Chapter 6

Design for quality

Design, innovation and improvement

Products, services and processes are designed both to add value to customers and to generate profit. But leadership and management style is also designed through the creation of symbols and processes which are reflected in internal communication methods, materials and behaviour. Almost all areas of all organizations have design aspects inherent within them.

Design can be used to gain and hold on to competitive edge, save time and effort, deliver innovation, stimulate and motivate staff, simplify complex tasks, delight clients and stakeholders, dishearten competitors, achieve impact in a crowded market and justify a premium price. Design can be used to take the drudgery out of the mundane and turn it into something inspiring, or simply make money. Design can be considered as a management function, a cultural phenomenon, an art form, a process, a discrete activity, an end-product, a service or, often, a combination of several of these.

In the Collins *Cobuild English Language Dictionary*, design is defined as: 'the way in which something has been planned and made, including what it looks like and how well it works.' Using this definition, there is very little of an organization's activities that are not covered by 'planning' or 'making'. Clearly the consideration of what it looks like and how well it works in the eyes of the customer determines the success of products or services in the market place.

All organizations need to update their products, services and processes periodically. In markets such as electronics, audio and visual goods, and office automation, new variants of products are offered frequently – almost like fashion goods. While in other markets the pace of innovation may not be as fast and furious there is no doubt that the rate of change for product, service, technology and process design has accelerated on a broad front.

Innovation entails both the invention and design of radically new products and services, embodying novel ideas, discoveries and advanced technologies, *and* the continuous development and improvement of existing products, services and processes to enhance their performance and quality. It may also be directed at reducing

costs of production or operations throughout the life cycle of the product or service system.

Within all industries rapid innovation is changing every aspect of the business, including the products and the services offered. These include an increase in the use of IT based technologies in design, communication, management, manufacturing and service delivery. In addition there are numerous examples of new technologies such as new equipment for materials handling and assembly, new products and materials, new financing arrangements and new procurement processes which involve the sharing of risk.

In many organizations innovation is predominantly either technology-led e.g. in some information and communications industries, or marketing-led e.g. in fmcg (fast moving consumer goods). What is always striking about leading product or service innovators is that their developments are market-led, which is different from marketing-led. The latter means that the marketing function takes the lead in product and service developments. But most leading innovators identify and set out to meet the existing and potential demands profitably and, therefore, are market-led constantly striving to meet the requirements even more effectively through appropriate experimentation.

Everything we experience in or from an organization is the result of a design decision, or lack of one. This applies not just to the tangible things like products and services, but the intangibles too: the systems and processes which affect the generation of products and delivery of services. Design is about combining function and form to achieve fitness for purpose: be it an improvement to a supersonic aircraft, the synthesis of a new drug, the development of a new building material or product, a new management process, a staff incentive scheme or a hand-held media device.

Once fitness for purpose has been achieved, of course, the goal posts change. Events force a reassessment of needs and expectations and customers want something different. In such a changing world, design is an on-going activity, dynamic not static, a verb not a noun – *design is a process.*

THE DESIGN PROCESS

Commitment from the most senior management helps to build quality throughout the *design process* and to ensure good relationships and communication between various groups and functional areas, both within the organization and across the supply chain. Designing customer satisfaction and loyalty into products and services contributes greatly to competitive success. Clearly, it does not guarantee it, because the conformance aspect of quality must be present and the operational processes must be capable of producing to the design. As in the marketing/operations interfaces, it is never acceptable to design a product, service, system or process that the customer wants but the organization is incapable of achieving.

The design process often concerns technological innovation in response to, or in anticipation of, changing market requirements and trends in technology. Those companies with impressive records of product- or service-led growth have demonstrated a state-of-the-art approach to innovation based on three principles:

- *Strategic balance* between product/service and process development to ensure that product and service innovation maintains market position, while process innovation ensures that production risks in safety, quality and productivity are effectively controlled and reduced.
- *Top management approach* to design and product/service creation to set the tone and ensure that commitment is the common objective by visibly supporting the design effort. Direct control should be concentrated on critical decision points, since over-meddling by very senior people in day-to-day project management can delay and demotivate staff.
- *Teamwork*, to ensure that once projects are under way, specialist inputs, e.g. from marketing and technical experts, are fused and problems are tackled simultaneously. The teamwork should be urgent yet informal, for too much formality can stifle initiative, flair and the 'fun' of design.

The extent of the product/service creation process (PSCP) should not be underestimated, but it often is. Many people associate design with *styling* of products, and this is certainly an important aspect. But for certain products and many service operations the *secondary design* considerations are vital. Anyone who has bought an 'assemble-it-yourself' kitchen unit will know the importance of the design of the assembly instructions, for example. Aspects of design that affect quality in this way are packaging, customer-service arrangements, maintenance routines, warranty details and their fulfilment, spare-part availability, etc.

An industry that has learned much about the secondary design features of its products is personal computers. Many of the problems of customer dissatisfaction experienced in this market have not been product design features but problems with user support, availability and loading of software, and applications. For technically complex products or service systems, the design and marketing of after-sales arrangements are an essential component of the design activity. The design of production equipment and its layout to allow ease of access for repair and essential maintenance, or simple use as intended, widens the management of design quality into the supply chain and contractors and requires their total commitment.

In the construction industry, design has a much larger role than is generally recognized; for example, on site, in the process of assembling a building, the selection and positioning of equipment is a design task. Similarly the selection of technology – the decision between using cast in place or prefabricated components – is also essentially a design task. Proper design of plant, equipment, buildings and surrounding environments plays a major role in good process operation, the elimination of errors, defectives and waste. Correct initial design also obviates the need for costly and wasteful modifications to be carried out. It is at the design stage that such important matters as variability of details, reproducibility, technical risk of failure due to workmanship, ease of use in operation, maintainability, etc. should receive detailed consideration.

Designing

If design quality is taking care of all aspects of the customer's requirements, including cost, production, safe and easy use, and maintainability of products and services, then *designing* must take place in all aspects of:

- Identifying the need (including need for change).
- Developing that which satisfies the need.
- Checking the conformance to the need.
- Ensuring that the need is satisfied.

