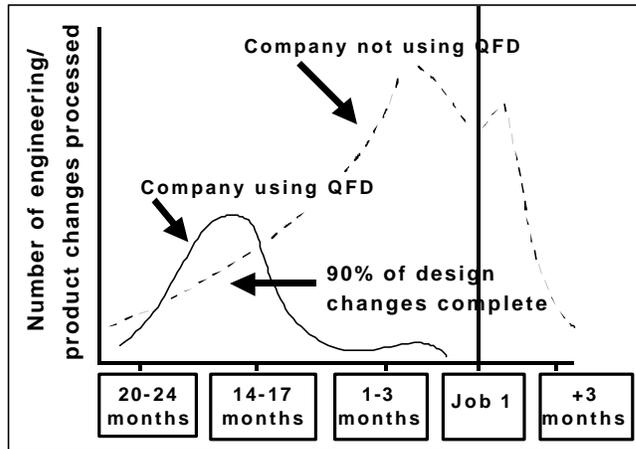


Fewer design changes

Reduce cost

Faster time to market

- ◆ Start later, see fewer changes in customer demands
- ◆ Early QFD participation of downstream processes and suppliers reduces last minute fixes and delays.

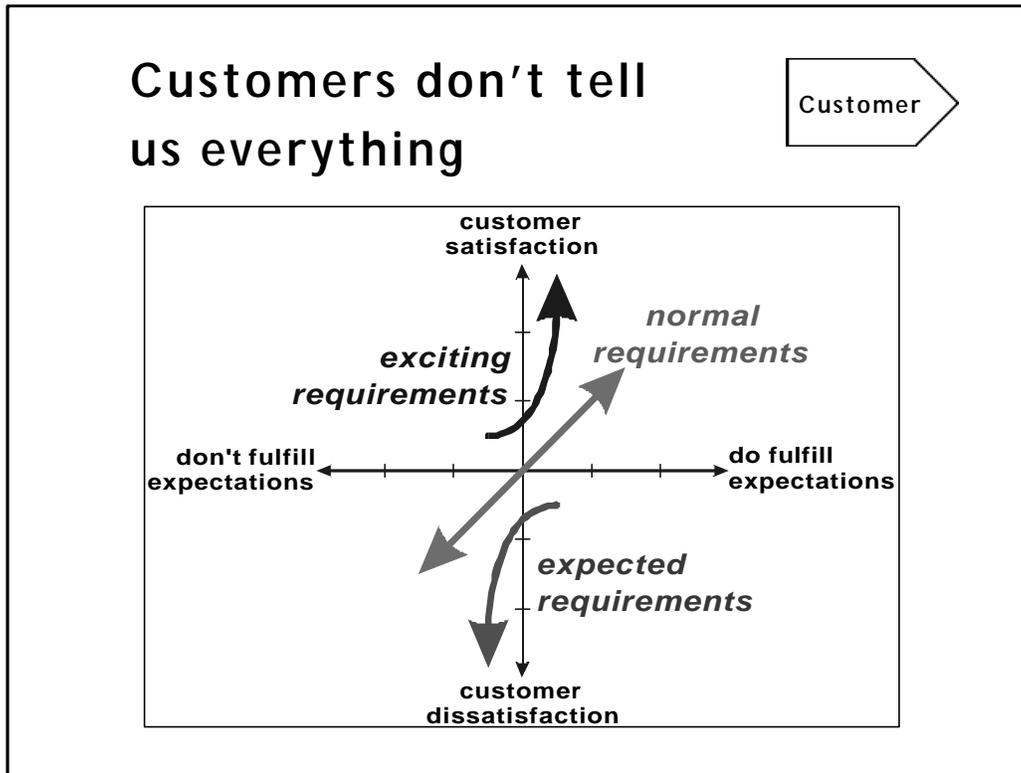


Adapted from L. P. Sullivan, "Quality Function Deployment." *Quality Progress*, June 1986.

