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**The Effect of Management Structure and
Organisational Process on Decisions in
Industrial Design**

Angela Mary Piers Dumas

Ph.D.

London Business School

1993



Abstract

TWO SENSES OF DESIGN

This thesis is divided into three sections. Section 1 provides the background and historical context for the study. Section 2 consists of four chapters presenting the research project and its findings, and Section 3 contains of two concluding chapters.

This thesis considers the structure and organisational processes surrounding industrial design in manufacturing and service industries in Britain, and identifies and categorises the many decisions taken by managers that directly impact upon design development. The thesis differentiates between the acknowledged decision-making of designers and the unacknowledged decision-making of non-designers. These are called respectively “seen” and “silent” design, and the thesis concludes that design development is at its most effective when these processes act in tandem. Many organisations suffer from a corrupted process of design which at worst prevents new product development and at best slows and complicates it. In many cases this appears to be associated with a failure to give voice to the silent design activities of managers. The thesis uses primary data from representative case studies to trace the design process in organisations which can be shown to have used design “well” or “badly”. The first step in this process is to understand the origins of any mistakes made in the categorisation of design. The second step is to recognise the way in which design, defined as a planning process to put ideas into action, has or has not been integral to new product development. The third step is to identify to what extent, at each stage of the process, there has been effective use of the deep knowledge vested in management and workforce. This deep, or “tacit” knowledge is also related to the idea of core competencies. The thesis suggests that utilisation of the deep knowledge in an organisation, changing it from passive to active, becomes sustainable as the two design processes are re-integrated in design development.

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The Dormouse and the Doctor.

There once was a Dormouse who lived in a bed
Of delphiniums (blue) and geraniums (red),
And all the day long he'd a wonderful view
Of geraniums (red) and delphiniums (blue).

A Doctor came hurrying round, and he said:
"Tut-tut, I am sorry to find you in bed
Just say 'Ninety-nine,' while I look at your
chest...
Don't you find that chrysanthemums answer the
best?"

The Dormouse looked round at the view and replied
(When he'd said "Ninety-nine") that he'd tried and
he'd tried,
And much the most answering things that he knew
Were geraniums (red) and delphiniums (blue).

The Doctor stood frowning and shaking his head,
And he took up his shiny silk hat as he said:
"What the patient requires is a change," and he went
To see some chrysanthemum people in Kent.

The Dormouse lay there, and he gazed at the view
Of geraniums (red) and delphiniums (blue),
And he knew there was nothing he wanted instead
Of delphiniums (blue) and geraniums (red).

The Doctor came back and, to show what he meant,
He had brought some chrysanthemum cuttings from
Kent.

"Now *these*," he remarked, "give a *much* better view
Than geraniums (red) and delphiniums (blue)."

They took out their spades and they dug up the bed
Of delphiniums (blue) and geraniums (red),
And they planted chrysanthemums (yellow and
white).

"And *now*," said the Doctor, "we'll *soon* have you
right."

The Dormouse looked out, and he said with a sigh:
"I suppose all these people know better than I.
It was silly, perhaps, but I *did* like the view
Of geraniums (red) and delphiniums (blue)."

The Doctor came round and examined his chest,
And ordered him Nourishment, Tonics, and Rest.
“How very effective,” he said, as he shook
The thermometer, “all these chrysanthemums look!”

The Dormouse turned over to shut out the sight
Of the endless chrysanthemums (yellow and white).
“How lovely,” he thought, “to be back in a bed
Of delphiniums (blue) and geraniums (red).”

The Doctor said, “Tut! It’s another attack!”
And ordered him Milk and Massage-of-the-back,
And Freedom-from-worry and Drives-in-a-car,
And murmured, “How sweet your chrysanthemums
are!”

The Dormouse lay there with his paws to his eyes,
And imagined himself such a pleasant surprise:
“I’ll *pretend* the chrysanthemums turn to a bed
Of delphiniums (blue) and geraniums (red)!”

The Doctor next morning was rubbing his hands,
And saying, “There’s nobody quite understands
These cases as I do! The cure has begun!
How fresh the chrysanthemums look in the sun!”

The Dormouse lay happy, his eyes were so tight
He could see no chrysanthemums, yellow or white.
And all that he felt at the back of his head
Were delphiniums (blue) and geraniums (red).

And that is the reason (Aunt Emily said)

If a Dormouse gets in a chrysanthemum bed,

You will find (so Aunt Emily says) that he lies

Fast Asleep on his front with his paws to his eyes.

A. A. Milne

The Doctor and the Dormouse understand flowers very differently – although the Dormouse knows what he wants, somehow he cannot say. The Doctor and the Dormouse provides this thesis with a metaphor with which to explore the dynamics between that which is explicit and that which is tacit in design development.

Metaphorically design is lying in a bed of chrysanthemums, on its front, paws to its eyes, fast asleep.

Introduction

My own experience of the structural and organisational processes that impinge upon a designer's working life provided the impetus that led to this study – regular experiences of not being in the right place at the right time, of typically being excluded at times when clients were taking critical decisions on current projects – simple but frustrating experiences.

As a consequence I witnessed myself and my colleagues working at sub-optimal levels, or worse, losing clients. All due, I believed at the time, to poor communication, confusion over objectives and insufficient knowledge of the design process.

Later, however, as an observer of the design process rather than a participant, I began to see design development through an altogether different lens. Design seemed to be not just one activity undertaken by designers, but a series of activities which cut across many functional boundaries. I was forced to ask, “What should be assumed to lie within a definition of design?”

In this thesis I propose that there are in fact two senses of design, and that we have lost one sense. I suggest that the loss of one sense of design creates the confusion and discomfort experienced by both design and management teams. A missing sense of design is a complex enough issue, yet within the sense of design which we all acknowledge there are two different types of design, aesthetic and engineering design, which creates another level of confusion. Designers from the aesthetic design disciplines and design engineers frequently find great difficulty in acknowledging each other's validity. This schism is reflected here; a high proportion of the primary data is about the industrial design of products, graphics, textiles and interiors where the visible and physical aspects are prime criteria. Where possible both aesthetics and engineering are considered since the lost sense of design affects both types of designer equally and to this extent the conclusions of the study are appropriate across both aesthetic and engineering design.