Designing covers every aspect, from the identification of a problem to be solved, usually a market need, through the development of design concepts and prototypes to the generation of detailed specifications or instructions required to produce the artefact or provide the service. It is the process of presenting needs in some physical form, initially as a solution, and then as a specific configuration or arrangement of materials resources, equipment and people. Design permeates strategically and operationally many areas of an organization and, while design professionals may control detailed product styling, decisions on design involve many people from other functions. Total quality management supports such a cross-functional interpretation of design.

In the construction environment, this broad conceptualization of the design function is essential as design impacts on every stage of the production process: safety during construction, constructability, the cost and ease of prefabrication of engineered products, and the reliable achievement of product quality on site.

Design like any other activity, must be carefully managed. A flowchart of the various stages and activities involved in the design and development process appears in Figure 6.1.

By structuring the design process in this way, it is possible to:

- Control the various stages.
- Check that they have been completed.
- Decide which functions need to be brought in and at what stage.
- Estimate the level of resources needed.

The control of the design process must be carefully handled to avoid stifling the creativity of the designer(s), which is crucial in making design solutions a reality. It is clear that the design process requires a range of specialized skills, and the way in which these skills are managed, the way they interact and the amount of effort devoted to the different stages of the design and development process is fundamental to the quality, producibility and price of the service or final product. A team approach to the management of design is critical to the success of a project. The input of manufacturers, engineering fabricators and site assemblers is as crucial as the input from the end-user market.

It is never possible to exert the same tight control on the design effort as on other operational efforts, yet the cost and the time used are often substantial, and both must appear somewhere within the organization's budget.

Certain features make control of the design process difficult:

1. No design will ever be 'complete' in the sense that, with effort, some modification or improvement cannot be made.
2. Few designs are entirely novel. An examination of most 'new' products, services or processes will show that they employ existing techniques, components or systems to which have been added novel elements.
3. The longer the time spent on a design, the less the increase in the value of the design tends to be unless a technological breakthrough is achieved.

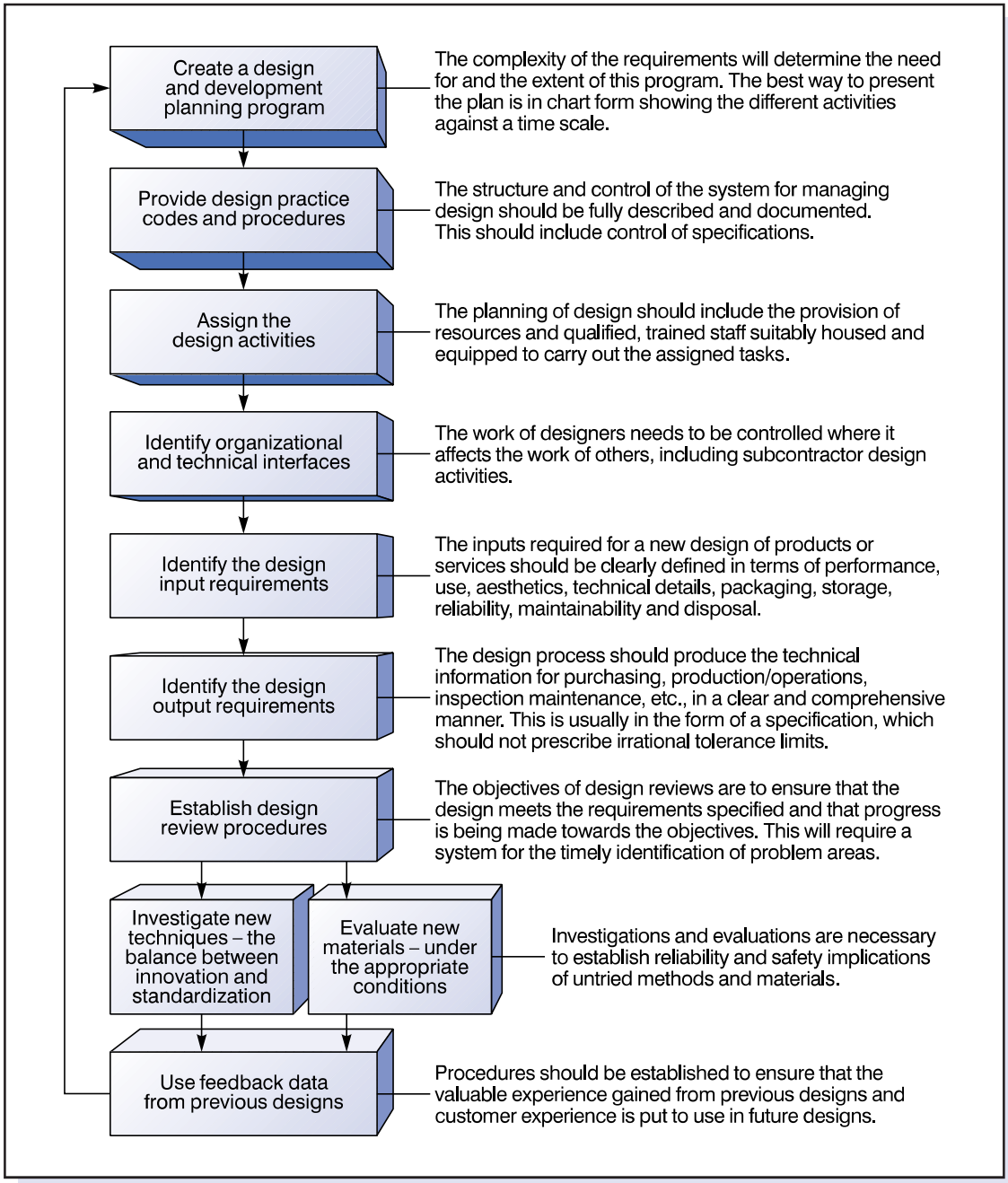

Figure 6.1
The design and development process

This diminishing return from the design effort must be carefully managed but this has to be balanced with the need for adequate design resolution and sound documentation, because production risk increases when the design is not properly resolved and effectively communicated.