In a 1985 study of design practices at Ford and Mazda, Larry Sullivan then QA manager at Ford determined that by using QFD to better understand customer requirements during the early design phases, engineering changes later in the build process could be significantly reduced. Later design changes often require tooling changes which significantly impact cost and schedule. Also, with a better understanding of customers and consumers, design changes due to market changes are reduced. Fewer design changes shortens development cycles which can begin later, and thus be more in tune with the latest market needs.

Suppliers who do QFD can link into manufacturer activities sooner, resulting in fewer design related change orders. In fact, at companies like Toyota and Nissan, it is the supplier base that has been the earliest and strongest champions of QFD.

“An auto maker’s capacity to develop new cars and trucks quickly can give it an edge in responding to swings in customer demand. Savings on engineering and tooling costs translate directly into profit.” - Simison, Robert. “GM turns to computers to cut development costs:” *The Wall Street Journal*, October 12, 1998. P B4.

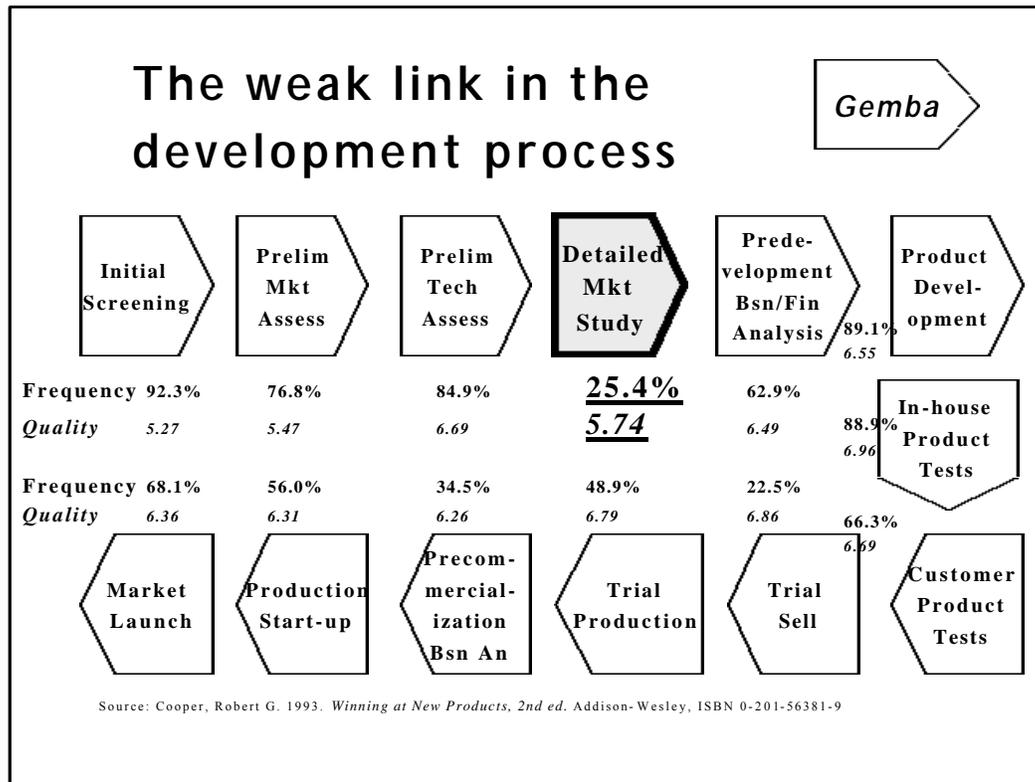


To satisfy customers, we must understand how meeting their requirements affects satisfaction. There are three types of customer requirements to consider. Adapted from "Attractive Quality and Must-be Quality" by Kano, Seraku, Takahashi, and Tsuji, *Hinshitsu*, Vol. 14, No. 2 (1984).

Normal Requirements are typically what we get by just asking customers what they want. These requirements satisfy (or dissatisfy) in proportion to their presence (or absence) in the product or service. Fast delivery would be a good example. The faster (or slower) the delivery, the more they like (or dislike) it.

