Structured Product Definition
The first step to a successful new product

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Abstract

Successful New Product Development (NPD) is the lifeblood for many organizations. The first step in any endeavor is always the most important as it sets the direction. For NPD projects this first step is defining what the product should be.

Structured Product Definition (SPD) is a revolutionary new method that provides a customer-focused and measurable product definition, while focusing on team-building and unambiguous communications.

- SPD pulls together the customer knowledge that already exists within the organization.
- SPD focuses on team and consensus building to foster an alignment with project and corporate goals.
- SPD uses databases and structured reports to help the team accomplish their goal and to provide the ability to monitor their progress.

Compared to the Japanese developed Quality Function Deployment (QFD), SPD is quicker, more flexible, and less expensive. Its team-based approach is cognitive of our Western culture and works with the culture, instead of trying to alter the culture. Its database and report methodology is easier to use and monitor than the complex "House of Quality" graphics. Typically the process is 1/3 to 1/10 the cost of QFD.

Understanding the Customer

Building the team

The Structured Product Definition involves the total development team and is facilitated by a Product Development expert. Using a variety of quantitative, qualitative, and brainstorming techniques the product knowledge is gathered and formatted into a highly usable database.

The process starts with a one-day meeting of the total team during which we begin to capture the organizations knowledge. First the rationale for initiating the project is discussed and clarified. Next the Purchase Stakeholders, that is: "Who is involved in the purchasing decision?" are identified along with their relative influence as shown in Figure 1. Finally the Demanded Qualities (Customer requirements) are defined and structured into a logical hierarchy. Demanded Qualities are those attributes that drive a customers purchase decision. These are expressed in the Customer's own language as shown in Figure 2.

Over the next 1-2 weeks this qualitative information is finalized. The results from that first meeting are refined and entered into a database for review and reporting. A questionnaire is quickly generated and will be used to prioritize and verify the identified qualities. Concurrently, a review to rate competitive or analogous products is scheduled. If possible, customers are used for both the ranking questionnaire and the competitive rating.

Once the results of the ranking questionnaire and competitive ranking are recorded and analyzed, a team meeting is scheduled to review the information and finalize the selection of which qualities should be focused on while developing the product.

Setting goals

At this point, the team has reached a consensus on the important areas of development (important to the customer) and must convert the "soft" Demanded Qualities into "hard" Performance Measures. Typically, many of these measures already exist as test criteria and corporate requirements. The appropriate performance measures are matched with the relevant customer's requirements.

The final step to complete the definition is to choose target values for the Performance Measures. To assist in this, it is useful to benchmark the same competitive products that the customers evaluated. Correlating the customer's perception of competitive products with their measured performance provides insight to the appropriate target values for the new design.

These target values and the measurement criteria provide clear and concise goals for the design team. They are also quantitative method for tracking the development's progress. Once again all this information is maintained in a database form, allowing for quick and flexible reporting as shown in Figure 3. The sum total of this information is the Structured Product Definition.

Developing the product

Tracking progress

With team consensus on the Product's Definition, the project can proceed to success. A tight linkage is maintained to the definition through the use of two techniques. First a Concept Selection Matrix is used to evaluate alternatives at the earliest stages of the design. This form, shown in Figure 4, is similar to the Pugh's Selection Chart, this technique allows rapid comparison and selection while the design is still in a theoretical form.

A FMEA–like analysis is used to analyze and organize the effort that is required to meet the target values. These reports, shown in Figure 5, are customizable allowing specific items to be distributed to the responsible individuals and an overview to be distributed to those with oversight responsibilities.

Later on, as the design progresses, a Performance Tracking ScoreCard (figure 6) is used to track the design's progress. The score is calculated from the difference between the Target value and the Actual value and is used for a fast reference of the design's progress.

Once the product is released to production, the SPD database is linked to a specific piece part or assembly. This provides a permanent "memory" of the product's requirements that ensures a product's quality is maintained during subsequent redesigns.