4. The design process is information intensive and the timing of decision-making, both by the clients and the design team, is critical to the efficiency of the entire process. It is not practical to manage the design process in the same manner as we do the production process – on the basis of tasks. For every task there may be up to ten information flows and the ratio of information flows to tasks is highly variable. Also there are a great number of concurrent and interdependent activities which need skill and experience in their effective resolution.
5. External and/or internal customers will often impose limitations on design time and cost. It is as difficult to imagine a design project whose completion date is not implicitly fixed, either by a promise to a customer, the opening of a trade show or exhibition, a seasonal 'deadline', a production schedule or some other constraint, as it is to imagine an organization whose funds are unlimited, or a product/service whose price has no ceiling.

Total design processes

Quality of design, then, concerns far more than the product or service design and its ability to meet the customer requirements. It is also about the activities of design and development. The appropriateness of the actual *design process* has a profound influence on the performance of any organization, and much can be learned by examining successful companies and how their strategies for research, design and development are linked to the efforts of marketing and operations. In some quarters this is referred to as 'total design', and the term 'simultaneous engineering' has been used. This is an integrated approach to a new product or service introduction, similar in many ways to Quality Function Deployment (QFD – see next section) in using multifunction teams or task forces to ensure that research, design, development, manufacturing, purchasing, supply and marketing all work in parallel from concept through to the final launch of the product or service into the market place, including servicing and maintenance.

Most companies now recognize the need to develop and successfully deploy an end-to-end Product or Service Creation Process (PCP/SCP). This is built to ensure that the product or service requirements are translated from identification of need (or potential need) into the reality of a tangible new/revised product/service. Such a PCP/SCP will transgress the whole organization and involve the engagement of all functional areas. An example of such a process is shown in Figure 6.2.

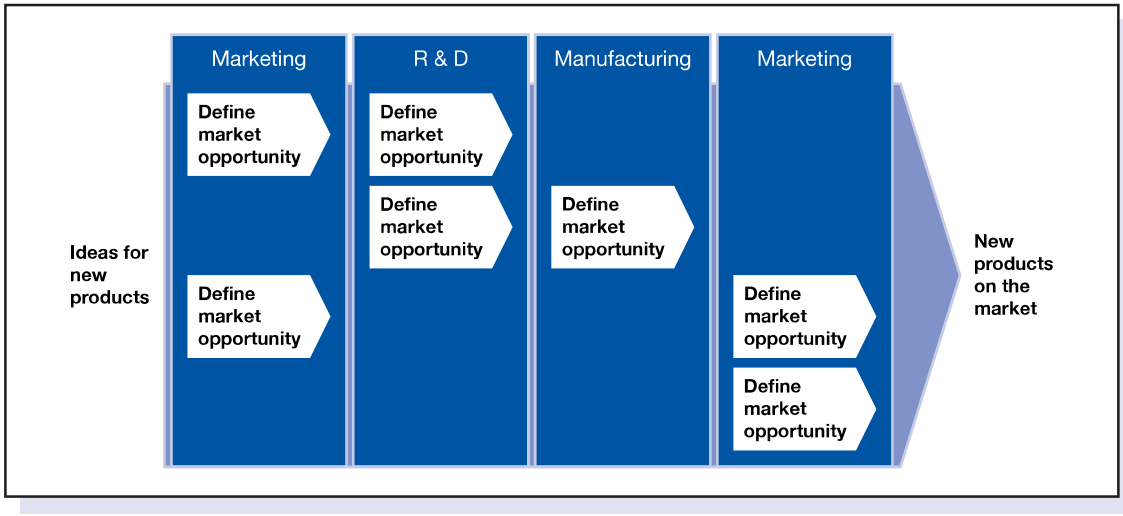

Figure 6.2
Cross-functional new product creation process

QUALITY FUNCTION DEPLOYMENT (QFD) – THE HOUSE OF QUALITY

The 'house of quality' is the framework of an approach to design management known as quality function deployment (QFD). Dr Yoji Akao originally developed QFD in Japan in 1966, combining his work on quality assurance and quality control with function deployment as used in value engineering.

It originated in Japan in 1972 at Mitsubishi's Kobe shipyard, but it has been developed in numerous ways by Toyota and its suppliers, and many other organizations. The house of quality (HoQ) concept, initially referred to as quality tables, has been used successfully by manufacturers of integrated circuits, synthetic rubber, construction equipment, engines, home appliances, clothing and electronics, mostly Japanese. Ford and General Motors use it, and other organizations, including AT&T, Bell Laboratories, Digital Equipment, Hewlett-Packard, Procter & Gamble, ITT, Rank Xerox and Jaguar have applications. In Japan, its design applications include public services and retail outlets. In the construction sector the application of QFD is limited to companies that have specialized in a specific market sector; for example, in Japan and Brazil it has been used to design apartment layouts, and it has application for areas of mass production of products and materials.

Quality function deployment (QFD) is a 'system' for designing a product or service, based on customer requirements, with the participation of members of all functions of the supplier organization. It translates the customer's requirements into the appropriate technical requirements for each stage. The activities included in QFD are:

1. Market research.
2. Basic research.
3. Innovation.
4. Concept design.
5. Prototype testing.
6. Final-product or service testing.
7. After sales service and trouble-shooting.

These are performed by people with different skills in a team whose composition depends on many factors, including the products or services being developed and the size of the operation. In many industries, such as cars, electronic equipment and computers, 'engineering' designers are seen to be heavily into 'designing'. But in other industries and service operations designing is carried out by people who do not carry the word 'designer' in their job title. The failure to recognize the design inputs they make, and to provide appropriate training and support, will limit the success of the design activities and result in some offering that does not necessarily satisfy the customer. This is particularly true of services generally.

The QFD team in operation

The first step of a QFD exercise is to form a cross-functional QFD team. Its purpose is to take the needs of the market and translate them into such a form that they can be satisfied within the operating unit and delivered to the customers.