In the first chapter there is a comprehensive discussion of various definitions of design and their origins, but the study also needed its own broad working definition of the design process to enable relatively objective tracking of design decision-making which would automatically include engineering and aesthetic design, and all other contributions. The definition is along the following lines:

Any decisions which contribute to the functional and aesthetic properties of a product (or service) are design decisions and will be considered as an integral part of the design process.

The primary data covers design decision-making in both manufacturing and service industries. Whereas design decision-making is obviously embodied in the products a company manufactures, in a service industry the specification of product or environment can be equally critical to performance.

The two senses of design are the acknowledged aspect of design, called here “seen” design, and the unacknowledged aspect called “silent” design. The silent sense of design has been lost. A brief example indicates how difficult it can be for each sense to understand the intentions of the other: the new factory manager of a blouse factory suggested to the design manager of the design studio at headquarters that they might work together to make-up a selection of components, pockets, collars, etc., which were less likely to cause extra procedures in the factory. Much to his surprise the design manager was affronted by the proposition and said he found the idea abhorrent and needless to say it didn’t happen. Each individual had a different sense of design, but only one was acknowledged. From a designer’s perspective, the designer’s activities result in concepts that become products. They believe that something about the consistency of concept development gives the garment its integrity through its design. From a manager’s perspective the factory manager’s activities result in assemblies that are products – the product is the sum of its parts, and integrity and design reside in the parts to be assembled. To the designer, the sense of product is in the concept, while to the manager the sense of product is in the sum of its parts.

In this way the senses of what constitutes the integrity of a product differ, and this is accompanied by differences in the nature of the activities and the way in which they are acknowledged.

We normally mean by design only the designer’s sense of design, captured first in the product concept and then manifested in the final reality. Design, as the process to put those concepts and ideas into material actions requires the deep and often tacit knowledge residing in the minds of individuals and this sense of design is rendered silent and so is lost to us. The acknowledgement of only one sense of design is a case of mistaken categorisation. In order to re-integrate the two senses of design the origins of the mistake made in design must be identified and we must gain an understanding of the pervasive power of category mistakes. As a simple example, I can say that I have a left hand glove and a right hand glove, or I can say that I have a pair of gloves, but I cannot sensibly use both statements together. Category mistakes are bound up with how we order our world and were first voiced by Plato who ‘...was among the first to intellectualise the predicament of human beings as prisoners of their thoughts and actions’ (Morgan, p.365).

“Design” is operable in more senses than we readily recognise and describes a process, particularly so in its lost sense. There is an increasing use of the word *innovation*, but it is not an adequate substitution and is poorly employed as such. Neither will terms such as “core competencies” prove sufficiently robust to stand the test of time. We must re-assess our utilisation of the word *design*.

Limits of the Study

The limits of this study need to be clarified. The study set out to consider the role of industrial design, the contributions made by individuals to the design development process and the organisational circumstances surrounding these contributions. Therefore issues such as, for

example, indications of development costs and the overall financial success of projects fell outside the study. This is not to imply that such considerations are less important. Rather, there seemed a need to return first of all to the situation of design development and describe its nature and context.

The study was principally a study of UK companies. There are only a small number of consumer goods manufacturers represented within it. To an extent, this factor is connected to issues in the UK economy and our declining manufacturing base, particularly in consumer goods. UK manufacturing industry, particularly in product groups where appearance has a role to play, is very poor. Consumer electronics, home appliances, etc., do not form a significant industry sector in the UK.

Brief Description of Sections and Chapters

The thesis is in three sections. Section One gives the background and context for design and design management. Section Two gives an account of the research studies. Section Three gives the theoretical context for the conclusion and the conclusion itself.

Section One

Chapter one describes the way definitions of design shape the roles of industrial designers and design engineers. Both groups of designers experience themselves as disadvantaged and misunderstood by managers, yet each in turn perpetuates the cycle. Chapter two explores the history of design from its beginnings as a separate activity, following the practice and education of design from the Industrial Revolution in Britain to the present day. Chapter three considers the emergence of design management and the small body of literature produced on the subject. This literature puts forward a best practice of formalised rules and procedures and is isolated from comparable management literature which in the field of new product development and innovation does not generally endorse rule-based procedures.

Section Two

Chapter four begins the research with observations in several British companies of the use made of different methods of managing design. Chapter five takes six companies, looking in greater depth into the design development process and charts the interactions of managers and designers. The conclusion of these two chapters is that company culture and structure are more influential in the management of design than are formalised rules and procedures; that type of business has a greater effect; that in the design development process there is more interaction between managers than there is between designers and managers; and that managers are actively taking decisions that impact directly on the design process. Chapter six describes the results of a statistical questionnaire study which considered the attitudes and practices of managers across four functions in 20 companies from both manufacturing and service industries. Significant results include that non-designers are responsible for

design projects; that use of design resources differs in manufacturing and service industries, as do perceptions about design; that designers have markedly different opinions from other functions. One shared opinion about the role of designers is that they are “catalysts” in the design process. Finally chapter seven describes a case study of a new design initiative in a textile company. The new initiative foundered within a year and the study considers the reasons why this occurred, and the relationship between design and the company’s strategy.

Section Three

Chapter eight considers how the adoption of the theory of two senses of design would impact upon the literature on strategy and innovation, particularly the idea of core competencies and the learning organisation. Chapter nine is in two sections. It begins with a section that discusses two theories, the category mistake and the two senses of knowing, drawing upon the work of Gilbert Ryle and Michael Polanyi. The second section of chapter nine draws together the results and conclusions of the primary data collected and, using the insights from the theory of the category mistake and the two senses of knowing, draws final conclusions on the re-integration of the two senses of design.

Section One

COMMENTARY

Section one introduces design. It aims to provide information on the heritage and origins of design.

Chapter one, Definitions of Design, considers a number of definitions to build a “gestalt” of design, and to help us to understand the preferences and prejudices held in the communities of both industrial and engineering design. In chapter two, Design History and the Practice of Industrial Design, we see the emergence of a dominant model in industrial design and consider how the development of the practice of industrial design, the education of designers and the development of theories in design fed into the dominant model of design. Two early theories in design were immensely powerful, these were the “Arts and Craft” and “Modern” movements.

