



QFD

Quality Function Deployment

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Sydney

Dr Farhad Shafaghi

The AMC

- An independent organisation originally funded by NSW and Commonwealth Government
- Members of the AMC include:
 - University of Sydney
 - University of NSW (including Unisearch and IMMT)
 - The University of Technology, Sydney
 - Australian National University



Why do Customers Buy a Certain Product over another?

- Reliability
- Safety, Safer
- Durability
- Ease of use
- Marketing
- Conformance to standards
- User Familiarity
- Aesthetics



Why do Customers Buy a Certain Product over another?

- **Less tax, insurance, etc.**
- **Less/easier maintenance**
- **Performance**
 - More, longer, greater, less, faster, etc.
- **Physical Features**
 - More, less, smaller, larger, easier, etc.
- **Lower Price**

Methods to focus on Customers

- **QFD**
 - **Quality Function Deployment**
 - Pugh concept Selection
 - Cultural anthropology
 - Kansei analysis

QFD History

- **Developed in Japan**

Introduced to Japan in 1966 by Yoji Akao

Used in 1970 by Kobe Shipyard

Adopted by Japanese Car makers

- Wanted to beat Volkswagen
- First used for Toyota Door Rust Problem

Moved to electronics

- Panasonic - Just Slightly Ahead of our Time

- **Toyota Auto body uses QFD to reduce cost of producing vehicle bodies.**

1974 430,000 units per year at \$71 per unit

Cost of \$30,530,000, or 1.5 times annual profit

Used QFD in Process Planning and Production Planning



QFD History cont..

- Toyota cont...
 - QFD reduced production launch costs by 61% from Jan. 1977 to Apr. 1984
 - Product development time was reduced by a third while quality increased.
- **Developed for supertanker manufacturing by several universities**
- **1978 first book was written on QFD, in 1994 it was translated to English**
- **QFD is now used widely in Japan**



QFD History cont..

- Origins of Name

品質
HIN SHITSU

Quality
Features
Attributes
Qualities

機能
KINOU

Function
Mechanization

展開
TEN KAI

Deployment
Diffusion
Development
Evolution

QFD....also known as.....

- **Quality Function Deployment or QFD for short**
 - **Has also been called**
 - Voice of the Customer
 - the House of Quality
 - Customer-Driven Engineering
 - Matrix Product Planning
 - Decision Matrix



What is QFD?

- QFD is understanding the needs of the customer and converting them into a set of design and manufacturing requirements.
- It is a design tool of TQM.
- It is a systematic process for motivating business to focus on its customers.
- QFD helps companies design more competitive products, in less time and with less cost

What is QFD? cont..

- Defining requirements is its most common use
- It helps make the transition from reactive to preventative manufacturing quality control.
- Helps to create a closed loop of ever improving cost, quality, timeliness, productivity, profitability, and market share.

Quality Function Deployment

- QFD is a pointed way of listening to customers to learn exactly what they want, and then using a logical system to determine how best to fulfill those needs with available resources.
- QFD is a team builder, provides focus
- Provides road to show how each step from design to delivery helps meet customer requirements



Quality Function Deployment

- Answers three basic questions
 - What are the qualities the customer desires?
 - What function(s) must this product serve and what functions must we use to provide this product of service
 - Based on the resources we have available, how can we best provide what our customer wants



Voice of the Customer

- Defining the voice is the most time consuming step in QFD
- Captured using Requirements Engineering techniques.
- A clear voice is essential .
- Quality is defined by the customer using their own terms.
- QFD carries the voice to the factory floor.
- Not all customer requirements can be easily identified.
- It can include a diverse number of people.



QFD Team Work

- Teams are multidisciplined and represent all key functions.
- Are used from initial identification of requirements to deployment of requirements.
- Team members work toward a shared goal of a customer defined product.



What does QFD do?

- Takes broad product specifications or specific problems and, through a series of matrices, breaks them into specific action assignments.
- These actions set the minimum level of effort that must be made to satisfy the customer.

Why do we need QFD?