This example project, the redesign of a commercial beverage dispenser, is illustrated by actual reports from the SPD database. They can be viewed at http://www.dmajic.com/spd/spd.html

David Anderson is a Product Development expert with over 25 years experience. He has designed many successful products ranging from Agricultural Equipment to Medical Devices. He has been a driving force, leading process improvements that improve consistency and efficiency while reducing costs. Dave is an innovator with several U.S. patents and extensive experience in information systems and engineering computer tools.

Stakeholder List — **Beverage Dispenser Project**

Organization	Stakeholder	Stakeholder Description	Stakeholder Duties	Influence
All Ops	Service Staff	Franchise Operations	Maintain and Repair	1%
All Ops	Installers	Franchise Operations	Initial Install	2%
All Ops	Store Manager	Either local or franchise manager	Purchase / Approve	15%
All Ops	Crew Member	Store Operations	Fill order	1%
	Total	**All Ops**		**19%**
Consumer	Table Served	Either table or counter served	Select Brand	5%
Consumer	Self Served	Retail Consumers	Fills order, chooses	15%
	Total	**Consumer**		**20%**
Distribution	Syrup Distributors	Brand Name Distributors	Marketing / Distribution	15%
Distribution	Bottlers	Brand Name Producers	Production / National Sales	5%
Distribution	Distributors	Regional / Local Suppliers	Production / Distribution / Install	5%
Distribution	Equipment Mfg	Dispenser Manufacturers		5%
	Total	**Consumer**		**20%**

Figure 1. Stakeholder's are identified and their influence on the purchasing decision is allocated

Demanded Qualities — **Beverage Dispenser Project**

Logical Group
How drink is poured **Ice** .

#	Demanded Quality	Explanation	Rank
1	No Ice Run On	Ice stops flowing once cup is removed	2
2	Ice portion control	Amount of ice can be preselected	4
3	Ice doesn't spill onto drip tray	Minimum ice runout to reduce the ice buildup in the tray	3
4	Dispense Ice and Product at same time		1
5	Consistent quantity of Ice	Each lever press results in consistent quantity of ice being dispensed	3

Figure 2. Demanded Qualities are the Customer's Requirements for the product in their own language. These are ranked according to the customer's perceived relative importance. Using this information, the team selects the items that will be included in the development process.

Performance Measure — Beverage Dispenser Project

How drink is poured

Ice

Demanded Quality	Rank	Performance Measure	Procedure	Value	GRP
Consistent quantity of Ice	0.024	Granularity of Ice	Sort Ice delivered using .25 dia mesh (square), measure % over, pour through .01 dia mesh	95	ICE
Consistent quantity of Ice	0.024	Weight of Ice	Fill Ice Hopper, Press dispense lever 2 sec, weigh ice delivered	1	ICE