Finally in chapter three, The Context for and the Emergence of the Literature of the Management of Design, we review the literature on the management of design, where unlike many aspects of management, the number of published books is small, and there is no body of academic work. However, one of the strangest aspects of the literature is that it is entirely British. Can this be linked back to the British origins of design and the industrial revolution? Furthermore does it suggest that Britain identifies more problems than do other countries in the integration of individuals involved in design and product development?

Chapter 1: Definitions of Design

Design is most readily understood in terms of tangible things, for example automobiles, computers, clothes, furniture, restaurants and shops. Most people use the word design to convey meaning for both functionality and style. We are less likely to use the word design in its planning meaning, which is interestingly the first meaning of the word given in the Complete Oxford English Dictionary which devotes well over a page to the various meanings of design, a few of which are listed below.

- A mental plan.
- A plan or scheme conceived in the mind and intended for subsequent execution; the preliminary conception of an idea that is to be carried into effect by action; a project.

The sixth and seventh meanings given refer directly to works of art.

- A plan in art.
- A preliminary sketch for a picture or other work of art; the plan of a building or any part of it, or the outline of a piece of decorative work, after which the actual structure or texture is to be completed; a delineation; [a] pattern.

The meaning of the word in the 16th century was purpose, intention or determination, and also draught, model, plot and picture. It was taken into the French language and differentiated, so in modern French, the spellings are different for its two primary meanings: *dessein* is “purpose, plan” and *design* “design in art”! The first reference to design in relationship to machines comes in the fourth meaning given in the dictionary.

- Contrivance in accordance with a pre-conceived plan; adaptation of means to ends; pre-arranged purposes, where Paley in 1802 used it in ‘The machine we are inspecting, demonstrates by its construction, contrivance and design’.

If we turn to the word *designer* then the first meaning is the general one:

- One who originates a plan or plans.

And the third is the more dedicated meaning:

- One who makes an artistic design or plan of construction; a draughtsman; one whose business is to invest or prepare designs or patterns for the manufacturer or constructor.

The first mention of the “designer label” in relationship to fashion items was in *The New York Times* in 1966.

All the dictionary meanings imply process more than they refer to tangible things, so it is not surprising that for anyone with more than a passing interest in design the relationship between design process and design outcome receives the attention. This chapter aims to build up a sense of the design process by considering how it is and has been defined, principally by the design community.

The first two definitions of design come from individuals who write on design but are not designers. Penny Sparke is a British design historian. Ralph Caplan is an American design commentator and journalist. In the introduction to Sparke's *An Introduction to Design and Culture in the Twentieth Century* she describes design in the following way:

Design has always been one aspect of a larger process – whether of manufacturing, in the craft or mechanised sense, or, from the consumer's point of view, of participating in social or economic life – and its definition has from the moment the word entered the English language been in a constant state of flux, due primarily to the changes in the socio-economic framework which has sustained it. Thus the difference between a seventeenth-century pattern maker and a modern industrial designer is less one of the nature of their respective creative activities than of the economic, technological and social constraints within which the activity is performed. What have remained constant are the visualising and humanising aspects of the design process as even today the designer's input into the manufacture of an electronic calculator, for example, focuses on the aesthetic and ergonomic aspects of that product. (Sparke, p.xx & xxi.)

In this description emphasis is on the aesthetic and cultural aspects of design and this she expands upon as she describes design decision-making.

Design decisions are constantly being made everywhere, whether by designers or consumers. They all focus on the aesthetic of the product whether, in the designers case, defined as a creative resolution of the joint demands of technology, price, function and social symbolism of taste, practicality and social and economic needs... (Sparke, p.xxiii.)

The second definition comes from the American writer Ralph Caplan in his book *By Design*. This book is described on the jacket as 'a startling and enlightening exploration of the role of design in all our lives'. Ralph Caplan, like Penny Sparke, acknowledges the broad span of design, though in doing so he identifies the effect that this can have upon the design community.

The more complex a project, the more nearly inevitable that it be a group activity; and even very simple products involve a number of people before the design is complete. In the field of industrial design this sometimes gets twisted into an exaggerated notion of what designers themselves need to know: the "Renaissance Man" concept (again). Descriptions of what one has to know in order to be an industrial designer are commonly so comprehensive and overblown that only Leonardo da Vinci (who has been – no kidding! – soberly cited by some industrial designers as the first in the business) could qualify. The

designer must fully understand technology, we are told. The designer must understand people and know their wants and needs. The designer must know how to organise space. The designer must know which materials are available at any given time and what each of them can do. The designer must be a master of fabrication techniques. The designer must be familiar with the workings and dimensions of the human body. The designer must be a master of marketing and sales strategies. The designer must be a planner, and an artist to boot. Also an ecologist. And so on, and so on.

Apart from all these musts and shoulds, what designers do know and actually are able to perform varies considerably. The first industrial designers came from wherever they could be found: theatrical design, typography, engineering, architecture, commercial illustration. Design training has reflected that diversity. Depending on the school, a graduate industrial designer may understand something about engineering and hardly anything about art, or he may know a lot about art and know nothing about what goes on in factories; or he may know astonishingly little about either art or engineering.

Obviously, even the most earnest of industrial design spokesmen know, and when pressed will acknowledge, that the designer's versatility does not make him a master of any of the many fields his professional life touches. He is not so much twenty times a specialist as twenty times a layman, and that may work in his favour. The ignorance that a designer brings to a project is in itself a valuable commodity, and the history of industrial design abounds with examples of products that have been vastly improved by a designer's ignorance of the limitations of technology. (Caplan, p.94–95.)

