: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 9: Have them sign your patent log that they understand the idea.

L2-Use Data from Customer Feedback Systems

Customers will often offer that they are not happy with your offering. They let you know directly or indirectly. Being sensitive to customer needs and requests can give a lot of information without asking customers directly. Sometimes a simple direct question to the customer will be appropriate.

Method

Step 1: Determine whether customer feedback systems are available

Step 2: From the entries, try to determine the job: “What were people trying to accomplish?” (What job did they “hire” this product to do?) “Do they use the system for other unusual purposes or jobs?”

Step 3: Evidence of competing systems: What do people say about competing products?

Step 4: Environments: Where are people using the products? Note all extreme conditions: temperatures, pressures, harmful objects, potential mishaps, use by unqualified people, vibration, stress and strain, bumping or dropping, chemical exposure, moisture exposure, mildew or fungus, sand and dust, extreme operating conditions.

Step 5: Job well done and constraints on performing the job: “How do people indicate when the job is done correctly at each stage of the life cycle?” What are the constraints on performing the job. Are they what you thought they would be for the market segment?
TRIZ Power Tools

Is this changing your idea of the constraints or are you looking at a different market segment than you thought?

Step 6: How people measure at each stage of the life cycle: “How do people appear to be measuring the ease of transport, setting up, powering, adjusting, using, stowing, storage, cleaning up messes, accidents, disposing? What senses did you use and what do they have to say about the different choices?” Examples are: sight, smell, sound, texture, weight, taste, awkwardness of use, etc. “What attributes of the product are indirect measures of product quality? For example: maintenance, aesthetics, simplicity, price and attention to detail.”

L3-Interview B2B Customers

Business to Business (B2B) customers are those customers that buy your product to insert into their product or as a middleman to the customer. If you supply an offering to be incorporated into a larger system, then it is necessary to understand the needs of this type of customer which are generally centered on financial needs. It is important to understand how original equipment manufacturers (OEMs) make their money. In other words, you need to understand and react to their business model. You may need to educate the customer in complex systems as to why they may want certain features and what the ultimate benefit to their bottom line is.

Note that while the needs may be very different from the end user, your understanding of the end user is still very valuable. The OEM needs to feel that they can capture a significant amount of the value that you offer to the end customer.

Method

Step 1: Go to the OEM to observe and interview.

Step 2: Ask questions that allow you to understand the customer’s business model. It is important to understand many of the details and what the customer believes will make the most difference to the bottom line.

Step 3: Ask about unexpected behaviors that you observed. “I noticed that you use this a little differently than other customers.”

Step 4: Evidence of competing systems: Look about for competing systems. “What are you currently using and what other ways have you attempted to get the job done? What are the strengths and weaknesses of the competing products?

Step 5: Competitive Attributes: “What factors were you looking for to determine which product you wanted to purchase? “What factors would you consider when considering trading up or down?” At the same price, identify four things that you would like to see improved at the expense of four things that you see much less value in? What four things would you be willing to sacrifice if you could get it at a third the price? What compromises are you always forced to make? For what particular missions is our offering least suited?”

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Step 6: Ask17 “What are your conditions of satisfaction?” And “What will you do if I can meet the conditions?”

Step 6: Have them sign a non-disclosure agreement.

Step 7: Get feedback on the prototype (if you have one at this point). “What do you like and not like?” Get feedback on new potential functions and how well the offering will meet the job needs throughout the offering life cycle.

Step 8: Determine the incremental amount that each person interviewed would be willing to pay for each feature. Be sure to capture the value of features that are related to the human interfaces that you have idealized.

Step 9: Industry Competitive attributes: After interviewing ask yourself what factors does the industry appear to compete and invest in. This gives an idea of the advantages that your product will have when compared to what the industry thinks is important.

L3-Focus Groups

As mentioned in the introduction, it is important to consider the effect of group dynamics when getting feedback on prototypes and use the most appropriate group to gain the information that is required.

Method

Step 1: Determine what you want to learn. Is it acceptance in the most likely setting, determine the setting and how group dynamics will play in to the measurement. Consider the group dynamics of where the offering is most likely to be used. Is it in isolation, public settings or in natural groups? To understand how it will likely be used in the most natural settings, find ways to test in these settings.

Step 2: Consider the information that you want to gather. Is it feedback on popularity, aesthetics or styling? If this is the case, more unusual settings might be appropriate so that group comparisons can be drawn. Watching people choose between products can be instructive.

Step 3: if the offering is not typically used in a group setting, be cautious of feedback from a group. The group dynamics may change the more natural responses.

L2-Further Investigate Price Sensitivity

This is one of the most risky steps due to the difficulty of sizing up non-consuming markets. They are difficult to study. Here we will present some experimental methods for determining price sensitivity of non-consuming markets. The volume of the market that will respond to your offering is largely determined by the product attributes, especially price.

17 High Probability Selling by Jacques Werth and Nicholas E. Ruben (May 1997)
TRIZ Power Tools

Method

Step 1: Use a de-rated survey. A de-rated survey is one that attempts to determine price sensitivity by asking a general population or a tailored population about interest. Taking the percentage of positive responders in a region and multiplying the population in that region gives a highly optimistic estimate of the interest. Now, we come to the de-rating. Since the risk is high that many responders are exaggerating their interest, it is necessary to multiply the calculated price by a number significantly less than one.

Step 2: Auctions—offer fake products on public internet auctions. Responders should be rewarded for participating in a fake auction. De-rate the reaction of the respondents. Only do this where it is allowed under the terms of the auctions.

Step 3: Go to Google insights at www.google.com/insights/search/# to identify the interest in overcoming the impediments to performing the function. Use Google AdWords to get the absolute market size of the searches found on insight.

L2-Summarize Constraints, Features and Environments

Now that you are done with the interviews, you are ready to put it all together. Remember that a clear view of the constraints that the target market are trying to overcome as well at the environments where your offering needs to operate are fundamental to determining the requirements we will use to design the product or service.

Method

Step 1: Summarize the job to be done.

Step 2: Summarize the constraints on performing the job. What stops them from performing the job? What irritates them? What unseen burdens do they carry?

Step 3: In what environments must the offering operate?

Step 4: What other competitive attributes are they looking for?
L1-Verify that the Market Segment is not too Small

At the point that we began this book, we only had a hypothesis as to the viability of the market segment. Once we have had the opportunity to interview consumers and show them a prototype, we have a sense for how common they are, their willingness to pay and how much it will cost us to provide the offering. We are getting close to the ability to put together a full business model. Unfortunately, this information is still somewhat vague, so we don’t have the complete picture, but one thing that we should know at this point is whether the market is too small to be worth pursuing. Remember that we will spend a lot of time trying to please these consumers trying to please them. Time is a precious commodity and we should not set our hearts on a market that is too small to be viable.

If this market segment is too small, then we should switch to one that is larger. It is likely that during the interviewing process, we have discovered other market segments. Also, we can go back to TRIZ Power Tools--Discovering Markets to identify an alternative segment.

**Method**

*After numerous interviews do we believe that the market segment is not too small to continue? Can we justify continuing with the market segment or should we switch to another?*
L1-Summarize Why the Market Segment Wants the Job

Now that we have understood the job to be done; we have a chance to summarize why the market segment wants to do the job. In order to create products and services for the chosen market segment, we have understood the job to be done and the constraints on doing the job. In order to more fully satisfy the market needs, it is important to understand why the chosen market segment wants to get the job done. This allows us to fill in many of the gaps of understanding and empathize with our chosen market segment. Better yet, we are now able to convey the Whys of the offerings so that the market knows that we understand and respect their desires. In the best case, this market segment can reach out to each other in promoting the offering.