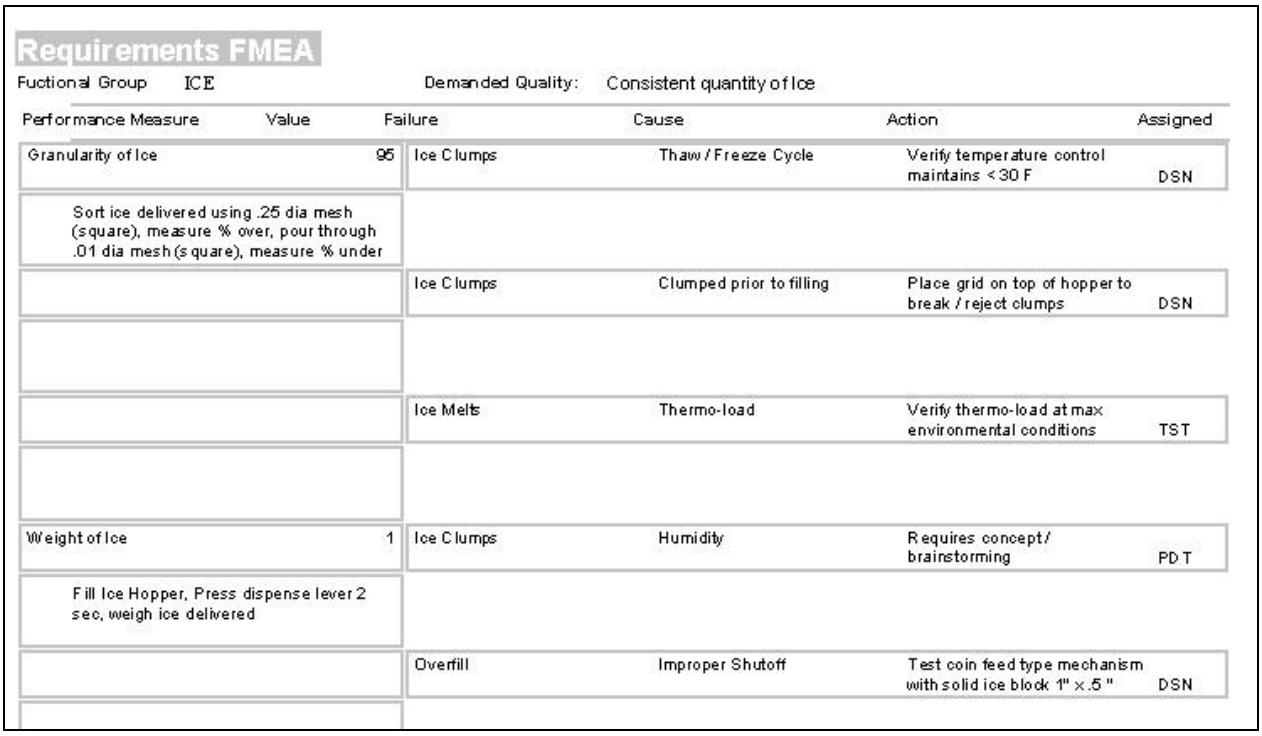
Figure 3. Quantitative measurements are associated with each Customer Demanded Quality. The Value (Target) is determined with the help of competitive analysis and existing corporate standards. Once set, the design team has a clear and concise specification for the product.

Concept Selection

Fuctional Group ICE **Demanded Quality:** Consistent quantity of Ice

Performance Measure	Value	Benchmark	Concept 1	Concept 2	Concept 3	Concept 4	Concept 5
Granularity of Ice	95						
Weight of Ice	1						
Sum of pluses / minuses ==========>							

Figure 4. Concept Selection charts can be easily generated to aid in the concept selection process.