Though Caplan's book concentrates primarily upon the industrial design aspects of design, he discusses the relationships of design with engineering and design with art. Here is what he has to say on design in relationship to engineering:

The designer–engineer relationship is shot through with misunderstandings, seeming conflicts of interest, and just plain petty back-biting... According to the myth prevailing among engineers, the designer is all gloss, a stylist equipped by temperament and training to do nothing more than frost the bread of life so it can be sold as cakes... On the other hand, consider the mythical engineer as the industrial designer sees him. Narrow and uncreative, he is a highly trained mechanic, congenitally unable to view a product in any context larger than the working of its parts. He is wholly oblivious to the requirements of marketing, use convenience and appearance... The plain truth is that even if appearance were the only criterion, engineers have a better record than designers have... certainly some of the most stunning examples of twentieth century design are technological products that have no design treatment as such... Crediting is a sensitive issue in the designer–engineer relationship. That credits ever became an issue is pretty much the fault of industrial designers whose orientation was toward art, and underscores the extreme difficulty of ever understanding precisely what it means to say that something has been “designed”. (Caplan, p.96–99.)

Caplan's reference to the “Renaissance Man” and to the exclusion by the industrial designer of the design capabilities of the engineer are to my mind powerful insights into two

critical shortcomings of the dominant definition of design, yet *By Design* is largely dedicated to reinforcing the special place of the dominant design definition as this final description by Caplan indicates, where he talks of the relationship between design and art.

The most interesting thing about art as it relates to contemporary technology is its essentialness... We begin to move away from Art with a capital A as soon as we take seriously the idea that form follows function... In Art, form is function, or at least so nearly inseparable from it as to amount to the same thing. This is not true of industrial design. Even in its most Germanic sense, form tends to follow function only up to the point of designer's choice.

The motor for a power drill, for example, may be substantially the same as the motor used for other tools manufactured by the same company. So the motor's shape and composition are fixed. The designer is responsible for the housing. And the shape of the housing is not only functional but expressive: it must express the interior mechanism and delineate the purpose and character of the drilling operation. As artist-in-industry the designer is supposed to see to it that both form and material meet these requirements... Function itself is not devoid of this aesthetic consideration: part of any tool's function is to look like what it is. (Caplan, p.126–127.)

Both Penny Sparke and Ralph Caplan write as observers and commentators on the design process and as such they provide a sense of the complexities and contradictions that are to be found within it. The next two descriptions are of the decision making process in relationship to design. The first description is made by Don Schon. The second description, included in stark contrast to that of the architect, is made by Herbert Simon.

The first description leads us deeper into aspects of a designer's decision-making processes. Don Schon's research is on the design decision-making process of designers and architects. He suggests that it is hard to describe design activity, since often it is based upon tacit knowledge. He believes that more than being merely a problem-solving process, it is in fact 'more a process of making'. This extract describes the poor ability of designers to be articulate in their descriptions of their personal thought processes.

Designers are usually unable to say what they know, to put their special skills and understandings into words. On the rare occasions when they try to do so, their descriptions tend to be partial and mistaken; myths rather than accurate accounts of practice... [if] we recognise designers *tacit* knowledge, what shall we say about the ways in which they *hold* it or get access to it when they need it? (Schon, p.181.)

Schon's description will ring true to anyone who has worked alongside designers – there is a tendency for them talk about apparently unrelated issues and then appear suddenly to produce a sketch or model for a design. Later in the same paper Schon describes this phenomenon as designers having a number of design worlds. Interested as he is in designers' mental processes, he apparently overlooks any effect of the designers' interface with other peoples' mental processes or beliefs about design. We see this in his description on decision-making in the design for a building.

Designing is a social process. In every major building project, there are many different kinds of participants: architects, engineers, building contractors, representatives of clients and interest groups, regulators, developers, who must communicate with each other in order to bring a project to completion. These individuals in their different roles tend also to pursue different interests, see things in different ways, and even speak different languages. Yet they do sometimes come to agree on something to be built. How shall we account for the way in which they do so? (Schon, p.182.)

The way that Schon goes on to account for how these groups come to agree is by discussion of the need for 'the notion of design worlds'. However, Schon is not referring to the differing perspectives or what could be described as the "design worlds" of the above participants but to the different processes undertaken by skilled designers.

We need a way of talking about the objects of designing – what we design with – that allows us both to take cognisance of multiple ways of seeing things, each a reality for those who hold it, and to make sense of strivings for commonality. Hence I am led to the notion of design worlds. These are environments entered into and inhabited by designers when designing. (Schon, p.182–183.)

Perhaps as Schon suggests we do need a way of talking about "what we design with" that does allow for "multiple ways of seeing", and to accept that there are many "design worlds" and that we need to develop a striving for commonality. But maybe these notions need to extend beyond the "design world" of the acknowledged designer into the worlds of others who are involved in the process of making decisions about the making of things.

Herbert Simon is one of the few people in management theory to include the notion of design. Simon includes design within a stream of decision-making activities. He describes decision-making as comprising three principal phases: 'Finding occasions for making a decision; finding possible courses of action; and choosing among courses of action.' He details these as follows: 'The first phase of the decision-making process – searching the environment for conditions calling for decisions – I shall call *intelligence* activity (borrowing the military meaning of intelligence). The second phase – inventing, developing and analysing possible courses of action – I shall call *design* activity. The third phase – selecting a particular course of action – I shall call *choice* activity' (Simon, p.1–2). Simon maintains that executives spend a large proportion of their time on the first two phases, less time on the third but that overall the three phases more or less constitute what executives do.

Simon's simple decision-making model might help Schon. For example, when he asks what one designs *with*, then it is with the intelligence gathered, Simon's phase one. What Simon refers to as design equates to Schon's idea of different worlds – these are the activities of inventing, developing and analysing and all three require a somewhat different mental set. Schon, like many in the design community, has a particular understanding of the model of design. This design model is rather like the automobile in that it is such a strong dominant model that we can really not conceive of anything else. A typical feature appears to be its

exclusivity, which we saw in the way Schon acknowledged the presence of other participants in the building process but in his description of the design process excluded them altogether. We need to see more descriptions of design to gain a *gestalt* of this model of design. Description as a way of arriving at better understanding is what Abraham Kaplan calls “systemic meaning”¹.