If we are trying to meet the needs of several market segments, the reasons for performing the job may be different for each segment. In this case, we will be helping them to achieve their several ends by giving them a common means to do this.

Relating to the target market segment and making sure that you relate to their needs can have a magnet effect on the markets that you are serving. When leaders are able to articulate the whys of what they are trying to accomplish then people who also sympathize with these causes will have more passion to jump onboard. This will all come to fruition after the offering has come to market and advertising helps the market know that you are ready to serve them. At this stage, it is mostly important to understand the deeper needs of the consuming segment.

L1-Method

Step 1: Summarize the Whys: the reasons that the target segment wants the Job to be done.
L1-Create Market Segment Personas

Now that we have understood the job to be done; why the job is to be done and the constraints on performing the job, we can succinctly describe a persona for our market segment. A persona is a way of describing the job and the type of person that will be performing the job. The persona can become quite personal and may even have a name or a story attached. The value of the persona is to create in the innovator’s mind a picture of who is being served by your product or service.

L1-Method

*Step 1: Identify the various personas that will represent the target market*

*Step 2: Consider giving them a name and story*
L1-Define Product Functions and Attributes that Simplify the Job

The input to this step is what constitutes a job well done and the problems with current systems for performing the jobs. The outputs of this step are the system functions and other requirements of the system that simplify the job (super-system).

Our System Function Should Simplify the Super-System (Job)

Patients with diseases make good analogies when it comes to performing causal analysis. The doctor attempts to go beyond the symptoms to find out what is causing the problem. What went wrong? The doctor probes carefully considering all symptoms until the source of the problem is found.

When it comes to solutions, however, the doctor-patient analogy begins to fail. With living patients, a doctor performing a surgical procedure will attempt to preserve as much of the patient as possible. With man-made systems we want to preserve the least amount of the system possible to still get the job done. This is because technical systems impose human burdens. Radical surgery is better than preserving the system so long as we don’t sacrifice performance.

This is the hallmark of TRIZ solutions and of all good designs. The second axiom of Axiomatic design tells us that good designs impose the fewest requirements for information exchanges. In simpler terms, good designs require fewer functions and are therefore simpler. Regardless of what we do, either the system or super-system should become simpler. (This means that it is fine for the system to become more complex if the super-system (Job) becomes less complex).

The goal of this is to define our system functions that will allow the super-system (job to be done) to become less complex. Even hidden or institutionalized burdens may disappear. The super system will inevitably have institutionalized burdens or burdens that everyone forgets. Processes are developed and rigorously followed to reduce the burden until we forget that the burdens exist. The processes simply become a part of life. When we overcome these forgotten burdens, it creates a delight for the target market.

Our System Functions and Attributes Should Remove Constraints

Recall that we have done a lot to identify the constraints on the target market that have people from performing the job the way that they would like to. Once we remove the constraints, they are free to do their job. They are free to consume and we are free to help them consume.

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18 Suh Nam Pyo of MIT, The Principles of Design, Oxford University Press, 1990,
However, removing the constraints will take some detective work. It is necessary to understand why the constraints exist. There may be deeper problems that we need to resolve. In TRIZ Power Tools —Simplifying, we will try to understand why these constraints exist so that we can solve the deeper problems that cause the constraints. This is done together with simplifying the system, because removing elements and removing constraints require the same type of detective work to understand the chain of causes that makes both the constraints and the objects necessary in the system.

**L1-Method**

*Go to the book TRIZ Power Tools—Job #4 Simplifying.*

Identify the required functions and attributes that our system needs to have to simplify the super-system (job to be done) for the target market.

*(Remember, we are not designing the product quite yet, we just want to understand what our system needs to do in the context of the super-system that will make the super system simpler, remove institutionalized burden, etc.)*

**Example—Pet Feeding System**

*Go to the book TRIZ Power Tools—Job #4 Simplifying.*

Identify the required functions and attributes that our system needs to have to simplify the super-system (job to be done) for the target market.
In Summary: The above diagram shows the burdensome functions.

The bacteria, birds, and insects are those that seem to carry the highest burdens. With those removed, the harm to the pet is diminished, the target market is unconstrained and the human burdens are diminished. We would also like to remove the human from the system entirely in order to reduce the human burden and simplify the life of the target market. The water bowl and feeding system are also candidates for removal but have a lower priority since they will likely be instrumental in removing the human from the system. Also, if we view this from the perspective of the manufacturer of the pet nourishment system, then we would like to retain the food and water bowls.

In determining why the bacteria exists: The volume of the water controls the length of time that the bacteria are allowed to feed on the food and the water and the shape allows the bacterial food to collect in corners. We can imagine that if the volume were buckets worth that the bacteria might never be removed. If the volume amounted to the water consumed each time then the bacteria would be removed each time that the pet took a drink. We also note that if the volume of water is smaller than the amount of food washed off of the muzzle is much smaller. At this point, the bacteria in the water are a part of the system. They cause added burden to the system, both to the pet and to its owner. What we would like to do is to remove the bacteria from the system if possible.

The removal of the water by the pet is a key weak function. This is the deeper problem that, if resolved, allows the system to become simpler and removes one of the primary constraints on the target market which is the harm that the bacteria does to the pet. If the water were removed more rapidly, then the bacterial problem would mostly go away.

From our analysis we see that this is largely controlled by the volume of water and the shape of the pet bowl. As a side note, we also notice that the removal of the food from the muzzle is also controlled by the volume of the water.

While idealizing useful functions we note that: Containing the food is required to keep it from getting dirty or wet. By changing the food slightly, the dog food requires no container because it does not come in independent pieces. For instance, the food is linked together or comes as one piece. Perhaps it just hangs on a roll.
L1-Define the Human Experience Requirements

The human experience should be thought of as a system requirement. What we want to achieve is what the human experience should be.

When we idealize the job, the interface to our product is one of the last things that we worry about. This is because we must first decide what the product or service is required to do and what elements will be a part of the job. In every instance of functions on people, we have tried to simplify the system so that the human is not required. The human interactions that we have left are either functions that humans want to do (such as entertainment or exercise) or ones that we cannot find a way to avoid. We realize that if we have to do it, then the human interface needs to be right.

Few customers care what is inside a product. What they really care about is the higher level product or service features. One of the high level features of the offering is how the customer directly relates, communicates with or manipulates the product or service. How comfortable is it? How intuitive is it? As far as the customer is concerned, the interface to the offering is the offering. When the designer truly understands the customer, he or she will be more capable of getting the user interface right.

On the other hand, when we create the product, it is one of the first things that we worry about. At this point, we should know what the product requirements are. The job is known and the product’s part in that job is established.

The human interface IS the system to the user. They really don’t care what goes on inside. All they care about is how simple it is to get their job done. This cannot be over emphasized. What the customer experiences is the product or service to the customer. Products that are simple to use will have tremendous advantage over products that are complex to use. Cell phones are a great example of how the user interface IS the product. Nobody cares how simple or complex the internal electronics, software or mechanisms are. They only care what it can do and how easy it is to use. (This does not diminish the need to simplify the internal mechanisms for the purpose of cost reduction, etc.).