As with all organizational problems, the structure of the QFD team must be decided on the basis of the detailed requirements of each organization. One thing, however, is clear – close liaison must be maintained at all times between the design, marketing and operational functions represented in the team.

The QFD team must answer three questions – **WHO, WHAT** and **HOW**, i.e.

WHO are the customers?
WHAT does the customer need?
HOW will the needs be satisfied?

WHO may be decided by asking 'Who will benefit from the successful introduction of this product, service or process? Once the customers have been identified, WHAT can be ascertained through interview/questionnaire/focus group processes, or from the knowledge and judgement of the QFD team members. HOW is more difficult to determine, and will depend on the attributes of the product, service or process under development. This will constitute many of the action steps in a 'QFD strategic plan'.

WHO, WHAT and HOW are entered into a QFD matrix or grid of 'house of quality' (HoQ), which is a simple 'quality table'. The *WHAT*s are recorded in rows and the *HOW*s are placed in the columns.

The house of quality provides structure to the design and development cycle, often likened to the construction of a house, because of the shape of matrices when they are fitted together. The key to building the house is the focus on the customer requirements, so that the design and development processes are driven by what the customer needs as well as innovations in technology. This ensures that more effort is used to obtain vital customer information. It may increase the initial planning time

in a particular development project, but the overall time, including design and redesign, taken to bringing a product or service to the market will be reduced.

This requires that marketing people, design staff (including architects, engineers, physicists, chemists, etc), and production/operations personnel work closely together from the time the new service, process or product is conceived. It will need to replace in many organizations the 'throwing it over the wall' approach, where a solid wall exists between each pair of functions (Figure 6.3).

The HoQ provides an organization with the means for inter-departmental or inter-functional planning and communications, starting with the so-called customer attributes (CAs). These are phrases customers use to describe product, process and service characteristics.

A complete QFD project will lead to the construction of a sequence of house of quality diagrams, which translate the customer requirements into specific operational process steps. For example, the 'feel' that customers like on the steering wheel of a motor car may translate into a specification for 45 standard degrees of synthetic polymer hardness, which in turn translates into specific manufacturing process steps, including the use of certain catalysts, temperatures, processes and additives. Similarly in construction, the acoustic privacy that home-owners demand is translated into a measurable decibel transfer rate and specific construction systems to achieve it. The first steps in QFD lead to a consideration of the product as a whole and subsequent steps to consideration of the individual components. For example, a complete hotel service would be considered at the first level, but subsequent QFD exercises would tackle the restaurant, bedrooms and reception. Each of the sub-services would have customer requirements, but they all would need to be compatible with the general service concept.

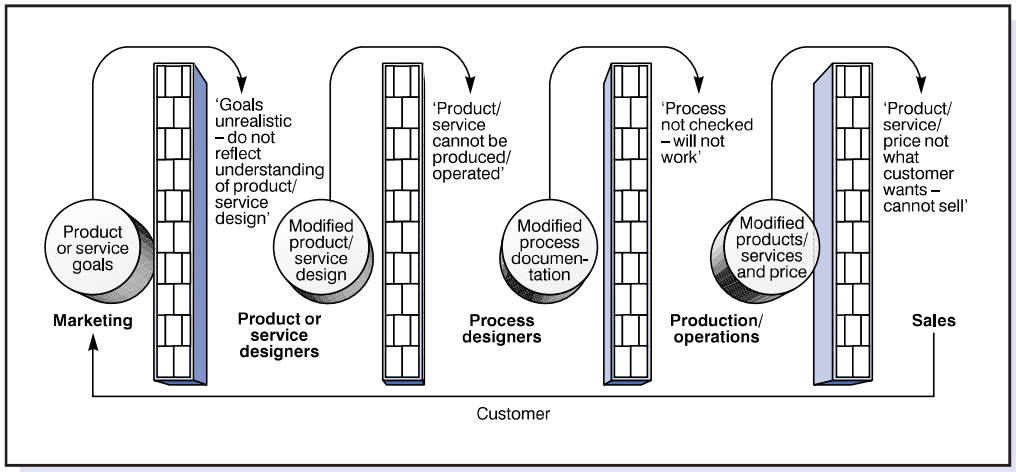

Figure 6.3
'Throw it over the wall.' The design and development process is sequential and walled into separate functions

The QFD or house of quality tables

Figure 6.4 shows the essential components of the quality table or HoQ diagram. The construction begins with the *customer requirements*, which are determined through the 'voice of the customer' – the marketing and market research activities. These are entered into the blocks to the left of the central relationship matrix. Understanding and prioritizing the customer requirements by the QFD team may require the use of competitive and complaint analysis, focus groups, and the analysis of market potential. The prime or broad requirements should lead to the detailed WHATs.

Once the customer requirements have been determined and entered into the table, the *importance* of each is rated and rankings are added. The use of the 'emphasis technique' or paired comparison may be helpful here (see Chapter 13).

Each customer requirement should then be examined in terms of customer rating; a group of customers may be asked how they perceive the performance of the organization's product or service versus those of competitors. These results are placed to the right of the central matrix. Hence the customer requirements' importance rankings and competition ratings appear from left to right across the house.

The WHATs must now be converted into the HOWs. These are called the *technical design requirements* and appear on the diagram from top to bottom in terms of requirements, rankings (or costs) and ratings against competition (technical benchmarking, see Chapter 9). These will provide the 'voice of the process'.