Many aspects of design overlap or are even contradictory, particularly in the realms of functionality and aesthetics. It will be remembered that the dictionary definition of design spans functionality and aesthetics and therefore in effect represents both engineering and industrial design. The next two descriptions constitute a comparison between the beliefs of the industrial designers and those of the engineering designers. The first description comes from the proceedings of an international forum on design held at Stanford University in 1988. The attendees at this forum were the aesthetic type of industrial designer. The forum was special, in that it brought together the world’s best known and most influential designers and design *cognoscenti*. Therefore this text represents the opinions of the most internationally influential design group in existence in 1988.

While most of us agree that design is important, no one seems quite certain how to define it... the issue is not a broader definition of design; it is too broad now... the term is applied to everything: organisation, software, electronic components, banking systems and molecular structures... however the term most typically refers to such elements of the “physical world” as ‘products, graphics, packaging, and buildings’. Many people would understand design in just this way, but as contemporary life becomes more orientated towards the designed objects of consumer culture, familiarity obscures popular understanding with such common phrases as “designer hairstyle”, “designer jeans” and “designer drugs”. As a result, design becomes identified with the most superficial elements of style. ...the designer bears responsibility for giving shape to products, communications and to spatial environments that in turn define the physical parameters of our lives. Like good manners well designed products facilitate the tasks of living. No longer able to specify directly the goods we need and to oversee their production we have empowered the designer to serve as ‘a surrogate for the consumer’; by extension the designer also serves as the ‘humane and aesthetic conscience of industry.’

Constraints are the essence of the design process. A designer worth his or her

¹ ‘The point is that there are terms which require for a specification of their meaning not one sentential context but the context of the whole set of sentences in which they appear. Such meaning I have previously called “systemic meaning”. Each sentential occurrence is a partial determination of the meaning, but only as we encounter the term in more and more contexts of varying sorts do we come to understand it more fully. (This description is as true of what we ourselves mean as of what is being said by another.) What Marx meant by “class” or by “capitalism” is made manifest only in the whole corpus of his writing, as is Freud’s meaning of “libido”, or Durkheim’s of “anomie”. Notice that a term may have systemic meaning even though it is apparently explicitly defined somewhere. There is a certain kind of pseudo definition in which a meaning is set down although the term is not in fact thereafter always used in accord with the “definition”. The chances are, indeed, that a key term of this kind is “defined” several times and in several different ways. This diversity does not necessarily mark a lapse either of logic or of memory, but the occurrence, rather, of systemic meaning.

Systemic meaning is always open, for the set of propositions making up a theory is never complete. The value of a theory lies not only in the explanations it was constructed to provide but also in its unanticipated consequences, and these in turn enrich meanings in unforeseen ways.’ (Kaplan, p.64–65.)

salt must integrate a complex set of sometimes contradictory solutions when designing even the most ordinary and apparently predictable object. The mechanically functional or engineered components of a product must be organised (and occasionally re-engineered) to fulfil their purposes efficiently – that is, with as little waste of energy or human effort as possible. They must be manufactured of durable materials and arranged to require relatively little maintenance and to permit easy repair. Taken as a whole, the assemblage of parts of a product must smoothly fit human bodies and minds – not in the abstract, but in all their multifarious diversity. A product in all of its applications must conform almost organically to the human form, be easy to operate and control, and remain safe during any conceivable use or misuse. As if all that were not enough, its shapes, colours, and textures must be carefully orchestrated not only to reflect its functions but also to appeal, in the long run as well as the short, to an intuitive aesthetic sense whose shifting fancies seek the pleasurable shock of novelty as often as the contemplation of harmony. The designer must also consider supply or manufacture of component parts and methods of final assembly of a product, not to mention packing, packaging, and in some cases such accessories as retail displays. And throughout the entire process runs the question of whether or not consumers will actually need or desire the product under consideration and purchase it in sufficient quantity and at high enough price to make its manufacture worth undertaking. To make the designer's task even more difficult, work proceeds simultaneously on all fronts, with even minor elements frequently changing in response to problems isolated and temporarily resolved elsewhere.

Understood in this way, the designer is to integrate and, it is implied, be responsible for all aspects of product: functionality, aesthetics, manufacture and appropriateness for the market. The designer is seen as a universal man (Caplan's Renaissance Man), operating simultaneously on all fronts. There is no mention of others in the process; there is no mention of team working. We see a sense almost of omnipotence, where the designer has the power to control all things because he is thinking about all things.

Donald Petersen, chairman and CEO of Ford, attended the Stanford Design Forum. In one section of the proceedings, 'Design as Corporate Strategy', Petersen is reported as saying that 'the key issue in managing the design process is creating the right relationship between design and other areas of the corporation': the text suggests that many in the audience were not happy with the neutrality of this statement, believing that by this statement Petersen was giving insufficient support to the design cause. A Japanese reporter asked if a designer typically possesses the qualities essential for acting effectively as a CEO. Petersen is reported to have said that designers are by virtue of their own training too narrow to act as CEOs – "designers are specialists" – which seems to be directly in contrast with their own view of themselves as individuals who are thinking about everything. The consensus of those who attended the Forum's first meeting was that 'design is too often misunderstood, taken for granted or merely ignored'. Recommendations were to:

- 1) promote effective management and application of design by the business

community and 2) to promote the spread of design literacy among the public.” (Stanford Design Forum 1988, p.15–18 and p.69.)

Engineers do not display quite the same rhetoric and desire for universality as do the industrial designers. Yet they too maintain that design, particularly engineering design, is overlooked. In a paper in the *California Management Review*, Dixon and Duffey state

It is becoming common for analysts to cite the “80/20 rule” first publicised twenty years ago in a British aerospace study that 80% of manufacturing costs are committed during the first 20% of the design process. However, the implications of this observation are still often ignored, and management continues to search principally for remedies in manufacturing operations. To regain world manufacturing leadership, we need to take a more strategic approach by also improving our engineering design practices.

In this last sentence the use of the word also is suggestive of a balanced viewpoint where engineering design should be better considered but alongside other strategic issues. The paper gives a definition of engineering design, extracts of which are set out below.

Unfortunately, just what engineering design is – and its role in the “stream” of product development, manufacturing, and use – seems to be obscure to most economic and business analysts, and consequently often poorly effected by US management.