- Primary goal is to overcome three major problems:
 - disregard for the voice of the customer
 - loss of information
 - different individuals and functions working to different requirements

Definition of Quality

- Hard to define
- Best description?
 - Fulfills requirements
 - is on time
 - and within costs?
- Quality is in the eye of the beholder
- QFD helps you fulfill your customer's concept of quality



QFD Applications

- More efficient Product development
- Improved Product quality and reliability
- Greater Customer Satisfaction
- Better proposals and Quotations

QFD - Traditional Trade offs

- The LAWS OF NATURE
 - Product quality can be improved only if a company spends more money
 - Product cost can be lowered if the product or process is cheapened.
 - A product can be brought to market sooner if certain steps are omitted, or if extra money is spent to speed up certain operations

QFD – Different Approaches

United States

- Everything is important
- Manage the tolerance stackup
- React to customer problems

Japanese

- Decide what is important
- Design to reduce variation
- Optimize the product



The QFD System

- QFD Model
 - Objective Statement
 - What's
 - Importance Ratings
 - Correlation Matrix
 - How's
 - Target Goals
 - Relationship Matrix
 - Customer Competitive Assessment



The QFD System

- QFD Model - cont'd
 - Technical Competitive Assessment
 - Probability Factors
 - Absolute Score
 - Relative Score

QFD Works

- QFD enables teams to reach consensus on:
 - what to do
 - the best way to do it
 - the best order in which to accomplish it
 - the staffing and resources required

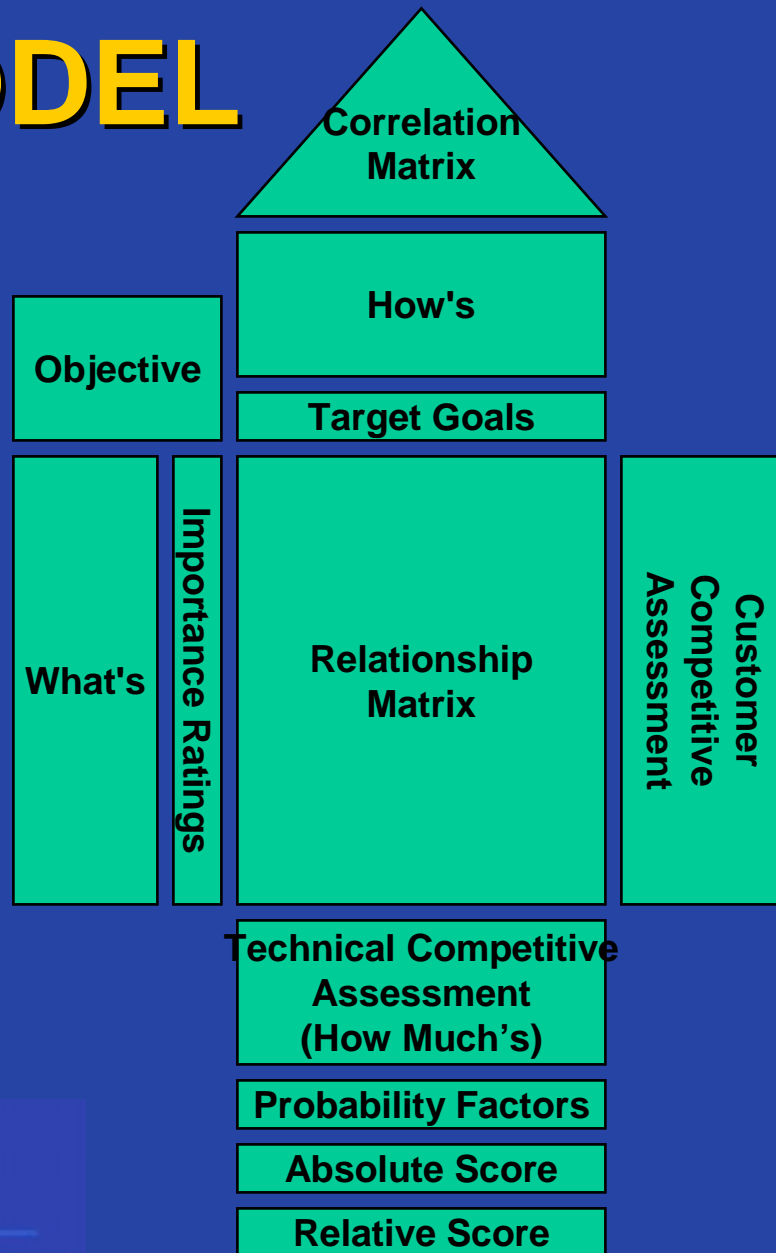
QFD is a Strategic Tool

- Helps bring together diverse data and allows a structured logical decision to be made.
- This data can be collected and evaluated in the earliest phases of a project.

QFD Thinking

- Paradigm - a model of how something is done
- QFD changes the focus from manufacturing quality control to product design quality control.