The technical design requirements themselves are placed immediately above the central matrix and may also be given a hierarchy of prime and detailed requirements. Immediately below the customer requirements appear the rankings of technical difficulty, development time or costs. These will enable the QFD team to discuss the

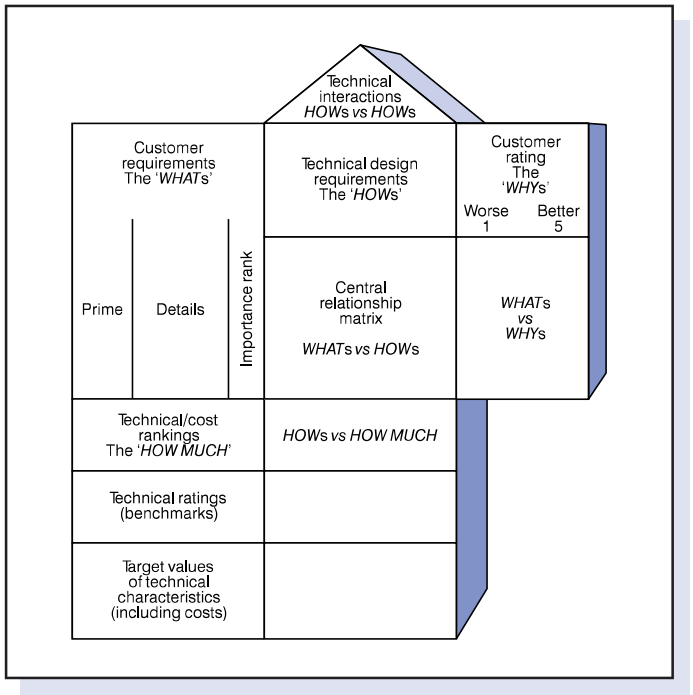

Figure 6.4
The house of quality

efficiency of the various technical solutions. Below the technical rankings on the diagram comes the benchmark data, which compares the technical processes of the organization against its competitors.

The *central relationship matrix* is the working core of the house of quality diagram. Here the WHATs are matched with the HOWs, and each customer requirement is systematically assessed against each technical design requirement. The nature of any relationship – strong positive, positive, neutral, negative, strong negative – is shown by symbols in the matrix. The QFD team carries out the relationship estimation, using experience and judgement, the aim being to identify HOW the WHATs may be achieved. All the HOWs listed must be necessary and together sufficient to achieve the WHATs. Blank rows (customer requirement not met) and columns (redundant technical characteristics) should not exist.

The roof of the house shows the interactions between the technical design requirements. Each characteristic is matched against the others, and the diagonal format allows the nature of relationships to be displayed. The symbols used are the same as those in the central matrix.

The complete QFD process is time-consuming, because each cell in the central and roof matrices must be examined by the whole team. The team must examine the matrix to determine which technical requirement will need design attention, and the costs of that attention will be given in the bottom row. If certain technical costs become a major issue, the priorities may then be changed. It will be clear from the central matrix if there is more than one way to achieve a particular customer requirement, and the roof matrix will show if the technical requirements to achieve one customer requirement will have a negative effect on another technical issue.

The very bottom of the house of quality diagram shows the *target* values of the *technical characteristics,* which are expressed in physical terms. They can only be decided by the team after discussion of the complete house contents. While these targets are the physical output of the QFD exercise, the whole process of information gathering, structuring and ranking generates a tremendous improvement in the team's cross-functional understanding of the product/service design delivery system. The target technical characteristics may be used to generate the next level house of quality diagram, where they become the WHATs, and the QFD process determines the further details of HOW they are to be achieved. In this way the process 'deploys' the customer requirements all the way to the final operational stages. Figure 6.5 shows how the target technical characteristics, at each level, become the input to the next level matrix.

QFD progresses now through the use of the 'seven new planning tools' and other standard techniques such as value analysis, experimental design, statistical process control and so on.

Specifications and standards

There is a strong relationship between standardization and specification. To ensure that a product or a service is *standardized* and may be repeated a large number of times in exactly the manner required, *specifications* must be written so that they are open to only one interpretation. The requirements, and therefore the quality, must be built into the design specification. There are national and international standards which, if