By engineering design, we mean the development of a product from its

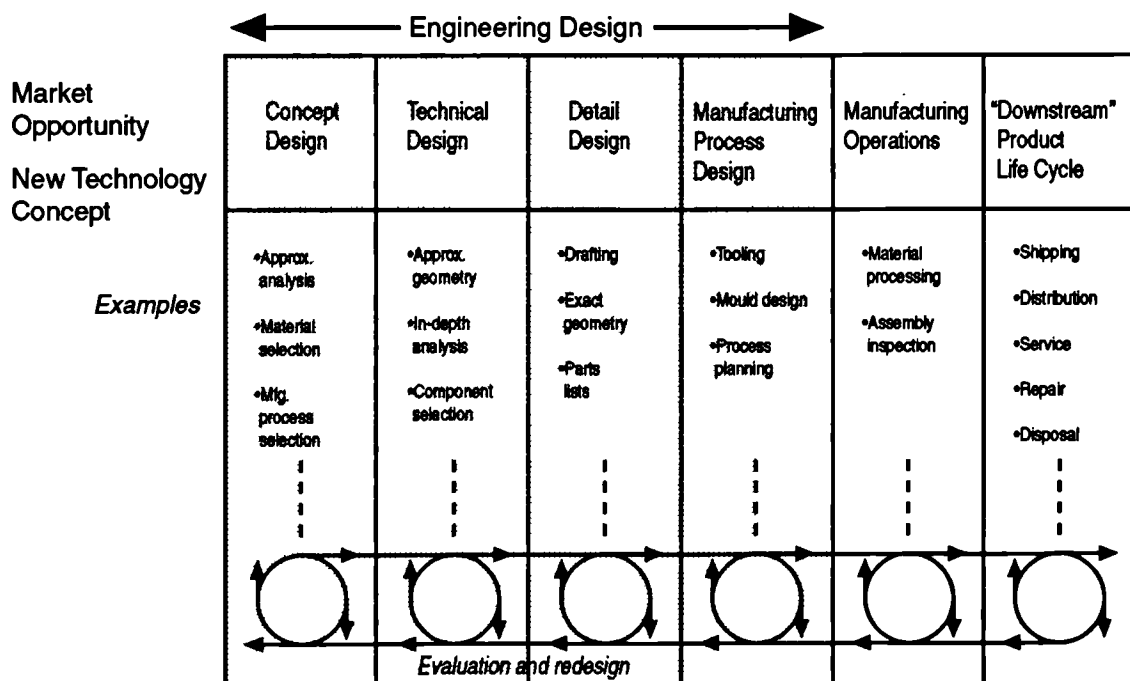


figure 1: The product life cycle: an engineering design perspective

technical conception through detail design, and the design of the related manufacturing process and tooling. It is mechanical design, as opposed to electronic design, that is considered to be a major problem for manufacturers... Mechanical design includes initial design and redesign for function, structural

integrity, manufacturability, use, serviceability, repair, disposal and other product life cycle considerations. We also distinguish engineering design from what is often called “industrial” design; the latter is centrally concerned with important issues of styling. Industrial design is a part of, or runs parallel to, engineering design... The Concept Design phase involves the initial technical conception and “back of the envelope” engineering of the product, incorporating input from upstream (new technologies, marketing assessment, aesthetic and ergonomic design considerations, etc.) and also – at least ideally – initially input from downstream manufacturing concerns. (p.10–12.)

In this definition of design, the concept phase does include new technologies, market assessment, and aesthetic and ergonomic design considerations, but these aspects are given scant recognition. Industrial design is described as either being a part of or running parallel to engineering design. While nowhere near as full of rhetoric as the Stanford Design Forum description, this paper nevertheless make a strong case for a broader extent of engineering design:

Engineering design includes both *new product* design and the *incremental* design of existing products to meet changes in marketing, manufacture, functional deficiencies, and so on. The Polaroid Land camera is a classic example of the engineering design of a new product. Following Edwin Land’s research into novel photochemical processing techniques, it was necessary to design such things as entirely new battery elements, roller mechanisms, optics, and shutters to transform this technological and scientific advance into a commercial product. (p.12.)

The paper also reports on the outcomes of a workshop held in 1988 on engineering design. In May 1988, the Design Theory and Methodology Program at the National Science Foundation sponsored a Workshop on Engineering Design. Sixteen nationally-recognised experts in design from industry and academia concluded that

Engineering design is not taught, researched, or practised as effectively as needed by American industry... Much of the world’s best existing design knowledge is not available to US designers... There is a need to convert the present “art form” of design into a theory-based and reputable professional discipline. Perpetuation of the art form leaves major issues of competitiveness, education, and utilisation of national resources to chance. (p.14.)

This appears to throw down a challenge to the “art form” perception of design with the implication that it cannot tackle key issues such as competitiveness and that it is not a reputable professional discipline. In the conclusion to this paper the authors write:

Economists, managers and business schools have [also] neglected engineering design by failing to understand it, value it and account for it appropriately. (Dixon and Duffey, p.22.)

So, although the engineers and the aesthetic designers do not share opinions on their own boundaries or apparently value the labours of each other, they do share a view that design

in whatever form is neglected by business and therefore by managers. Both descriptions indicate that they share a similar sense of being misunderstood and under-utilised. However, even if both forms of designers understand themselves as more universal than do others, the observation expressed by Petersen, that designers are specialists, still probably holds true. Being misunderstood or under-utilised is an issue for many specialist activities within the management process. Even early writers on management issues were describing issues between experts and managers in an effort to improve the introduction of expert knowledge into management situations: 'What actually occurs between an expert and a manager is quite simply a series of transactions between two people... and what is important is to find a method whereby the advice from the expert does not coerce but can be integrated' (Mary Parker Follet). The use of the word coercion suggests the implanting of advice or ideas that somehow would not otherwise emerge, and are difficult to integrate. It would