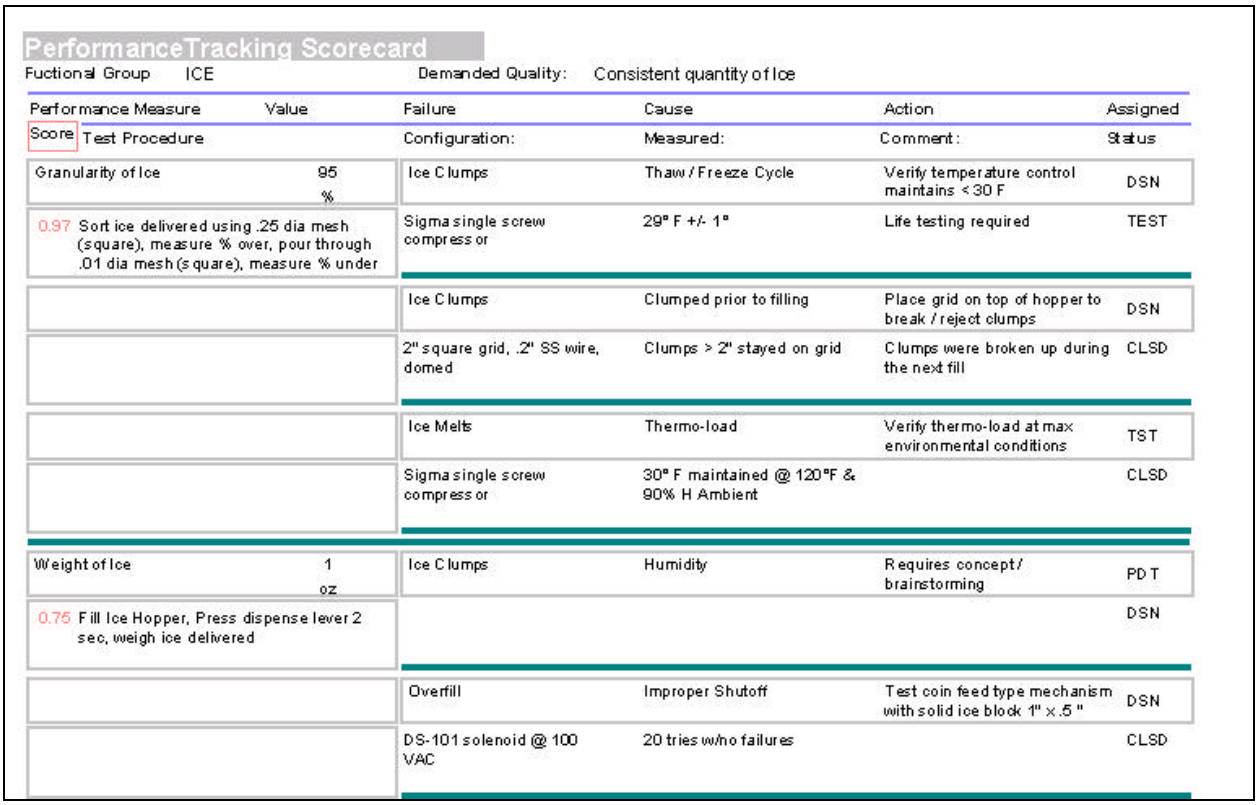


Requirements FMEA

Fuctional Group ICE — Demanded Quality: Consistent quantity of Ice

Performance Measure	Value	Failure	Cause	Action	Assigned
Granularity of Ice	95	Ice Clumps	Thaw / Freeze Cycle	Verify temperature control maintains < 30 F	DSN
Sort ice delivered using .25 dia mesh (square), measure % over, pour through .01 dia mesh (square), measure % under					
		Ice Clumps	Clumped prior to filling	Place grid on top of hopper to break / reject clumps	DSN
		Ice Melts	Thermo-load	Verify thermo-load at max environmental conditions	TST
Weight of Ice	1	Ice Clumps	Humidity	Requires concept / brainstorming	PDT
Fill Ice Hopper, Press dispense lever 2 sec, weigh ice delivered					
		Overfill	Improper Shutoff	Test coin feed type mechanism with solid ice block 1" x .5 "	DSN

Figure 5. FMEA analysis provides a method for assignment and tracking of project activities.



PerformanceTracking Scorecard

Fuctional Group ICE — Demanded Quality: Consistent quantity of Ice

Performance Measure	Value	Failure	Cause	Action	Assigned
Score Test Procedure		Configuration:	Measured:	Comment:	Status
Granularity of Ice	95 %	Ice Clumps	Thaw / Freeze Cycle	Verify temperature control maintains < 30 F	DSN
0.97 Sort ice delivered using .25 dia mesh (square), measure % over, pour through .01 dia mesh (square), measure % under		Sigma single screw compressor	29° F +/- 1°	Life testing required	TEST
		Ice Clumps	Clumped prior to filling	Place grid on top of hopper to break / reject clumps	DSN
		2" square grid, .2" SS wire, domed	Clumps > 2" stayed on grid	Clumps were broken up during the next fill	CLSD
		Ice Melts	Thermo-load	Verify thermo-load at max environmental conditions	TST
		Sigma single screw compressor	30° F maintained @ 120°F & 90% H Ambient		CLSD
Weight of Ice	1 oz	Ice Clumps	Humidity	Requires concept / brainstorming	PDT
0.75 Fill Ice Hopper, Press dispense lever 2 sec, weigh ice delivered					DSN
		Overfill	Improper Shutoff	Test coin feed type mechanism with solid ice block 1" x .5 "	DSN
		DS-101 solenoid @ 100 VAC	20 tries w/no failures		CLSD

Figure 6. Status and important performance information can be communicated to the development team and management via the Performance Tracking Scorecard.