There are three parts to the human interface: 1) Functions that the system performs directly on the human user. 2) Functions that humans perform to serve the system 3) Aesthetic functions that the system performs on the user. Let’s talk about these separately.

Functions that the system perform directly on the user

If these functions are the main functions of the system, then they may be the most important and should be perfected in order to satisfy the market. If these are additional functions and secondary to the primary functions to the system, then they may be subject to removal. For instance, a system performs a useful function and that function is monitored. The information fed back to the user of the system tells the user how the system is operating. This information may satisfy the user’s concerns about the system operation but if the system does not need to be monitored then it is even more ideal.

Functions that humans perform to serve the system

The master should not have to serve the slave, but in many instances, this is the case. Systems that require maintenance and monitoring can be simplified by removing the human from the system. As we go on to simplify the system, removing the human from the system should be kept high on the list of priorities.
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Aesthetic functions that the system performs on the user

Designs are not elegant until the user says “Aha!” The design should be ergonomic as well as create an emotional response. The emotional appeal should be directed towards the target market.

Some might argue that the aesthetic interface is a detail to be added later in the design. Actually, we should consider aesthetics in the earliest stages of considering what a product should do. The aesthetic function is an emotional function. What does the product do to the user or onlookers? Designing the user interface up-front is the best place.

In our case, we have just ripped and torn apart a design and then reassembled it. This is a good place to consider aesthetic appeal.

Perceived or Psychological Value is King

Value is a matter of perspective and perspective is always relative to something else. One of the difficulties of psychological value is that psychologists don’t have a model to hang everything on while the physical sciences do. Priority is usually given to mechanistic ideas more than psychological ideas. Consequently, we typically don’t pass technical or economic ideas past psychologists. Actually, perceived value is more important than actual value. Things are not what they are: they are what we think they are. “Reality” is not a good guide to happiness.

Count down: an example of a psychological idea is to use count-down clocks on subways to reduce the tension of waiting. Count down delays on red traffic lights reduces accidents. Green countdown lights increase them.

Do one thing: another example of psychological value is things that do one thing are seen as having higher quality than things that do several things. Google is a good example: if you are just a search engine you are perceived as being better. An example of perceived lower quality is the combination of DVD player and Television. (On the other hand, a smart phone can have a much higher perceived value than a regular cell phone.)

Chunking: another example is getting people to take a full course of antibiotics is difficult. It is made easier by giving the patient 18 white pills and 6 blue pills. Prescribe taking the white pills first and then the blue pills. Even though the pills are the same, the likelihood that the pills will be taken is increased dramatically. This is an example of “chunking” a difficult action into milestones to make it easier.

Control: The circumstances of our lives have less impact when we believe we have some level of control. This is true even when the circumstances are quite painful. Taxes are more painful when we have less control over what they will be used for. Pay $20,000 lbs. in taxes for health care and we get a mug. Pay $20,000 to a hospital ward and we call it philanthropy. Bailing out Greece or bailing out the dumb banks that lent to Greece is the same thing. But you look at them very differently. Control make something that is bad feel good.

Meaning: economics is a function of its amount and also its meaning. Toll station: if you let people go twice as fast by paying, people think that you are purposely delaying to make more money at the tolls. If instead it goes to a charity then you are happy to pay it. Money is not money. This could revolutionize tax policy. Psychology is more fundamental than economics.

Comparing: things are what we compare them to. The value of the food is the same as sweeping the floor. The context of the food is just as important. Best food ever won’t be as important is cleaning the floor. Post office had a 98% success rate to getting the mail delivered the next day. The perception was 50%. Why change the actual when the

19 Elegant Solutions by Owen Edwards, Crown publishers, Inc. New York, 2989

20 The following is a paraphrased presentation given by Roy Sutherland in a TED presentation where he presents the idea that value is always a matter of perspective. Perspective is always relative to something else.
perception was so poor. Tell them that they are better than the Germans. We can’t tell the difference between the quality of the food and the environment. People are generally not motivated to decrease their energy consumption until they are confronted by a comparison of their energy use to that of neighbors or a comparative group of people that live in the same type of dwelling.

**L1-Method**

*Step 1:* Identify functions that act on humans and that are performed by humans on the system. If these functions are the primary functions of the system then we would like to perfect them. If they have to do with monitoring the system then we may consider eliminating them.

*Step 2:* Identify aesthetic functions on users.

*Step 3:* Idealize the useful functions of the user.

*Step 4:* Error proof human interactions.

*Step 5:* Design the user interface to be comfortable and healthy.

*Step 5:* Design and prototype a variety of human interfaces. Create sketches of the human interface.

*Step 6:* Simulate how these interfaces will appear to the user. Create simple prototypes for the simulations. Try to experience the use of the product in ways that will help you to empathize with the user.

*Step 7:* Brainstorm ways to simplify the user experience. Eliminate functions performed by humans on the system if possible.
L2-Idealize the Useful Functions of the User Interfaces

During simplification, we may have already idealized these functions. If not, we will pay particular attention to it here. In this case, we idealize the object of the function, whether it is a part of the system or the user. We idealize the modification itself, how well it needs to be accomplished and everything humanly related to the function. Finally, we idealize the object that performs the function, whether it is the user or a part of the system.

**Method**

*Go to the book TRIZ Power Tools—Skill # 3 Idealizing Useful Functions and idealize the user interfaces that remain.*

L2-Add Aesthetic Functions

Part of the human interface is aesthetic functions that the system performs on people who use, maintain or observe the system. When given the option between two objects that provide the same function, aesthetic appeal can make the difference. This means adding aesthetic functions (artful design). Aesthetic Functions are usually related to the “form” of the system. How it looks, smells, tastes, feels, etc. If the system performs in public then users generally prefer that it have an aesthetic form that matches the environment. Most systems perform aesthetic functions on the user, even if they reside in industrial plants. Those who install and maintain such products may attribute quality to products that have that extra touch.

**Method**

1. **Step 1:** If the system is primarily functional, then add emotional appeal. This can include:
   - Associate it with something that has emotional appeal
   - Adding a popular brand name
2. **Step 2:** identify aesthetic function on the user. Do they exist?
3. **Step 3:** Identify their importance in the eyes of the user
4. **Step 4:** Consider aesthetic designs that would please common users. If you are not particularly artistic, this may involve enlisting the help of design consultants.
L2-Idealize the Human Interface for “Human Factors”

If humans must be involved in the job, there should be a persistent drive towards minimizing their burdens. There is a discipline called “Human Factors” which seeks to minimize human burdens. While we may not become experts in this, we should do all that we can to understand human burdens from the viewpoint of human factors. This is especially important if there is a requirement to operate the product or service for extended periods of time. A very nice tool for considering human factors comes from the NASA workload rating sheet.

Method

Step 1: Experience or simulate the required actions to perform the job.

Step 2: Consider the Mental Demand required for thinking, deciding, calculating, remembering, looking and searching. If data gathering is required, consider these three levels of gathering data. Ambient: Takes no special effort to gather data. Natural: Takes no special effort to interpret data. Continuous: Takes no special effort to update data.

Step 3: Consider the Physical Demand required for pushing, pulling, turning, controlling and acting. Is it easy versus demanding, slow versus brisk, slack versus strenuous, restful versus laborious?