Expected Requirements are often so basic the customer may fail to mention them - until we fail to perform them. They are basic expectations without which the product or service may cease to be of value; their absence is *very* dissatisfying. Further, meeting these requirements often goes unnoticed by most customers. For example, if coffee is served hot, customers barely notice it. If it's cold or too hot, dissatisfaction occurs. Expected requirements *must* be fulfilled.

Exciting Requirements are difficult to discover. They are beyond the customer's expectations. Their absence doesn't dissatisfy; their presence excites. For example, if caviar and champagne were served on a flight from New York to Chicago that would be exciting. If not customers would hardly



New product sales count for some 50% of company sales and companies are now average some 40-50 new products per year. Fueling this are R&D expenditures of about 2.8% of Gross Domestic Product in developed countries. Despite the importance of new products and the this huge investment in technology, the failure rate for new products runs about 35%.*

Where in the NPD Process do these failures occur? Research suggests that it is usually in the up-front activities that precede manufacturing and production.

In a survey of 203 projects at 123 industrial companies, the 13 key NPD activities were rated by managers in terms of on what % of projects they actually did each of the key activities, and then on a 10 point scale, how well did they actually perform the key tasks.

One of the weakest areas was the detailed market study that included such areas as user needs and wants, concept tests, competitive and positioning analyses, all involving considerable field work with customers.

Quality Function Deployment and Voice of Customer Analysis are activities that will focus marketing, engineering, manufacturing, and production on product features that are important to the customer.

The power of observation

Gemba

- ◆ Go to *gemba*
- ◆ See and hear customer's problems, opportunities, and image issues
- ◆ Not limited by what you ask or want to know
- ◆ Get real!



The Japanese have coined a word to describe the *true* source of information —the *gemba*. The *gemba* is where the product or service becomes of value to the customer, that is, where the product *really* gets used and delivers *real* value to the customer. It is in the *gemba* that we *really* see who our customers are, what their *real* problems are, how the product will *really* be used by them, etc. We go the *gemba* to see our customer's problems and opportunities as they happen.

Unlike other customer information gathering techniques, such as focus groups and surveys, we do not ask questions about problems with our technology or marketing, we do not remove customers to an artificial site such as a meeting room (unless our product is tables and chairs), and we do not rely on customers' memories to report problems to us. Rather, we employ all of our senses using contextual inquiry, video taping, audio taping, direct observation, direct interviewing with customer's employees, etc. for the larger purpose of trying to understand how we can help our customers better conduct their business with *their* customers.

QFD's Greatest Hits



- ◆ Assembled Product: West Bend Baker's Choice
- ◆ Processed Product: Suntory Wine
- ◆ Service: **Host Marriott Bagel**
- ◆ Software: Year 2000 Fix
- ◆ Business Process: **Quality of work life at TELUS**
- ◆ Entertainment: **Triceratops Encounter at Universal Studios**
- ◆ Construction: Sabigawa Dam