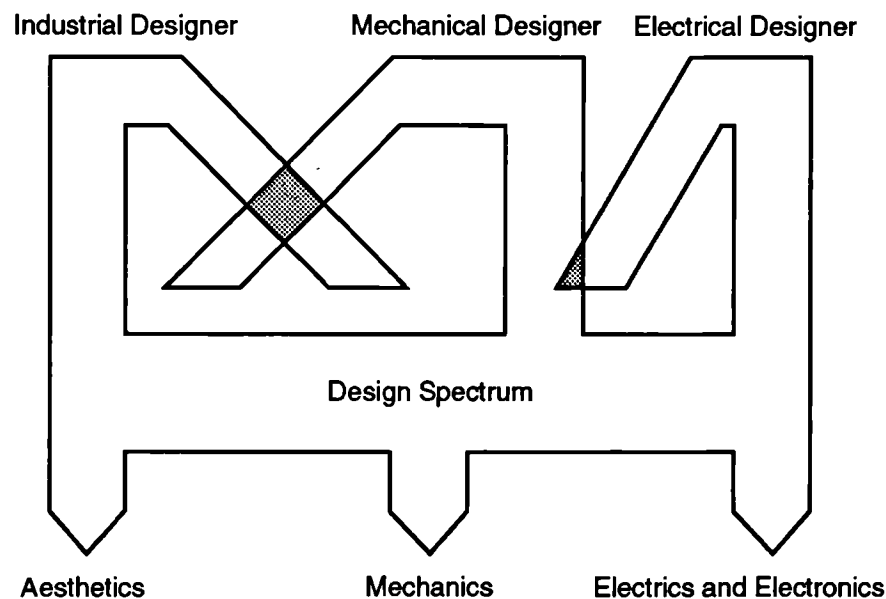


figure 2: The Design Spectrum

seem that this is the situation with design and the circumstances in which design is introduced do critically affect integration.

The human tendency to grab more as less becomes available might be affecting the forms of design, so that the under-utilised engineering and aesthetic designers claim more of the process by coercion and thereby create a cycle from which it is hard to break out, with integration becoming less and less likely.

The design model seems to advocate an exclusivity of the process of design. Sir William Barlow, who was chairman of the UK Engineering Council, Chairman of BICC and Chairman of the Design Council from 1980-86 produced a simple model that describes the spectrum of design and points to areas of conflict between design specialists.

In the model the shaded areas show the areas of conflict that he believes exist. Barlow, an engineer by background, says 'It is a fact that most electrical engineers believe that

mechanical engineering is usually obvious and as such is beneath their interest.' In describing the relationship between aesthetic designers and engineers he says

The industrial designer is typically reluctant to regard himself as a mere stylist or aesthetician and often claims expertise in the field of forms and structures, sometimes with good reason. But this is the legitimate terrain of the mechanical designer, who incidentally often feels that he too has an eye for the appearance of a product and certainly can speak with authority on matters relating to the product–human interface. The tails of the two profiles cross over and overlap, and this is a source of continuing conflict, each practitioner believing that his authority is being usurped by the other. But how does the electrical engineering designer get along with the industrial designer? For, after all, if they are to sell well, electrical products must also look good and be fit for their purpose. Things are usually a little easier in this context owing largely to the fact that neither in general has a clear understanding of what the other is talking about. (Barlow, p.90–92.)

When the best that can be hoped for is co-operation because the designers do not understand each other's design processes, then the situation can hardly be described as optimistic. Yet Barlow's pragmatism is based on his experience of managing the process and cannot be dismissed. Another aspect of design which should be considered is design in its relationship to marketers.

Design concerns in organisations are often to be found in the responsibilities of the marketing function. How then is design understood by marketing? A paper written by Philip Kotler (Professor of Marketing at Kellogg's Graduate School of Management) and Alexander Rath entitled 'Design: A Powerful But Neglected Strategic Tool' gives us an indication of the way it is suggested that design be understood by marketers. Prime position is given to the effects of the dynamic behaviour between functional and aesthetic designers – though it is not entirely clear whether the functional designers are engineers – because experience tells it is also the case that a degree of rivalry exists between sub-groups of industrial design.

Marketers need to be aware of the split in the design community between the functionalists and the stylists. The orientation of the functionalists is based on putting good functional performance, quality, and durability into the design. The orientation of the stylists is to put good outer form into the design. Functional designers are normally responsive to marketing research and technical research, while stylists prefer to work by inspiration and tend to pay less attention to cost. Fortunately, few designers are at the extremes, and most are willing to pay some attention to market data and feedback in developing their design... Each company has to decide on how to incorporate design into the marketing planning process. There are three alternative philosophies. At one extreme are design-dominated companies which allow their designers to design out of their heads without any marketing data. The company looks for great designers who have an instinct for what will turn customers on. This philosophy is usually found in such industries as apparel, furniture, perfumes, tableware, and so on.

At the other extreme are market-dominated companies which require their designers to adhere closely to market research reports describing what customers want in the product. These companies believe designs should be market-sourced and market-tested. This philosophy is usually found in such industries as packaged foods, small appliances, and so on.

An intermediate philosophy holds that designs need not be market-sourced but at least should be market-tested. Consumers should be asked to react to any proposed design because often consumers have ways of seeing that are not apparent to designers and marketers. Most companies espouse the philosophy that designs should be market-tested even if not market-sourced. (Kotler and Rath, p.19.)

Here then is a fairly concise description of the dynamics to be considered in the design arena and how they affect marketers. Kotler and Rath in the conclusion to this paper suggest that using design is a cost effective way to improve competitive advantage: 'As other strategic marketing tools become increasingly expensive, design is likely to play a growing role in the firm's unending search for a sustainable competitive advantage in the market place' (p.21).