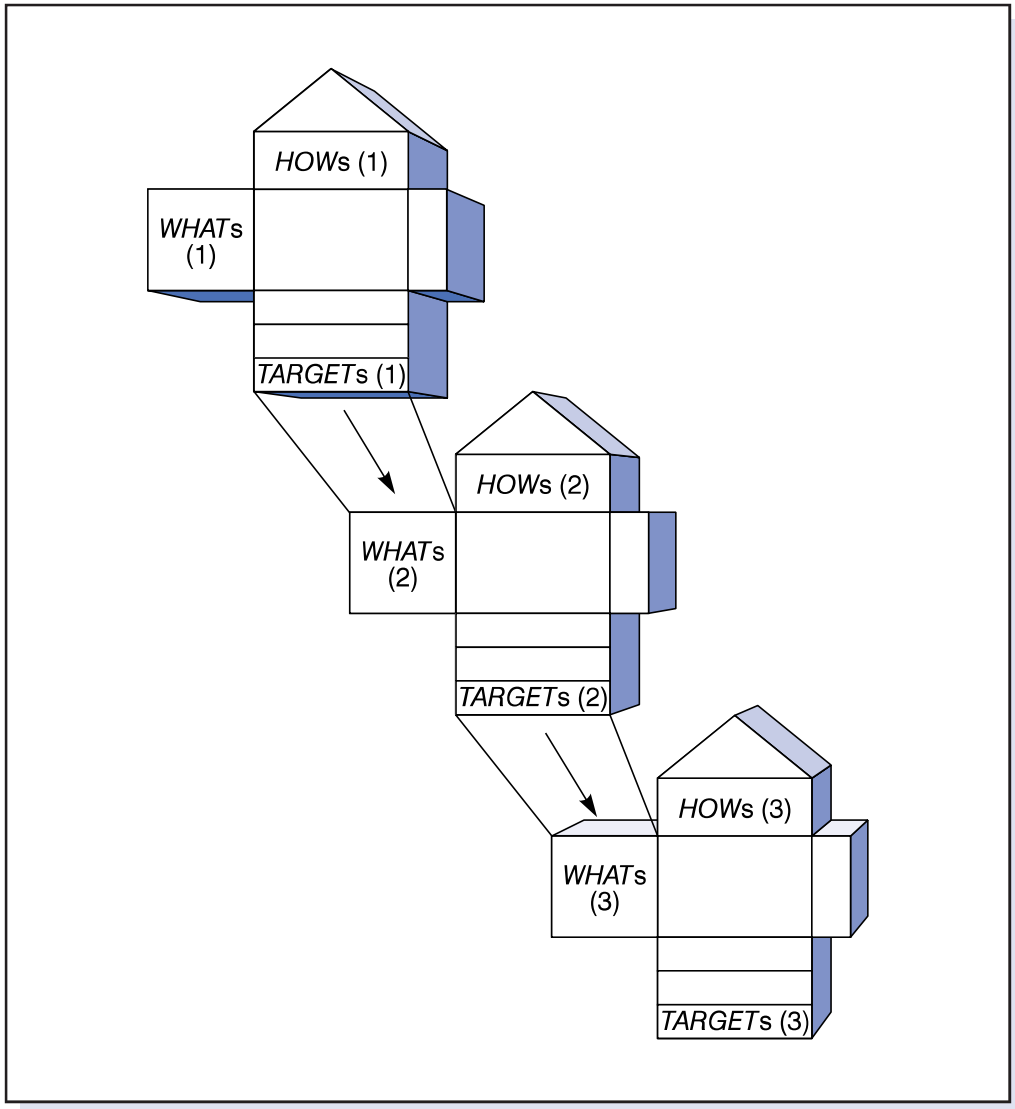

Figure 6.5
The deployment of the 'voice of the customer' through quality tables

used, help to ensure that specifications will meet certain accepted criteria of technical or managerial performance, safety, etc.

Standardization does not guarantee that the best design or specification is selected. It may be argued that the whole process of standardization slows down the rate and direction of technological development, and affects what is produced. If standards are used correctly, however, the process of drawing up specifications should provide opportunities to learn more about particular innovations and to change the standards accordingly.

These ideas are well illustrated by the construction sector's approach worldwide to the adoption of performance-based specifications wherever possible. Performance-based standards encourage innovation against measurable and transparent technical requirements. This allows the opportunity for manufacturers with new products and innovative solutions to have their ideas accredited and gain market entry. In areas like waterproofing, however, a building contractor might prefer to be very prescriptive in specifying the precise technical solution he wants. This is a particularly important area of construction where, based on everyday experience, we know that the risk of failure is high and its consequences of water leaking through the roof or out of a bathroom into adjoining rooms is simply unacceptable. In such areas, correct design and implementation is critical to managing an important area of risk for the general contractor.

It is possible to strike a balance between innovation and standardization; however, a sound approach to innovation clearly recognizes areas of design innovation that add value for the customer and areas of standardization that reduce risk in the production process. Clearly, it is desirable for designers to adhere where possible to past-proven materials and methods, in the interests of reliability, maintainability and variety control. Hindering designers from using recent developed materials, components or techniques, however, can cause the design process to stagnate technologically. A balance must be achieved by analysis of materials, products and processes proposed in the design, against the background of their known reproducibility and reliability. If breakthrough innovations are proposed, then analysis or testing should be indicated objectively, justifying their adoption in preference to the established alternatives.

It is useful to define a specification. The International Standards Organization (ISO) defines it in ISO 8402 (1986) as 'The document that prescribes the requirements with which the product or service has to conform'. A document not giving a detailed statement or description of the requirements to which the product, service or process must comply cannot be regarded as a specification, and this is true of much sales literature.

The specification conveys the customer requirements to the supplier to allow the product or service to be designed, engineered, produced or operated by means of conventional or stipulated equipment, techniques and technology. The basic requirements of a specification are that it gives the:

- Performance requirements of the product or service in measurable terms.
- Parameters – such as dimensions, concentration, turn-round time – which describe the product or service adequately (these should be quantified and include the units of measurement).
- Materials to be used by stipulating properties or referring to other specifications.
- Method of production or delivery of the service.
- Inspection/testing/checking requirements.
- References to other applicable specifications or documents.

To fulfil the purpose specifications must be written in terminology that is readily understood, and in a manner that is unambiguous and so cannot be subject to differing interpretation. This is not an easy task, and one which requires all the expertise and knowledge available.

It is in relation to the clear communication of process specifications that the use of 3D and virtual reality (VR) technologies are showing great potential. At many stages of the design and construction process, complex information has to be communicated to the partners in the supply chain or to customers and their design teams. Often, end-clients and other stakeholders are not able to conceptualize the design elements of a project; however, through the use of visualization tools their ability to interact with the design team is greatly enhanced. In other instances, the process design and detailing of parts of a structure can be very complex and VR simulation can assist both in optimizing the process through virtual prototyping and then in communicating the process to the people executing the work.

Good specifications are usually the product of much discussion, deliberation and sifting of information and data, and represent tangible output from a QFD team.

Design quality in the service sector

The emergence of the services sector has been suggested by economists to be part of the natural progression in which economic dominance changes first from agriculture to manufacturing and then to services. It is argued that if income elasticity of demand is higher for services than it is for goods, then as incomes rise, resources will shift toward services. The continuing growth of services verifies this, and is further explained by changes in culture, fitness, safety, demography and life styles.

In considering the design of services it is important to consider the differences between goods and services. Some authors argue that the marketing and design of goods and services should conform to the same fundamental rules, whereas others claim that there is a need for a different approach to service because of the recognizable differences between the goods and services themselves.

In terms of design, it is possible to recognize three distinct elements in the service package – the physical elements or facilitating goods, the explicit service or sensual benefits, and implicit service or psychological benefits. In addition, the particular characteristics of service delivery systems may be itemised:

- Intangibility
- Perishability
- Simultaneity
- Heterogeneity.

It is difficult, if not impossible, to design the intangible aspects of a service, since consumers often must use experience or the reputation of a service organization and its representatives to judge quality.

Perishability is often an important issue in services, since it is frequently undesirable or impossible to hold stocks of the explicit service element of the service package. This aspect often requires that service operation and service delivery must exist simultaneously, such as in a restaurant business.

Simultaneity occurs because the consumer must be present before many services can take place. Hence, services are often formed in small and dispersed units, and it can be difficult to take advantage of economies of scale. The rapid developments in computing and communications technologies have changed this in sectors such as

banking and insurance, but contact continues to be necessary for many service sectors. Design considerations here include the environment and the systems used. Service facilities, procedures and systems should be designed with the customer in mind, as well as the 'product' and the human resources. Managers need a picture of the total span of the operation, so factors which are crucial to success are not neglected. This clearly means that the functions of marketing, design and operations cannot be separated in services, and this must be taken into account in the design of the operational controls, such as the diagnosing of individual customer expectations. A QFD approach here can be very effective.