Triceratops Encounter, Universal Studios



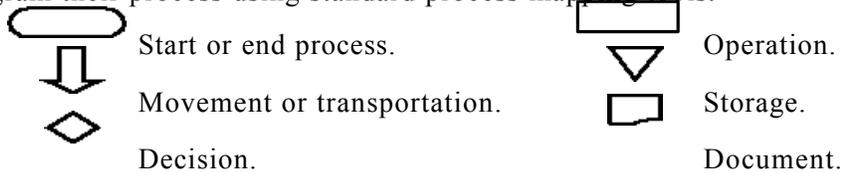
Sabigawa Dam RCD Construction

- **Suntory** looking to make a premium wine, used professional tasters as surrogates for unknowledgeable consumers. VOC data included “makes me think deeply of the meaning of life.” These were deployed to ideal wine characteristics, ideal process characteristics, ideal grape characteristics, and to pruning and horticulture techniques. Is bioengineering next?
- **Host Marriott** discovered unexpected market segments, the woman business traveler, for its airport kiosks. Increasing variety, toppings, and high speed toasting with on-site par-baking led to doubling sales in one month and nearly 400% after three months. *Read case on www.mazur.com.*
- **TELUS**, the recently deregulated telephone utility of Alberta Canada, found it hard to keep its best employees in a newly competitive environment. With QFD, they redefined managers as “sellers” of managerial services to “customers in th employees. Out came a list of management dos and don'ts that improved the quality of work life. *Read case on www.mazur.com.*
- **Consumers Power Company and Andersen Consulting** used QFD and AHP to deal with the century date change in 2000. The team was readily able to structure and translate the “voice of the business” into a framework to achieve a technical and information system obsolescence strategy. Better quality decisions were reached in less time. Jagrowski, et al. 1996 “Making the Millenium Decision: Using QFD and AHP to Tackle the Year 2000 Problem.” *Transactions from the Eighth Symposium on Quality Function Deployment*. QFD Institute. ISBN 1-889477-08-7
- **Sabigawa Dam** north of Tokyo consists of two dams built using a roller compacted road

3.0 Customer Process Table

Customer Process	Customer Scenario (observations and verbatims)	Problems and opportunities
	<p>Woman changing planes in a hub city and no break-fast on plane. Enters kiosk in terminal.</p>	<p>I am starving. I need a nutritious meal.</p>
	<p>Ready-to-eat foods are bagels, donuts, bacon and egg sandwich muffins.</p>	<p>I want something good for me. I want something immediately.</p>
	<p>Bagels are only thing that looks healthy, but they are wrapped in cellophane and look stale.</p>	<p>Pleasant aroma and nice appearance.</p>
	<p>There are only plain bagels and cream cheese. They heat it up in the microwave. Ugh!</p>	<p>I want some variety to choose from. I want my bagel toasted, or at least warmed.</p>
	<p>The microwaved bagel has now become hard and crumbly. When I try to slice with plastic knife, crumbs get all over my blue suit.</p>	<p>Easy to slice. Easy to spread cream cheese on. My clothes don't get messy. Easy to eat.</p>

3.1 Depending on the complexity of the customer’s situation, you can diagram their process using standard process mapping tools.



- 3.2 Capture details of the customer’s scenario as observations and words.
- 3.3 Reword into single issue statements of problems, opportunities, wishes.

Host Marriott

At the bagel gemba, there were many usage issues we had not seen before. For example, the packaged cream cheese was difficult to open, plastic utensils broke, there was no place to sit. Careful analysis of this data and interviews revealed that more bagel varieties and flavored cream cheeses were desired. We also noticed that they were selling bagels in a way that focused on speed of service (they wouldn't cut bagels or toast them which they thought could hold up the line), so they didn't offer the most popular ways bagels are eaten! As Steve Lampa of Host later exclaimed, "Our managers didn't believe customers really wanted a toasted bagel because they never asked for them. Boy, were we wrong!"