Step 4: Consider the Temporal Demand. This is the time pressure, pace or rate required to use the offering. Is it slow versus leisurely or rapid versus frantic?

Step 5: Consider the Effort required. How hard are they required to work (mentally and physically)? This is considered over the length of the job rather than the mental and physical demand per operation.

Step 6: Consider the Level of Performance. How successful was the task or goal? How satisfied were the participants with the performance?

Step 7: Consider the Level of Frustration: How insecure, discouraged, irritated, stressed and annoyed were the participants? Were they secure, gratified, content, relaxed or complacent?

Step 8: Consider the Emotional burden: Look at the current design. Does it inspire awe? Does it make you suspicious of the product? Is it aesthetically pleasing?

Step 9: What groups of people would not perform the job or would have difficulty performing the job because of the above “human factors”?

Step 10: Recognize whether any of these “human burdens” are constraints on recognized market segments.
**L2-Ergonomics—Designing for Comfort and Health**

All interactions should be healthy. Repeated motion injuries should be eliminated if possible. At a minimum, the interactions should be comfortable if performed repeatedly. Ideally, repeated motion should not cause joint or other health problems.

**Method**

*Design the human interface to be comfortable and healthy if motions are often repeated.*

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**L2-Increase Loyalty, User Identification and Identity**

In Job 1 Discovering Markets you may have identified that there were user experiences that you wanted the consumer to experience such as customer loyalty, identification\(^21\) and the Identity Function\(^22\). Now it is time to make sure that these features exist in the product. The added function is that the product must inform the user that they can identify with the product or consistently recognize where this product comes from. The effect of the product on people’s identities should also be taken into account.

As an example, the author happened upon a product developed by Black and Decker which was a radio that might be used at a construction site. The radio had the Black and Decker Look of black and orange. In addition, it was intentionally shaped to look like it was designed for rough handling. The corners appeared to have some sort of extra cushioning. This feature may not be necessary for protection, but it definitely gives the look of being able to handle rough handling. These features direct the consumer to customer loyalty and a sense of identification with the product as one that a serious worker would identify with.

**Method**

*Step 1: Recall the user experience that you want to encourage such as identification with the product, loyalty or identification with the brand and stakeholder identity.*

*Step 2: Identify the features of the product that will reinforce this experience.*

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\(^{22}\) Clayton Christensen--[http://www.innovationexcellence.com/blog/2013/07/31/disruptive-innovation-theory-revisited-christensen-hatkoff-kula?utm_campaign=innovation-excellence-weekly&utm_source=hs_email&utm_medium=email&utm_content=9867055&_hsenc=p2ANqtz-11ktwhdwecll3b8RGPyg54qJ2Kio9XCCZPz6Nsfjn1xKpmjDMykmsPleZvQuHL9WWMl5_DF70Vx1cwiqquVAFn9_wtQ&_hsmi=9867055](http://www.innovationexcellence.com/blog/2013/07/31/disruptive-innovation-theory-revisited-christensen-hatkoff-kula?utm_campaign=innovation-excellence-weekly&utm_source=hs_email&utm_medium=email&utm_content=9867055&_hsenc=p2ANqtz-11ktwhdwecll3b8RGPyg54qJ2Kio9XCCZPz6Nsfjn1xKpmjDMykmsPleZvQuHL9WWMl5_DF70Vx1cwiqquVAFn9_wtQ&_hsmi=9867055)
**L2-Increase Psychological Value**

As described by Roy Sutherland, we want to increase the perceived value of every human interaction, even if it is painful. Psychological value usually comes by changing the perspective. In other words, like separation by perspective, we want to compare to another thing with perceived value.

**Method**

*Step 1:* Give meaning to harmful interactions by giving some amount of control.

*Step 2:* Reduce tension by counting down.

*Step 3:* Increase perceived value by decreasing the amount of functions

*Step 4:* Improving a human interaction significantly beyond other psychological factors that makes up a job may not be adding a lot of value.

*Step 5:* Give meaning to unpleasant activities

*Step 6:* Reduce unpleasant functions by breaking them into stages or milestones.

*Step 7:* Compare the improvement to something tangible.

**L2-Error Proofing**

Error proofing helps humans to avoid making errors in assembly, operation, etc. If a human interaction is required, it should be ideally impossible to allow the error to happen. Next best, it should be obvious what the correct course of action is.

**Method**

*Step 1:* Identify opportunities for human errors with the human function.

*Step 2:* Look for ways to make it impossible to perform the operation incorrectly.

*Step 3:* If it is not possible to make the error impossible, then make it obvious how to perform the operation successfully.

**L2-Design, Prototype and Simulate a Variety of User Interfaces**

It is difficult to understand the feelings of the user without using the system. Efforts to imagine its use are just not enough. Remember the life cycle of the product? Use this map to understand the range of human experiences from purchasing the product to disposal and recycling. It is extremely important to make sure that the human interface works in the environments where the target market is doing their job. For instance, you would want to be able to work on a snowmobile engine wearing gloves in sub-freezing conditions.
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Method

Step 1: If the product already exists, simulate the range of experiences outlined in the life-cycle map (IN THE ENVIRONMENTS WHERE THE TARGET MARKET IS PERFORMING THEIR JOB)

Step 2: If a product does not exist, make crude prototypes and simulate their use, with the idea of experiencing what the user will experience in a variety of settings that will be common to the user. Consider using the life cycle map to identify these experiences.
Define the Human Experience Requirements
L1-Clarify Unique Competitive Functions and Attributes

The input to this step is the potential functions that our system might perform, the high-level attributes of the product or service, and the pricing information from the interviews. The outputs of this step are the specified functions that our system will perform and the level of the critical competitive attributes that the target market can discriminate.

Unique Competitive Functions and Attributes

Competitive attributes are the product features and functions that people use to decide between competitive alternatives. They are the unspoken and often unrecognized language of customer value. These same factors are often used when trading up or down. Industries typically assume that certain competitive attributes are those that the market uses to decide. Often, the process that the industry uses to determine the competitive attributes is to provide a certain product or service feature which some of the market uses and then decide that it is worth competing in. Unfortunately, some market segments could not care less about certain product or service features. We want to specify the attributes, at least temporarily, because we will use these attributes to test our market hypothesis, build prototypes and get further customer feedback. If this is one of the first rounds of iterations, then these competitive attributes and functions are still fluid. With more iteration, these functions and attributes will settle down. This is a learning process rather than an execution process. Learning first can save a lot of money and heartache.

It is important to understand that being better than other offerings is not good enough. The target market needs to see enough difference to readily tell that your offering is better. This is not a 5% difference. You are looking for a step change that is obvious. As you continue on your next round of interviews, it is necessary to make sure that the people that you are interviewing can really tell the difference.

People Vote with their Pocketbooks

Once the product or service is in the marketplace and consumption begins, we will learn what people value most, by what they are willing to pay for competitive offerings. If we wait until product enters the market place to determine the price then we have waited too long. This creates tremendous risk and does not give us direction on what features should be included in the offering.