Heterogeneity of services occurs in consequence of explicit and implicit service elements relying on individual preferences and perceptions. Differences exist in the outputs of organizations generating the same service, within the same organization, and even the same employee on different occasions. Clearly, unnecessary variation needs to be controlled, but the variation attributed to estimating, and then matching, the consumers' requirements is essential to customer satisfaction and loyalty and must be designed into the systems. This inherent variability does, however, make it difficult to set precise quantifiable standards for all the elements of the service.

In the design of services it is useful to classify them in some way. Several sources from the literature on the subject help us to place services in one of five categories:

- Service factory
- Service shop
- Mass service
- Professional service
- Personal service.

Several service attributes have particular significance for the design of service operations:

1. *Labour intensity* – the ratio of labour costs incurred to the value of assets and equipment used (people versus equipment-based services).
2. *Contact* – the proportion of the total time required to provide the service for which the consumer is present in the system.
3. *Interaction* – the extent to which the consumer actively intervenes in the service process to change the content of the service; this includes customer participation to provide information from which needs can be assessed, and customer feedback from which satisfaction levels can be inferred.
4. *Customization* – which includes *choice* (providing one or more selections from a range of options, which can be single or *fixed* and *adaptation* (the interactions process in which the requirement is decided, designed and delivered to match the need).
5. *Nature of service act* – either tangible, i.e. perceptible to touch and can be owned, or intangible, i.e. insubstantial.
6. *Recipient of service* – either people or things.

Table 6.1 gives a list of some services with their assigned attribute types and Table 6.2 shows how these may be used to group the services under the various classifications.

Parasuraman *et al.* (see Zeithaml, Parasuraman and Berry, 1990) used the relationship between service quality and customer perceptions of product quality; his five dimensions are:

Table 6.1 A classification of selected services

Service	*Labour intensity*	*Contact*	*Interaction*	*Customization*	*Nature of act*	*Recipient of service*
Accountant	High	Low	High	Adapt	Intangible	Things
Architect	High	Low	High	Adapt	Intangible	Things
Bank	Low	Low	Low	Fixed	Intangible	Things
Beautician	High	High	High	Adapt	Tangible	People
Bus/coach service	Low	High	High	Choice	Tangible	People
Cafeteria	Low	High	High	Choice	Tangible	People
Cleaning firm	High	Low	Low	Fixed	Tangible	People
Clinic	Low	High	High	Adapt	Tangible	People
Coaching	High	High	High	Adapt	Intangible	People
College	High	High	Low	Fixed	Intangible	People
Courier firm	High	Low	Low	Adapt	Tangible	Things
Dental practice	High	High	High	Adapt	Tangible	Things
Driving school	High	High	High	Adapt	Intangible	People
Equipment hire	Low	Low	Low	Choice	Tangible	Things
Finance consultant	High	Low	High	Adapt	Intangible	People
Hairdresser	High	High	High	Adapt	Tangible	People
Hotel	High	High	Low	Choice	Tangible	People
Leisure center	Low	High	High	Choice	Tangible	People
Maintenance	Low	Low	Low	Choice	Tangible	Things
Management consultant	High	High	High	Adapt	Intangible	People
Nursery	High	Low	Low	Fixed	Tangible	People
Optician	High	Low	High	Adapt	Tangible	People
Postal service	Low	Low	Low	Adapt	Tangible	Things
Rail service	Low	High	Low	Choice	Tangible	People
Repair firm	Low	Low	Low	Adapt	Tangible	Things
Restaurant	High	High	Low	Choice	Tangible	People
Service station	Low	High	High	Choice	Tangible	People
Solicitors	High	Low	High	Adapt	Intangible	Things
Takeaway	High	Low	Low	Choice	Tangible	People
Veterinary	High	Low	High	Adapt	Tangible	Things

It is apparent that services are part of almost all organizations and not confined to the service sector. What is clear is that the service classifications and different attributes must be considered in any service design process.
The author is grateful to the contribution made by John Dotchin to this section of Chapter 6.

- *Reliability* – ability to perform the service dependably and accurately.
- *Responsiveness* – willingness to help customers and provide prompt service.
- *Assurance* – knowledge and courtesy of employees and their ability to inspire trust and confidence.
- *Empathy* – caring, individualized attention the form provides to its customers.
- *Tangibles* – physical facilities, equipment and appearance.

As a part of their work Parasuraman and his co-researchers developed a generic survey instrument and this is widely recognized as an excellent tool for measuring *service quality*. SERVQUAL scores *service quality* using 22 standardized statements to

Table 6.2 Grouping of similar services

	PERSONAL SERVICES	
Driving school		Sports coaching Beautician
		Dental practice Hairdresser
		Optician
	SERVICE SHOP	
Clinic		Cafeteria
Leisure center		Service station
	PROFESSIONAL SERVICES	
Accountant		Architect
Finance consultant		Management consultant
Solicitor		Veterinary
	MASS SERVICES	
Hotel		Restaurant
College		Bus service
Coach service		Rail service
Takeaway		Nursery Courier firm
	SERVICE FACTORY	
Cleaning firm		Postal service
Repair firm		Equipment hire
Maintenance		Bank

canvass customer views on the dimensions of *service quality*. Statements from the instrument are shown in Table 6.3.

Responses to these questions using a nine-point Likert scale are used to enable customer satisfaction to be assessed and benchmarked.

It is interesting to reflect on the quality design challenges faced by lawyers in recent times. They are part of a generally honourable profession that is in fundamental transformation. Conventional legal advisers will be much less prominent in the future than in the recent past and there are two major forces that are shaping and characterizing legal services:

- Market pull towards commoditization
- Pervasive development & uptake of information technology.

