

## TUTORIAL

### How to Keep the QFD Process on Track: Seven Implementation Guidelines

Above all, quality function deployment is a decision-making tool. By starting at the most basic level of design — analyzing what the customer's desires are and how you can fulfill them — you open up a huge number of questions. But the implications of every tiny decision are very difficult to trace with any degree of precision.

Suppose an auto-maker knows that car drivers want safety and good gas mileage. It may not be difficult for the company's engineers to figure out that one possible way of improving safety, such as making the frame heavier, will have a directly negative impact on the other customer imperative — higher gas mileage.

But it will be much more difficult to determine the consequences for safety of a new method for assembling the fuel-injection electronics that are meant to increase fuel efficiency. The point is that a tool is needed to keep track of the constantly shifting relationships among customer needs, product attributes, and process capabilities.

Since anyone who has had even a passing encounter with QFD is simultaneously fascinated and frightened by the scope of the process, from time to time *DFM Alert* presents suggestions from experts in the field. This month we heard from Dilworth Lyman, a consultant with International TechnoGroup, Inc. (ITI-Milford, OH) and Brad Goldense, president of The Goldense Group, Inc. (GGI-Cambridge, MA). Stemming from hands-on QFD experience in many industries, their advice can be organized around seven umbrella guidelines.

#### 1. Look for the commonly missed voices.

When you sit down to construct the QFD matrices, every effort is made to hear the "voice of the customer." But what about crucial market differentiators that are never spoken? Dilworth Lyman calls them the 'missed voices.' When needs are expressed, alternative remedies can be systematically evaluated. You should also be on the lookout for two other types of unexpressed customer needs:

- The first are those product features or attributes that customers take so for granted

that they might fail to even mention them in a traditional survey. The problem, of course, is that what is obvious to the customer might not be so obvious to your design team. And the only time you'll find out is when the customer sees the product and asks why that "obviously needed feature" isn't included. To overcome this syndrome, ask about twice as many questions as you think you need to.

- The second type of missed voice is the "pleasantly surprised" voice. This is a particularly difficult one to hear because it essentially seeks to ask customers about features that they had never even considered, but which, when they discover them on the product, will surprise them pleasantly. Lyman cites the example of more recent audio compact disk players which randomly rearrange the order in which songs on a disk or a multi-disk cartridge are played, so that the same sequence does not become monotonous. This is just the kind of creative product definition effort that adds valuable points to customer surveys. But QFD does not provide a formal facility for hearing this voice. That's why it is important for users to alter whatever particular QFD methodology they're following to capture this kind of information.

#### 2. Focus on products, not on the charts.

Which brings us to another common problem: focusing more on the charts than on the actual product itself. "People get wrapped up in making a chart and they want to make it real pretty," recalls Lyman. "Their focus slowly shifts to the chart. But you've got to remember that your whole reason for doing this is to make a decision and to develop a plan for executing it." When Lyman gets a severely chart-obsessed group, he suggests they throw the chart away. "That tends to wake them up," he adds.

#### 3. Make sure that techniques used within QFD are included as training for the entire team.

Subsumed under the banner of QFD are a lot of different problem-solving tools, such as Nominal Group Technique (a structured brainstorming approach) and Arrow Diagrams (simple PERT charts). Some people may have used them, some may not have. Some people may have learned a different version of one or more of these tools, perhaps at a different

company. No matter how different the levels of expertise, most or all of the people who do QFD could benefit from a group session to iron out any differences of opinion on how the various techniques should be used. There are often subtle distinctions that have to be made between techniques.

For instance, while Affinity Diagrams (a way of grouping similar items) represent primarily a creative rather than a logical process, Tree Diagrams (which identify the functions and relationships of various substructures) are more logical than creative. Beyond this, it is important that all members of the QFD team understand how each tool fits into your particular project strategy. This means advanced training for everyone as a group. Other major tools include the Pugh Concept Generation method and Inter-relationship Diagrams.

#### 4. Work under the assumption that QFD is more that just a one-time effort.

Don't think that you can just complete the charts, make your choices, produce a product, and then move on. You have to constantly update or else the information no longer reflects the current customer preferences and competitive situation. Matrices are most useful as decision tools when they contain up-to-date information. Whether to respond to a change in customer attitudes or shifting markets becomes of process of revisiting the updated charts.

But be careful of adding in new categories as you go. "If the information in a matrix becomes too diverse," argues Brad Goldense, "conceptual clarity naturally suffers. And when that happens, updating the charts becomes very difficult, which means that you are less likely to do it. And then you lose a lot of the benefit, because updating is really the key."