House of Quality Exercise

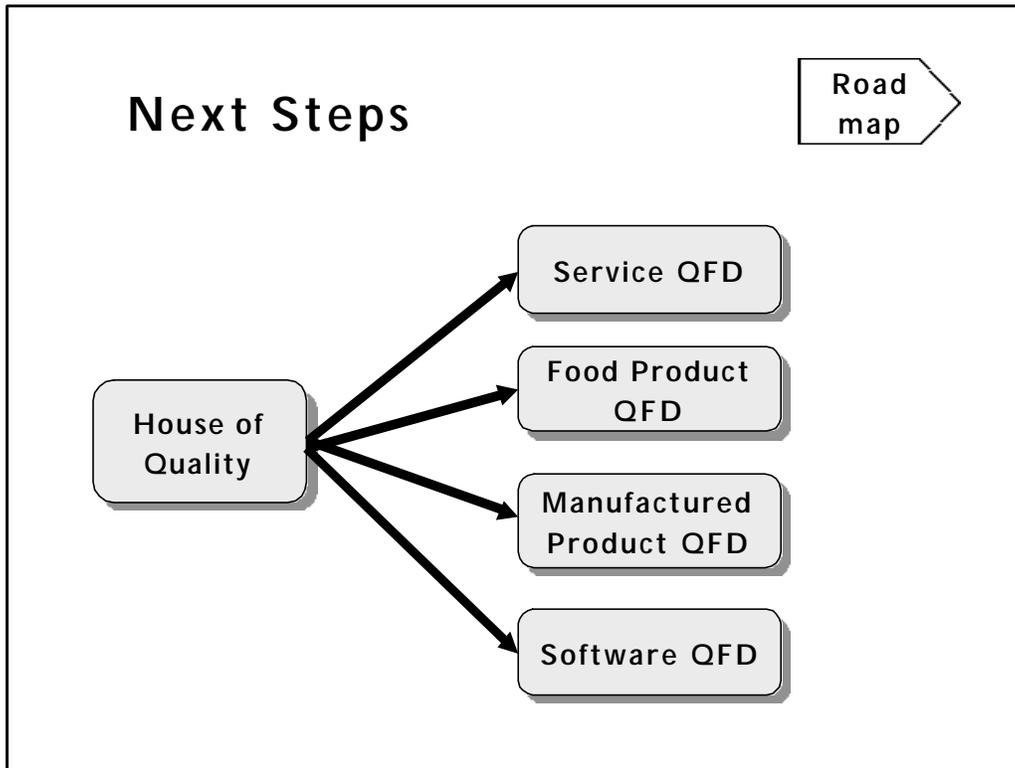


Technical Characteristics	VISIBILITY OF OPTIONS	# BAGEL VARIETIES	# TOPPING VARIETIES	# OF HEATING OPTIONS	IMPORTANCE	CURRENT	BOB EVANS	PLAN	IMPROVEMENT	SALES POINT	ABSOLUTE	CUSTOMER NEEDS WT.
Customer Needs												
MORE BAGEL CHOICES	⊙	⊙			4	2	4	4	2.0	1.5	12	36.7
	330	330										
MORE TOPPING CHOICES	⊙		⊙	○	3	2	3	3	1.5	1.2	5.4	16.5
	148		148	49								
MORE PREPARATION CHOICES			D	⊙	4	2	4	5	2.5	1.0	10	30.5
			31	275								
VISUALLY APPEALING	⊙	⊙	⊙	D	4	3	4	4	1.3	1.0	5.33	16.3
	147	147	147	16								
Absolute Weight	625	477	326	341	1768							32.7
Technical Char. Wt.	35	27	18	19								
Current Product	15-20	2	3	1								
Bob Evans	20% of menu	1	3	2								
Design Target	50-60	4-6	4-5	2								
Unit of Measure	% Case space	# varieties	# varieties	# option								

Legend	
⊙	9
○	3
D	1

Technical Characteristics					Importance Ratio	Our Current Product	Competitor A	Competitor B	Plan	Improvement Ratio	Sales Point	Absolute Weight	Customer Need Weight
Customer Needs													
Absolute Weight													
Technical Char. Wt.													
Current Product													
Competitor A													
Competitor B													
Design Target													
Unit of Measure													

Legend	
⊙	9
○	3
D	1



While the organization may functionally divide along organizational silos, product lines, or even internal vs. supplier activities, true customer focused product development should make these divisions invisible.

QFD begins with a unified voice of customer, but at some point must lead to the various organizational activities, product features, and external partnerships with vendors. In the Comprehensive QFD model is presented here, the House of Quality can lead to different deployments paths that may intersect at later points in the development stage.

To illustrate the breadth and depth of QFD, a service path, food product path, manufactured or assembled product path, and a software path will be studied. Additional paths for improving the organizational aspects of new product development will also be covered.