Value Curves on a Value Canvas

A good way to capture the competitive attributes is a Value Curve, as described by Chan and Mauborgne. A Value Curve gives a high-medium-low look at how our offering compares to the competitive alternatives. Cost is usually the first competitive parameter on the curve, followed by the main competitive attributes that the industry competes on and invests in. We add functions and other competitive attributes that we have studied from our own interviews. If our products already exist, we should include our products in the mix. Once the competitive attributes are identified, we need to determine how we rate, compared to all of the competitive alternatives. It is likely that products which directly compete will show up as being very similar, while alternative products will be quite different.

Because we are testing the market, we are learning what they want. Knowing what is important to potential consumers leads us to the creation of more ideal value curves. (Several potential value curves should be considered). If the new
value curve looks the same as the competitive alternatives, then we are swimming in red waters. We can only swim in blue waters if our value curve is:

--Significantly different from the competitive alternatives.
--Provides what potential consumers really want.
--Has a clear and focused tag-line. (For example, Southwest Airlines might have the tagline “Fast and flexible travel for the cost of a car trip”).

**Eliminating or reducing competitive attributes**

We have to carefully choose what we will do well and what we will eliminate. This will eventually lead us to a specification for our offering that provides outstanding value for potential consumers. In order to focus sufficiently, we will need to reduce or eliminate certain competitive parameters that potential consumers do not care about, and greatly increase others that they care a lot about. If new functions and associated competitive parameters appear to be highly attractive to potential consumers, this will make our value curve stand out. Remember, the target market must be able to discriminate our offering from all others.

How is it possible that competitive attributes can be eliminated?

If competitive products already exist, it is likely that the industry takes all competitive attributes for granted. They believe that the market desires all of the competitive attributes and seeks to provide as much as possible for consumers, and still be competitive on cost. Potential consumers are not interested in all of these factors and will generally give up some things if others can be greatly increased. Remember, when we can eliminate elements, the system is greatly simplified. In fact, most potential consumers are willing to drastically reduce certain factors if other factors, especially price, could be greatly improved.

The business benefit of eliminating certain competitive attributes cannot be overstated. Businesses often underestimate the direct and indirect costs of providing these additional competitive attributes. When non-required factors are eliminated, it is easier to increase more important factors as well as to meet the target cost.

One step of the process is to set a target price. The price of the offering is an important competitive factor. The price of a product or service should not be based upon the cost. The price is set by comparison to the competitive alternatives. This means that we set the target price before we set the target cost. The target cost must then be dictated by the business needs. After a cursory look at the target price and the target cost, it may seem improbable that the cost target can be hit at this step. Remember that we are very early in the overall innovation process. Identify this as a risk and move on. Future steps will be used to innovate and decrease the actual costs to meet the target.

The final step is to create a specification that reflects the ideal value curve. Meeting this curve will allow us to attract the largest market of potential consumers.

**L1—Method**

*Step 1: Summarize the known competitive functions and attributes.*

*Step 2: Eliminate, reduce, raise and create attributes that the target market wants to a level that your product or service is distinct from all other offerings.*

*Step 3: Decide on a target price.*

*Step 4: Decide on the level of each competitive attribute.*
L2-Summarize Industry Competitive Attributes

Right or wrong, the industry believes that certain attributes are what consumers want. Consequently, they try to create the greatest value in each of these areas. This value creation is often evident in how they invest and improve their products. Note that these attributes may be incorrect. Consumers may not care about these factors. Competing on attributes that consumers do not care about can un-focus products and make them less competitive. This is true because companies can spend enormous amounts of money which will distract from features and attributes that the consumer really wants. Understanding and capitalizing on competitive attributes that the industry takes for granted can have a powerful effect on imitation if the business is successful. It can take a long time for an industry to understand that certain segments just don’t care about certain competitive attributes.

Method
Step 1: Identify the product or service attributes that the industry normally compete and invest in.
Step 2: Include competitive attributes that the industry competes in from the lifecycle chart.

L2-Eliminate-Reduce-Raise-Create-Adjustable

Now that we have begun to talk to potential customers, we know what we can potentially change. Some features are taken for granted by the industry. Often, consumers in a target market segment do not care about these features. An interesting observation of the new women’s fitness center “Curves” is that there is a market segment of women that do not like to go to a typical fitness center because of features that the industry takes for granted. Large mirrors around the walls, showers, men in attendance, large windows. These were greatly reduced for this target population.

If there is a large variance in customer needs, a competitive attribute might best be satisfied by being adjustable. (Making a factor adjustable follows the evolutionary stages of technologies).

Method
Step 1: Based upon inputs from consumers and non-consumers, what factors which the industry takes for granted can be eliminated?
Step 2: What can be reduced with little effect? These are factors that are over-delivered. Potential consumers care little about these factors.
Step 3: What should be increased well above the industry standard? What will make our offering stand out from all the others?
Step 4: What new factors can be added?
Step 5: Due to a wide variation in needs, what factors should be easily adjustable.

Example—Pet Feeder
Step 1: Based upon inputs from consumers and non-consumers, what factors which the industry takes for granted can be eliminated?
Certain styling features of the containers can be eliminated.
Step 2: What can be reduced with little effect? These are factors that are over-delivered. Potential consumers care little about these factors.
The containers do not need to be durable. Many pet owners use disposable containers.

**Step 3:** What should be increased well above the industry standard? What will make our offering stand out from all the others?

The capacity of the water containers should be high. This is evidenced by the large buckets that people use as a non-commercial product. The large size also aids the stability of the container when the pet tries to play with it.

**Step 4:** What new factors can be added?

A new factor of protection from pests can be added.

**Step 5:** Due to a wide variation in needs, what factors should be easily adjustable.

The capacity of the feeding container needs to be variable to adjust to different sized animals.

### L2-Create a Value Curve Diagram

The Value Curve\(^\text{23}\) is a graphical approach to seeing how our features compare to the competitive alternatives. By this point, we may or may not have a current product. If we do then we can see how we currently stack up to the competition. More importantly, when we look at what we would like our product to become, we can see the advantages very starkly. As we look at the value curve, it is important to note how our product or process rates relative to the next best alternative. (Remember that the next best alternative may not be a product or service that is remotely like yours.)

#### Method

**Step 1:** Identify competitors or the industry average. The industry average should generally be near the Median.

**Step 2:** Identify where non-commercial alternative products or technologies are on the curve.

**Step 3:** If we currently have a product or service then identify this on the value curve.

**Step 4:** Identify potential products on the value curve. The final curve should have:

--- Focus with a compelling tagline

--- Divergence from the other value curves

--- A leap in value for the target market

#### Example—Pet Feeder

**Step 1:** Identify competitors or the industry average. The industry average should generally be near the Median.

The industry average is shown in red.

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\(^{23}\) Blue Ocean Strategy:
Step 2: Identify where non-commercial alternative products or technologies are on the curve.

Buckets have a distinct advantage when it comes to tipping and water height. Disposable containers have only the advantage of cost.

Step 3: If we currently have a product or service then identify this on the value curve.

Because we have no current product, nothing is shown on the curve for this.

Step 4: Identify potential products on the value curve. The final curve should have:

--Focus with a compelling tagline (We protect)

--Divergence from the other value curves (Well diverged)

--A leap in value for the target market (This remains to be seen)

Because attributes not yet regarded by the industry are added, the pet feeder appears high in the area of food height, cleanliness, patio protection, protection from insects, protection from birds and finally clean water.
L2-Determine the Target Price

Now that we have a picture of what the final features might be, we are in a better position to consider the price that people will pay for each feature. Remember that we have already tested the water for price when we were interviewing for competitive attributes. We have attempted to understand the incremental price that the customer would be willing to pay for each additional feature or functions. This is where we use this data.