#### 5. Don't forget the importance of sequence.

The sequence of the questions your team asks is almost as important as the number and quality of those questions. Lyman has set up a rough order of critical questions. "But," he adds, "if information comes in in a different order, by all means process it right away. There's no point in waiting." Here's the list: What is the mission of the team? Who is the customer? What do the customers want from the product? How important are each of the WHATs? How can we verify that the product meets the WHATs? Which HOWs are the most important? What are

the tradeoffs between the HOWs? What target values should be established?

#### 6. One way or another, follow through with the process.

One problem that Goldense has heard a lot from users who are first introduced to QFD is that the scope of the project is not adequately conveyed to them. "They get through the planning [i.e., the first] matrix, and come to realize that that's only a fourth of the process," he says. Goldense then takes a hit at quality consultants who do not make their clients fully aware of the extent of the QFD process. "I've had an experience with one company that has been turned off to QFD once it got into the process and realized what an enormous task it was."

Lyman has come across the same problem in his experience. "Groups like that end up doing just the first matrix," he says. "And then they feel guilty that they didn't do the rest of it. But the point is that if they decided from the beginning that they were going to just do one or two matrices, some of the vital elements from the matrices left out could be folded into a revised version of the first two."

Goldense has a slightly different solution. He urges users who, for one reason or another, are not going to complete all the matrices to find substitutes for those matrices that are left out. "For instance, all companies have process control resources that can be linked into the QFD," he argues. "The challenge is to find a speedy way to do it."

#### 7. Assemble a team of no more than six people.

What follows is Goldense's generic ideal QFD team. One caveat he raises is that the approach to team construction at your firm will depend on the approach to quality in your organization. For instance, is quality embedded in each function, as opposed to having a separate quality control department? If there is no "quality" perspective as such that must be included, that frees up a space on the team. "A group of more than six people is almost always ineffectual at drawing substantial conclusions," Goldense argues. Here are the six:

- Product Manager (Marketing person): The title here is important, says Goldense, because it is important that this person see this not as just a project, but as a series of projects that will stretch into the next product generation. The product manager will keep

on top of time constraints and know what is essential to keep the product line within the bounds set for it. He or she will have to make the ultimate decision of when a feature has to wait for the next release.

- **Design Engineer:** This is obviously a key person. It is the team member on whom everyone else will rely for a good deal of the analysis.
- **Software engineer** (if the product calls for software): Software expertise usually resides in the engineering department. But it must be included on the team separately, and not just rolled into the responsibilities of the design engineering representative. ALTERNATIVELY, (when software is not a factor), this person should be replaced by a senior service manager. Down-stream responsibility is too often consulted only summarily. When software is on the team, the product manager must represent the service function, or else it should be represented by manufacturing.
- **Manufacturing Engineering:** Of all the people in manufacturing who could be put on the team, the best to have, says Goldense, is someone who knows, not only the way parts are made, but also the logistical constraints of the process. Having someone on the team who knows the flow capabilities of the plant is essential to a realistic product definition assessment.
- **Materials Engineer/Purchasing Manager:** Not represented by the 'manufacturing' team member is the company's materials expertise. The question then becomes, should this person be an engineer, or can someone from purchasing do the job? The generally low level of technical understanding found among buyers would favor putting the engineer on the team. But consider the oft-cited statistic that designers spend only 20% of their time

designing, and perhaps it does make sense to have a purchasing person doing QFD. Don't hand responsibility over to engineering just because the technical competence of purchasing personnel is currently low. Do training if you have to. "Corporate America really has to tune into this," Goldense warns, "because in nine out of ten companies you look at, purchasing is the poor boy."

- **Finance Person:** The first qualification for this position is that the person be able to draw up flexible guidelines regarding the use of working capital. "In a new product development effort you may find that you can't use any of your existing tooling, so you need to pay \$50,000 for new tooling," explains Goldense. "A company typically has a limited capital budget. Now all of a sudden \$50,000 must be changed in the middle of the planning year. Usually, capital budgets are set on an annual basis. But new product ideas can be spurred at any time of year." How you set up your capital budget, therefore, is very important.

### ***In Summary***

In theory, QFD is a mechanical, dispassionate tool for achieving very specific technical aims. In practice, of course, it is a much more temperamental process, prone to misunderstandings. The natural tendency is to want to include everything. After all, that's the point of QFD — to weigh each factor in light of all the rest. But we've heard of matrices as large as 600 x 2000 for products that have yet to get off the ground. The guidelines above deal largely with finding a balance between thoroughness and timeliness. We will continue to update the state of the art in QFD in future issues of *DFM Alert*.

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