QFD MODEL



The Four Phases of QFD

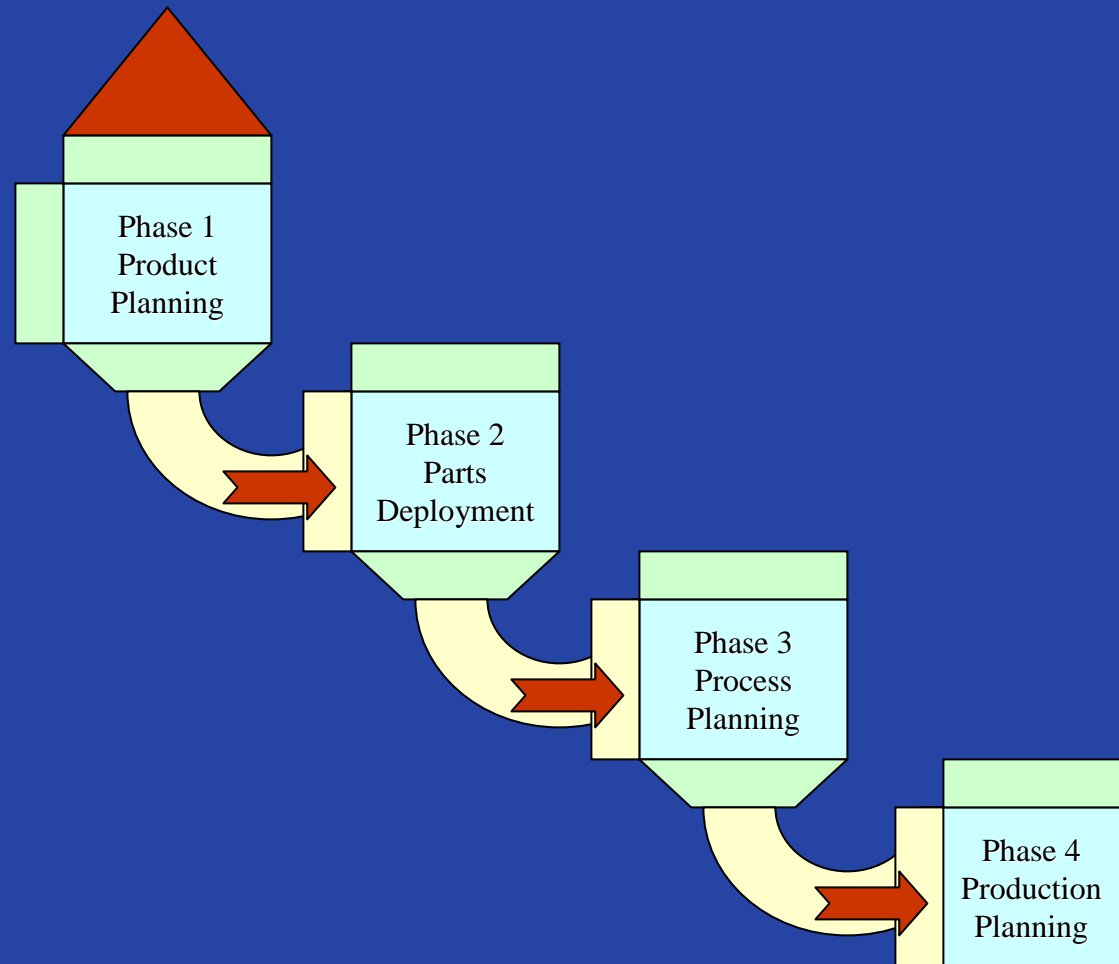
- Design
- Details (parts)
- Process
- Production



The Four Phases of QFD

- Each Phase has a column of Whats
- and a row of Hows
- The most important are carried forward to the next phase.

The 4 Phases cont..



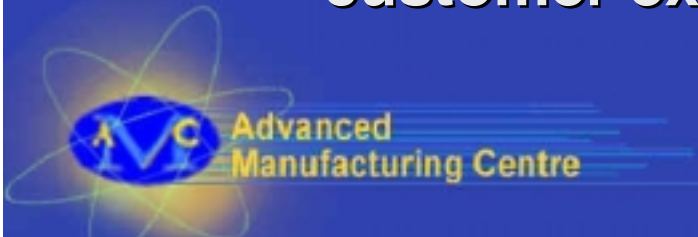
Four Phases to QFD

- **Phase I: Product Planning**
 - Centered around the House of Quality
 - Defines the customers wants in relation to the product
- **Phase II: Parts Deployment**
 - Product engineering functions
 - design characteristics are transferred to part characteristics



Four Phases to QFD cont..