Price and cost are two separate discussions. The price is a competitive attribute and people really don’t care how much it costs you to provide a product or service. They only care how it compares to the competition in features and in price.

People Vote with their Pocketbooks

Once the product or service is in the marketplace and consumption begins, theory stops and reality begins. We will learn what people value most, by what they are willing to pay for competitive offerings. Merely guessing at what the product should cost or adding a profit to the manufacturing cost is very risky. Determining the price and cost of each product feature at this point in the process reduces the risk and gives us direction on what features should be included in the offering. In this step, we put forward a view of how to determine the features that will be included and the price of the offering.

Principles of Pricing for Pricing Models

Principles of pricing are put forth to guide the formation of pricing models. Let’s take an overall view of what people would be willing to pay for our offering as a function of price. We first take the case where there are no competitive offerings whatsoever. Later, we will add competition so see how it modifies the situation.

Looking at the curve to the right, when the price is zero, we see the highest number of customers willing to “purchase” the offering. As the price increases, the number willing to pay decreases until nobody is willing to pay. Note that this curve will be changed at different times of the year and under different macro conditions such as holidays or during local emergencies. It is also interesting to note that many people would not want the if it cost nothing.

Next, we investigate who is willing to pay at different price points. Each customer has different requirements for a “job well done” and a different willingness to pay. Those willing to pay the highest price may demand a higher performance. On the other hand, those willing to pay the highest price may not be highly demanding, but may have more disgressionable income. Customers with less money may require the higher performance, but simply cannot afford the higher prices. Thus, the curve drops with increasing price.

At the lower price points, are two types of customers. Those that are satisfied with a lower performance offering and are unwilling to pay more for a higher performance, and those that demand higher performance but are unable to pay the higher prices.
We should recognize that any offering will be purchased by a variety of market segments. The features of the offering, however, will appeal most to just a few segments. For instance, a variety of market segments would be willing to buy a computer with super high processor speed and memory. However, many people don’t need the excess capacity to perform simple email, web-surfing and word processing and would consequently not be willing to pay a higher price. Those with a penchant for video gaming would be more willing to purchase the higher capacities at the higher prices. Note that the lower the price, the more segments an offering can appeal to. Conversely, the higher the price, the fewer the segments it will appeal to.

Another element of pricing is the cost to provide the offering. Note that what people are willing to pay has nothing to do with what it costs to provide the offering. Some pricing models are based on starting with what it costs to provide an offering and then adding a needed profit. This is not a good strategy. People are not interested in what it costs. They base what they are willing to pay on their personal needs. It is possible that this strategy will leave money on the table because the customer is actually willing to pay more than expected if the value is high enough. Providing high value to a customer is what allows us to increase the price, thus increasing the margin and profit.

On the other hand, we cannot afford to ignore what it costs to provide the offering. Neither we nor our competitors would be willing to drop the price below what it costs us to provide the offering, since we would be losing money with each sale. We can represent this by adding a line to represent the cost to manufacture the offering. Below this price we lose money and above, we make a profit. Ultimately, we are interested in the net profit that we can make. A simple model for profit is: 

\[ \text{Profit} = \text{Volume} \times (\text{Price} - \text{Cost to Provide}) \]

In the curves to the right, we present the profit as a function of price. We see that the profit curve takes on a parabolic or domed shape that has a peak. (As the price approaches the cost to provide, the profit tends to zero because \((\text{Price} - \text{Cost})\) goes to zero. As we approach the price at which people are no longer willing to pay, the profit goes to zero because the volume in the equation goes to zero.) In order to maximize the profit, the price would be set at the peak of the curve. Given the uncertainties of the data involved, the midway point between the maximum price that customers would pay and the cost to provide the offering is a good starting point.

Please note that, at this point, we may or may not know the cost to provide the offering. If this is the first iteration on interviews and prototyping, then we may know very little about the cost. With each turn through the process, we learn more of what the offering should be and what it will cost to provide it.

Now, let us consider what happens as we add and subtract features from the product. First we need to recognize that just like the main functions, the market segment has a similar willingness to pay for each added feature and we will ultimately have a cost to serve for each added feature. The curves are similar to what we have already shown, except that generally, the price and cost will add incrementally to our original curve.
The left curve to the right shows the effect of adding a feature to the product or service. This adds incrementally to the curve of willingness to pay and the cost to serve. Like the main function, the willingness to pay is higher at zero cost and decreases as cost increases. Certain high-end customers may be willing to pay incrementally more. The figure at the far right represents the net effect on the willingness to pay and the incremental cost increase of the product.

Without showing it, we can also understand that the resulting profit curve is slightly higher and shifted to the right which means that we can charge more for the product or service and a greater number of people will be willing to pay the higher price.

So far we have only considered what happens if there is no competition. When we add competition many things change. First, different consumers will value the features of a product differently. If we have enhanced our product to perform the main function at a very high performance level, there will be consumers that would rather not pay the higher price for the enhanced performance. The performance is too good already. According to Clayton Christensen, this is the ultimate fate of mature products that the performance will ultimately outstrip the desires of many customers. This opens the way for “low end disrupters” that charge a much lower price for the lower performance and provides the main function with a different low-cost technology. As this technology improves, it ultimately satisfies more and more demanding customers until only the few high-end customers remain. While margins remain high, the sales volume drops and the higher performing technology is replaced by the low end disrupter.

Let’s add a second competitor to our willingness to pay curve and assume that the price is the same for both our offering and the competitor. Notice that for each curve, the number willing to pay reduces as the price increases until nobody is willing to pay if the price is too high. Next, assume that we have loaded up our offering with a lot of features that the competition does not have. People looking at both offerings, side-by-side and at the same price, would likely choose ours, because the difference is compelling. This is as though the competition did not exist.

So far, we have displayed each curve as though the competition did not exist. The actual willingness to pay is dramatically changed when both offerings are compared side by side. If the price were the same, almost everyone would choose our offering due to the greater number of features at the same price. The competitors curve would effectively be zero across the chart in the presence of our product and at the same price point.

This case is probably not realistic because competitors will fight back if they see that we are providing more features at the same price and their share of the market is falling. It is likely that they may be able to afford a lower price since they do not pay the manufacturing costs of the added features that we have provided.
Let’s see what would more likely happen. Given that the competitor’s costs are likely lower due to the lower number of features, the competitor’s price is also lower. Let’s see how this would affect our curve.

Note that all of this is contingent on the customer being able to differentiate the difference between our offering and the competition’s. This is often referred to as “differentiation.” If the product features or performance is perceived to be too close, it is difficult for the consumer to make a choice and this changes the willingness to pay. Sure, your offering may actually be superior, but if it is difficult to detect this, either because the product description on the package or the advertising does not show a significant difference, the added cost of providing the enhanced performance or features is wasted.

Thus far, only the principles of pricing are explained here. It is up to the reader to understand and model the incremental price that consumers are willing to pay and to understand the competition.

**Method**

**Step 1:** Based upon what you know from the interviews about the willingness of people to pay various prices for each feature, create a price model which includes competitor features and prices.