Just as other industries and sectors are having to adapt to broader change, so too have legal companies which are needing to think more creatively about the way they do business and in particular where they can innovate. To compete, a solid foundation of high-quality, efficient processes will be required:

THERE IS A NEED . . .

- To identify the tasks that the market is increasingly unlikely to tolerate expensive lawyers for that can be delegated to less expert and less expensive people, working with sophisticated processes and systems.
- To identify the new and different client needs emerging.

WHICH MEANS THAT . . .

Table 6.3 SERVQUAL survey statements (Parasuraman *et al.*)

Reliability
1. Providing service as promised
2. Dependability in handling customers' service problems
3. Performing services right the first time
4. Providing services at the promised time
5. Maintaining error free records (e.g. financial)

Responsiveness
6. Keeping customers informed of when services will be performed
7. Prompt service to customers
8. Willingness to help customers
9. Readiness to respond to customers' requests

Assurance
10. Instilling confidence in customers
11. Make customers feel safe in their transactions
12. Being consistently courteous
13. Having the knowledge to answer questions

Empathy
14. Giving customers individual attention
15. Dealing with customers in a caring fashion
16. Having the customers' best interests at heart
17. Understanding the needs of their customers
18. Convenient business hours

Tangibles
19. Modern equipment
20. Visually appealing facilities
21. Having a neat, professional appearance
22. Visually appealing materials associated with the service

- Legal companies will need to be really clear on their strengths, identify their distinctive skills, talents and capabilities that cannot be replaced by advanced systems, or less costly workers supported by IT (standard processes).
- They will also need to be very clear on how to position themselves in the market.

AND . . .

- They will need to address their weaknesses, drive out excesses, reduce waste, eliminate outdated practice and up-skill or remove outdated lawyers.

In short they will need to ensure they have the best people, processes and technology to support their target operating models.

Figure 6.6 shows the evolution of legal services, as set out in Richard Susskind's excellent book, *The End of Lawyers?* (2008). It is not as simple as choosing where on the spectrum to play, the legal services portfolio is now like a conveyor belt that moves from left to right, though some organizations are polarizing toward the ends.

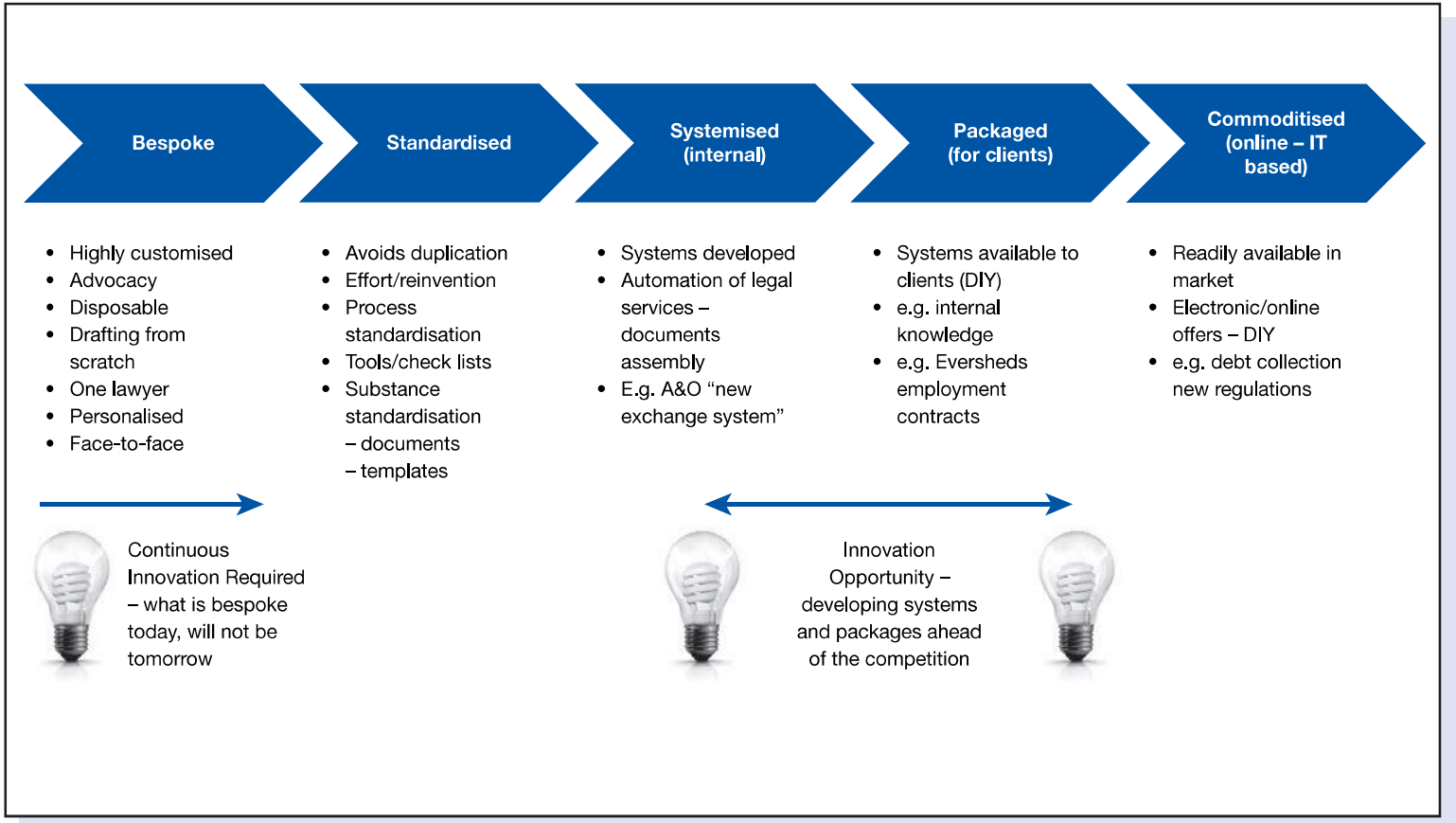

Figure 6.6
The evolution of legal services (Source: Susskind – *The End of Lawyers*)