- **Phase III: Process Planning**
 - Move from design to manufacturing operations.
 - Process for improvement is developed
 - Involves floor level personnel
- **Phase IV: Production Planning**
 - Employees on the floor contribute knowledge
 - Employee activities interact to achieve customer expectations.



What Does QFD Provide

- What Do The Customers Want?
- Benchmarked Existing Products
- Evaluated Design Tradeoffs
- Set Targets For Design Measures Guidance In Information Gathering Process
- Systematic Evaluation Of Products And Needs
- Quantification Of Needs
- Justification Of Decisions
- What Was The Goal?
- Defined Product Placement



Issues/Lessons

- Facilitator
- Planning And Research Are Essential
- Training
- Automated Tools Are Necessary
- Recording
- Issues List

Where Does QFD Fit

- What types of companies
- Will It Work In North American Business Climate?
- New Products
- New Situations
- Variety of Business Analysis/Decision Making Processes



Why do we need QFD?

- Controls Murphy's Law
- Builds a knowledge base
- Ties together various product development stages.
- Overcomes differences amongst corporate functions

QFD Benefits

- **Shorter Development Cycles**
- **None of the Traditional Trade-offs**
- **Lower Costs, Greater Productivity**
- **Commonly, a reduction in costs of 50% and 200% increases in productivity**

Benefits

- Traceability Of Requirements
- Forces Focus On Customer Needs
- Short Development Cycle
- Low Cost, High Productivity Once Background Work Is Done
- Improved Quality And Reliability
- Increased Market Share
- Possible With Distance Groups (DQFD)



Cautions

- **Expensive And Difficult**
- **Requires Extensive Customer Involvement**
- **Requires Competitor Analysis**
- **Comprehensive Process**
- **Not Suited To North American Organizations?**

Where To Now?

- Look At Alternative Concepts
- Conceptualization Of Product
- Additional “Houses”
- Design

How To Do The Exercise

- “Voice of Customer” information
 - interviews, surveys, and focus groups
- Competitor Analysis
 - UltraDesk
 - VD (Virtual Desks)
 - Desks Galore

The First Exercise

- See Handouts



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What Does Exercise One Provide Us With?

- What
- Customer View/User Voice
- User Part Of Process

What Can We Learn From It?

- Which Customer Requirements Are Most Important?
- What Are Our Strengths And Weaknesses?
- Where Do We Focus Our Efforts?
- Where Do We Position Ourselves?
- Where Do We Need To Do The Most Work?
- Where Must We Go To Meet Our Customers Expectations?

How To Do Exercise 2

- “Voice of the Designer”
 - Asks “How?”
 - Measurable / Specific
- Relationship Matrix
 - Asks “How well?”
 - Numerical value (1, 3, 9)
- Target values
 - Evaluate Customer Importance and Business Objectives

The Second Exercise

- See Handouts

What Does Exercise Two Provide Us With?

- How
- Supplier Voice
- Design Measures
- Product Features

Inputs

- Technical Assessment
- Evaluation Of Customer Requirements

Outputs

- List Of Relevant Features
- Relationship Matrix
- Target Goals

What Do We Get From It?

- Input to Decide What We Need To Do To Reach Our Goal
- Visual/Numeric Representation Of Technical Requirements

How To Do Exercise 3

- Importance of Technical Specification
 - Sum of Products
 - Overall Importance rating
- Correlation Matrix (the roof)
 - Synergies (Positive and Negative)

The Third Exercise

- See Handouts



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What Does Exercise Three Provide Us With?

- Evaluation Of Matrix

Inputs

- **Matrix**
- **Technical Evaluation Of Product Features**

Outputs

- **Visual Representation Of Which Features Are Compatible/Incompatible**
- **Visual/Numeric Analysis Of How Features Contribute To Overall Goals**

What Do We Get From It?

- **What Features Have Synergies And Which Have Negative Synergies?**
- **Input To Determine What Actions To Take In Light Of Tradeoffs.**
- **Numeric/Visual Representation Of How Features Will Fulfill Goals**

Discussion

- Issues and Questions



Advanced Manufacturing Centre

Located at the

**Australian Technology Park,
Sydney**

visit us at www.amc-atp.com

ph: 02 - 9209 4209