**Step 2:** Optimize the price for the expected volume.

(You may discover that higher than anticipated production costs may mean that you cannot bear this price and it may need to be higher. This causes a contradiction: the price must be high and it must be low. The contradiction may be solved by using the principle of Gradually Separating in time: Renting --Time share --Slice share (sell part rather than the whole) --Equity interest—partnering. This is the safety valve, but it is important to try to hit the price point in the initial stages.)
L2-Create Value Curves for other Customers

In the end, we must create a leap in value for the target market and encompass the largest market possible to reduce the risk of scale.

Method

Step 1: Create several value curves from the viewpoint of different players in the value chain.

Step 2: Create a value curve for other market segments that you believe might be attracted to your product which was created for a specific segment. Look for the largest catchment possible.

L2-Decide Unique Level of Competitive Attributes for the Product or Service

We have already identified the Competitive Attributes of the product. These are attributes that the consumer looks at to judge between competing alternatives. The consumer will usually make this judgment in a heartbeat, so the difference needs to be obvious.

Unfortunately, having the Competitive Attributes is not sufficient to define the specific characteristics of the product. The competitive attributes must be broken down into more specific requirements that describe what the system will do within the context of the environment that it must exist in.
TRIZ Power Tools

Take, for instance, the Job of telling time under water. If the market is a construction diver that must stay submerged at great depths for long periods of time where the sun’s rays do not penetrate and the water pressure is deep, the competitive attributes that set this watch apart might be durability and visibility. If we have chosen to be greatly superior to industry standards in both of these areas, what does this mean in terms of the specific characteristics of the product?

First, we have to take into account the Environment that the time piece will operate in. In this case, the depth of the sea requires that it be able to withstand pressures of 500 pounds per square inch. The darkness is akin to telling time in an underground cavern. The temperature of the water varies from 35 to 50 degrees Fahrenheit. Since the construction worker is moving about and impacting objects under water, the time piece must be able to withstand impacts and abrasion from a variety of unknown sources. (Everything cannot be known).

Knowledge of environmental conditions should have come from the observations of living in the customer’s world during the step interviewing for constraints features and environment. With knowledge of the environment, we are now prepared to determine the requirements for the product or process.

Let’s look more carefully at the need to translate Competitive Attributes into specific Product or Process Requirements. For instance, most people would like to have a clean hotel room. What does that mean? Can this be measured in hairs per square inch or visible stains? Is there something else? What must the attributes of the Hotel be in order to be judged “Clean”?

One way to begin translating the Competitive Attributes into Product / Process Requirements is to look to clues from the customer about what the requirements should be. Typically, the customer is not aware of the specific requirements, but we can try to get inside the customers head by asking specific questions: What is it that tips you off that a Hotel is not clean? We can take inventory of the various senses. Is it the smells when you walk into the room? Is it visible stains? Is it the uneven textures that you feel when you wipe a surface?

What indirect measures does the customer use? Do the materials of the room that tip off the patron how clean the room is? Compare a carpeted room to a tiled room. Does the customer automatically assume that the tile is easier to keep clean? If the hotel room baseboards or woodwork does not appear to be well maintained, does the cleanliness also get a bad rap?

If possible, it is usually best to visit the environment and find out the specifics. It may also be necessary to experiment or present the customer with specific attributes to determine what the real requirements are. Living in the market world is extremely valuable to get this right.

The value curve gives a low, medium, high look at product features. This is valuable for comparison between competing products. Now we need more detail in order to create prototypes and talk to the business.

Method

Step 1: Create a specification for the product, process or service which gives more of what the market needs and less of what they can do without. The requirements should make the product unique and stand out against all other offerings. Include target price and required manufacturing costs. The specified levels should be concrete and measurable. (Remember the questions that you asked regarding HOW the target market detects the level of the attributes?)

Step 2: If necessary, decompose the requirements to a level that is measurable.

Example—Pet Feeder
**Step 1:** Create a specification for the product, process or service which gives more of what the market needs and less of what they can do without. The requirements should make the product unique and stand out against all other offerings. Include target price and required manufacturing costs. The specified levels should be concrete and measurable. (Remember the questions that you asked regarding HOW the target market detects the level of the attributes?)

**Step 2:** If necessary, decompose the requirements to a level that is measurable.

1. The containers will remain clean for up to 2 weeks.
2. The container will exclude birds and insects.
3. The container will not allow for the growth of bacteria in the water.
4. The container will also serve water.
5. The water container will contain sufficient water for 4 days without spoiling.
6. The food height will be comfortable for a mid-size dog.
L1-Clarify Business Attributes

Many of the business constraints should have already been minimized if you have determined where the business is willing to play from Job #1 Discovering markets. You would have only considered a market segment that the business is comfortable with. While this is very helpful, difficulties may have crept in as you discover what this market segment wants. The business may have difficulties serving the target market segment. For instance, we may have initially concluded that a potential market segment would not require a new business model. Now, we are suspicious that it will. The business may be very reluctant to do this since it is so disruptive.

In this chapter, we will consider the business constraints to serving the market segments and also try to discover ways to remove these constraints. Both the market segment and the business need to be aligned to provide a product or service that meets the needs of the business and the consumer.

L1-Method

Step 1: Explain the progress made to this point and explore possible snags that might get in the way.

Step 2: Mutually explore ways that these problems might be overcome.

L2-Explore the Progress with Key Decision Makers

It is probably never too early to engage with the business people to keep them up to date with your progress. This step is a good one to take at any time. If you are seeking to license ideas with companies, it is possible to do this well in advance of the license arrangement. Often it is good to get feedback whether you are on the right track

Method

Step 1: Describe the progress made to date. If the progress is inconclusive then advise that the investigation should continue or progress at risk. It should be noted that the time to investigate is usually orders of magnitude lower than misdirected costs to develop a product that the market really doesn’t want. However market timing may be the bigger issue. If the investigation takes too long then market opportunities may be less lucrative. A lot depends upon the type of market involved and how well the market is already understood.

L2-Explore Potential Value Chains

This step is more important if the value chain is not clearly understood or the market segment is new. In this case, it is important to understand how each member of the chain adds value to the product or service and how each will claim its portion of the money. Additionally, it is important to understand how the company resources will complement the given supply chain or how it will need to be modified in order to work seamlessly with the supply chain.
It should be noted that it is typically not a good idea to mix supply chains for new products that must compete for resources with incumbent products for key customers. Key customers end up holding the supply chain hostage which reduces the flow of resources to the new markets. Also, the level of quality and cost of the existing suppliers may be inadequate for new markets.

**Method**

*Step 1: Describe the Value Chain*

*Step 2: Describe how each element profits from the chain*

*Step 3: Determine how the company will claim its’ portion of the money*

*Step 4: Determine the complimentary assets within the company such as equipment, existing distribution channels and company brand.*

**L3-Explore How the Customer Will Pay**

The customer wants to pay in the way that allow the value of the offering the greatest visibility. For example, at one point, copiers were sold on the basis of unit price and it was left up to the customer to make sense of this. Later, it became apparent that most customers wanted to see the printer from a cost per print point of view. This allowed them to make quick decisions on whether or not to copy. Ultimately, many business models were changed a type of leasing on the basis of cost per print. This allowed the customer to contain the number of prints that will be made are highly discretionary.

**Method**

*Step 1: Know the Target Price, how much will you charge?*

*Step 2: How will the customer pay? (Note that many of these represent the resolution of a contradiction).*

--- Sale
--- Renting or leasing
--- Pay for units processed through the product or service
--- Charging by the transaction
--- Advertising and subscription models
--- Licensing
--- Giving away the product and selling the after-sale support and services
--- Mixture of payment mechanisms (Subscription price + advertisement)

**L2-Determine the Required Recurring and Non-Recurring Costs**

In order to meet certain business goals, we need to establish recurring and non-recurring product or service costs. Usually there is a financial model which is prepared and many assumptions are put into the model including required...
margin, product volume, overhead costs, handling costs, etc. Exercising this model under a variety of conditions helps the business to know the options for pursuing an opportunity.

Method

Step 1: Create a financial model
Step 2: Exercise the model to investigate different possibilities
Step 3: Determine the product or service cost to make the offering work. Remember that required improvements in manufacturing may be the main constraint that must be overcome for the consumer to get their job done. Thus, one should not be too quick to judge at this point that the offering will not work. We will consider how the cost may be decreased.
Step 4: In order to meet certain non-recurring cost targets such as capital costs for new manufacturing equipment, this may also be an important output of the model. This may be an important consideration if the constraint is in the manufacturing process.

L2-Explore Value Network Partners

Value network partners are business partners that add something that the target market wants to the product or service. An example of this is application providers that provide special applications for smart phones. The business may be happy to provide the platform and would like to split out the costs and benefits to these providers. This is a way to resolve a contradiction. Something most cost and not cost a lot. In this case, the cost is split between providers.

Method

Step 1: Identify Third Parties that can boost the value of the product in the market place
Step 2: How might connections be built to strengthen the relationship with these parties?

L2-Determine a Competitive Strategy

If the Value Curve is sufficiently differentiated from other alternative products, then a difficult hurdle is past. In this section, we consider strategies that make imitation difficult.

Barriers to Imitation

Why do industries not rush to imitate successful businesses when these new lucrative markets are discovered? There are several non-obvious obstacles to imitation:

1. Blue ocean opportunities go against conventional wisdom. It won’t make sense until it is too late. In the first place, blue ocean opportunities are not easily identified. Most marketing tools are built around competitive marketing strategies. Also, there are many competitive attributes which the industry takes for granted. These factors are so entrenched that they are never challenged. These paradigms distract from what the non-consumer really wants. This draws off valuable resources which could be used to expand into blue ocean opportunities.

2. If another company accepts the new strategy, it must abandon its own. Internal struggles and politics will make it difficult to change.

3. With limited resources, the market may not be able to support more than one player.
4. Patents and other protections may make it difficult to copy.

5. Imitation is unlikely until a high volume of sales is evident. Cost advantages are a natural result of high volumes. These cost advantages may make it difficult to catch up.

6. Buyer loyalty or habit makes it difficult to switch to the imitator. Strong branding has an impact on this.

It is possible to capitalize on some of these factors by using the following method.

**Method**

*Step 1:* Engage with limited suppliers as early as possible. This makes it more difficult for other players to engage these resources.

*Step 2:* Pursue protections to the intellectual property. Decide what is to be a trade secret and what is to be patented or copyrighted.

*Step 3:* Do what is possible to increase the brand strength and recognition.

*Step 4:* Develop internal processes, including business models, that are difficult to detect and hard to copy since they are not publicly visible.

**L2-Explore Ways to Resolve Business Issues**

Depending on what iteration you are on with interviewing and determining the competitive attributes, you may want to wait on bringing up business issues so as not to alarm or bias the decision maker before you have good data. If you are sufficiently ready, then it is important to explore and resolve the business issues. Some of the problems may be very difficult and require inventive solutions. Resolving business contradictions may be more important than resolving technical product or service issues. If necessary, you may want to employ some of the techniques used in Job #5 Resolving problems.

We should note that by this time, there may be issues of providing the product or service at a target cost. The resolution of this problem may have to do with inventively resolving manufacturing issues. The issue of how to make the product for a certain cost may be the primary constraint for both the business and the consumer.

**L2-Method**

*Step 1:* Identify difficult business issues

*Step 2:* Mutually explore ways that these problems might be overcome. If necessary, contradictions may need to be identified and resolved along the way.
L1- Decompose Requirements to a Verifiable Level

Some of the features may not be sufficiently decomposed to the level that a product or service can be created. It is one thing to understand that most people want a clean hotel room. But to simply require that the hotel room is clean does not help the person who is trying to decide what the product or service looks like. What does “clean” mean? The answer to this question starts with how the customer knows that it is clean. We have already interviewed people and asked them this question. What senses do they use to tell when a job is done to their satisfaction? Do people use sight more than smell to tell? If they use smell, then what kind of scent or odor are they looking for to tell that is either clean or dirty? If it is sight, what visual cues are they looking for? Do they look at the carpet for spots? Do they look at the architecture of the room for crisp lines and proper function and extrapolate cleanliness from these other cues? This is our opportunity to present a set of requirements in a form that is more objective, meaning that we can measure it to determine whether we have met the requirements.

In industrial settings, this is often referred to as derived requirements. In some cases, the stated requirements are sufficient. In others, a great deal of derivation is required. For instance, a requirement may state that a system operate in a stable manner. What does this mean? This can be further stipulated in terms of overshoot and number of oscillations allowed before coming to a stable steady-state condition.

Having said this, we should realize that meeting objective requirements does not guarantee that the subjective requirements of the target market segment will be satisfied. We need to see their reaction in order to get a final validation that they are satisfied. Consequently, it is important that consumers give feedback on prototypes, if possible.

Specifying the product requirements correctly is very important. Remember, everything beyond this point is dependent on getting this right. The product specification focuses the rest of the innovation activities. If a group is involved, it is essential that everyone is on the same page.

At this point, the requirements should be sufficiently decomposed to a level that a product or service can be created from these requirements.

L2-Method

Step 1: Summarize all requirements at whatever level that you currently have them.

Step 2: Decompose or derive the requirements to the objective measurable level that is required to design the product or service. The requirements should be clearly stated and verifiable.

Step 3: List the specific requirements of the product or process.

--Environmental
--Performance
--Safety
--Convenience
--Maintainability
--Reliability
--Aesthetic appearance or taste
L1-Design and Prototype the Offering

This is where we jump out of this book and into the one on designing and prototyping products and services. Designing and prototyping go together because we may be adding layers of subsystems to make the final product. Each of these sub-systems may need to be designed and prototypes built.

Usually, there is a way to prototype some elements of the system. It may take a lot of ingenuity to find inexpensive ways to test your ideas. Sometimes solving “simple” manufacturing problems are the biggest problems of all. The constraint on the market segment may be the ability of any business to manufacture the product or provide the service at the target cost. In this case, the prototype may be the manufacturing method.

Method


The main issues may be involved with the businesses ability to create a product at the target cost. The prototypes may not be product prototypes by rather prototypes of manufacturing methods.
L1-Continue Iterating—Jump Back up to Interviews

This process is iterative in order to make sure that we really understand the target market needs. In some cases, this iteration will be required several times. We may only have one chance to talk to each customer and therefore we need to get as much out of them as possible. We need to put potential functions and prototypes in front of them and get their reactions. This is not a one-time-through proposition.

**Method**

*Jump back up to the interviews. Iterate until you feel confident that you are hearing the same things over and over and the product or service requirements are stable.*
## TRIZ Power Tools

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### Appendix:

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