This chapter began with the dictionary definitions of design and has reviewed a number of attitudes and beliefs that are held about design. Within the design community it is clear that there is a dominant model of design. Sparke suggests it can be defined as 'creative resolutions of the joint demands of technology, price, function and social system,' while Caplan captures it in the designers' view of themselves as "Renaissance Man", adding his wry comment that 'the range may be wide, but the depth may be illusory!' All that Caplan refers to is witnessed in the proceedings of the Stanford Design Forum where the belief in the universality of design, coupled with the absence of acknowledgement of other people from other functions in the process, lends an unreality to the proceedings. Donald Petersen's mild and rational comment on the need for integration is taken as a lack of support for the cause of design. It is tempting to compare the beliefs surrounding the dominant design model, particularly in industrial design, with the beliefs of a religious sect, the power of the belief generating an inward-looking set of cultural norms and practices. We see in Don Schon's description of the designer's process a removal from the everyday and an elevation into the intangible and the mythical. His notion that the designer has differing design realities in his head is accompanied by the implication that this accommodation of a number of realities is unique to the designer. We cannot be sure that this untrue, yet one is tempted to ask whether designers are so different from other people, or whether it is just that the more complex a belief system becomes, the harder it is to share it with any individuals who are not similarly indoctrinated. Consider this statement by one design director: 'There is a recognition that design is crucial to industrial and commercial competitiveness. If this is true, then it is certain that designers should be given greater influence in management.'

Does it necessarily follow that if design is crucial to industrial and commercial

competitiveness that it is designers who should have greater managerial influence? Maybe it is the managers who should be more responsible for and responsive to design than they previously understood themselves to be. The effect upon the design community of their model of design is a powerful one and it maintains that the design process must stay within the bailiwick of the designer.

Another question to ask is which bailiwick? That of the industrial designer or that of the engineer? Must we accept this state of affairs? We face the two types of designer, both claiming much of the same territory; the engineering designer gives little space to the industrial designer and the industrial designer gives little space to the engineer, and between them they give even less space to anyone else. Is the model of design, no matter how powerful a model, giving good service to any of us?

We can address this question more directly once we know more about the origins of modern design practice and can gain a sense of how this dominant and exclusive model of design came into being.

Chapter 2: Design History and the Practice of Industrial Design

INTRODUCTION

The breakdown of craft traditions within the guilds is accepted amongst design historians as a turning point, the beginning of the practice of design as we now know it. This extract from Seigfried Gideon suggests something of the origins of the enthusiasm and glorification that emerged in the late nineteenth and early twentieth century for the idea of mechanization and mass production and its potential to herald a new social order.

Mechanization, as envisaged and realised in our epoch, is the end product of a rationalistic view of the world. Mechanising production means dissecting work into its component operations – a fact that has not changed since Adam Smith thus outlined the principle of mechanization in a famous passage of his *Wealth of Nations* in 1776: ‘The invention of all those machines by which labour is so much facilitated and abridged seems to have been originally owing to the division of labour.’ It need only be added that in manufacturing complex products such as the automobile, this division goes together with re-assembly.

The rationalistic approach to things came to the fore in the Renaissance. Complex events – the movement of bodies for instance – were dissected into their components and united in a resultant (parallelogram of forces). The nineteenth century and our century expanded to the gigantic this principle of division and re-assembly until the whole factory became an organism with division and assembly occurring almost automatically.

Mechanization could not become a reality in an age of guilds. But social institutions change as soon as the orientation changes. The guilds became obsolete as soon as the rationalistic view became dominant and moved continually toward utilitarian goals. (Gideon, p.31–32.)

The relationship between mechanisation and craft is an important factor to take into consideration in a summary of design history. Mechanization was the generator behind the Modern Movement, which combined the visual, ideological development of the machine aesthetic and that of utopian socialist idealism, which sought a new society. Craft was the generator behind the Arts and Craft movement, which sought in a rather Luddite fashion to turn its back on industrial progress in favour of a more romantic humanist society that valued pastoral ideals and the labours of the craftsman. Both the Modern Movement and the Arts and Crafts movement became equally powerful influences in the early years of the 20th century, though we have to look for the origin of design in the 19th century. Design began in Britain, perhaps not surprising given our early progress in industrialisation, though the critical developments in industrial design occurred in Germany and the USA. In different

ways both these countries were able to embrace the Modern Movement, while in Britain we came to prefer the Arts and Crafts movement.

It is a historic irony that the nation that gave birth to the industrial revolution and exported it throughout the world should have become embarrassed at the measure of its success. The English nation even became ill at ease enough with its prodigal progeny to deny its legitimacy by adopting a conception of Englishness that virtually excluded industrialisation... An English "way of life" was defined and widely accepted; it stressed non-industrial non-innovative and non-material qualities, best encapsulated in rustic imagery. (Wiener, p.5–6.)

The following three sections will deal with the development of industrial design, first in Britain, then in Germany and finally in the USA.

First Beginnings in Britain: 1760-1860

I think we might claim, without any particular pride, that industrial design, as a separate branch of the arts, was originally a British conception... It was made a subject of public concern by the same statesman who invented the British policeman, Sir Robert Peel, and it is a highly significant fact that from the first – the occasion was the establishment in 1832 of a National Gallery in London – it was the fine arts that were chosen for the tasks of instilling a sense of design in the manufacturer and of elevating taste in the consumer. (Read, p.9.)

The British attitude alluded to so far is captured in the sentiments of Sir Herbert Read, who was an eminent and influential art historian.

The word that Robert Peel used was "pictorial design" and the reason for government concern was the threat to British manufacturers from foreign competition. In this sense, governments' approach to design could be said to have remained constant since 1832. In this brief summary of early British design history, two figures and one event stand out as significant. The two individuals are Josiah Wedgwood, founder of the world-famous ceramics company, and William Morris, founder of the Arts & Craft Movement; the one event, the Great Exhibition of 1851.

Design in Manufacturing: Josiah Wedgwood

As early as 1775 Josiah Wedgwood had seven full-time designers on his staff whose job was to make models for prototypes for useful ware and apply decoration to ornamental ware, both hand-painted and transfer. Josiah Wedgwood was born in 1730 into a family of craft potters stretching back many generations, and at the age of 29, after his apprenticeship, Wedgwood returned to Burslem and set up on his own. His aim was not to imitate foreign competition but to provide an alternative. Wedgwood made a clear distinction between "ornamental" and "useful" ware by organisational division. He earned an international reputation for the ornamental ware but Wedgwood also invested in product improvements

and innovation in the quality and mix of clays and moulding techniques which resulted in the appearance in 1763 of “Queen’s Ware”. John Heskett writes

Queen’s ware was revolutionary, its quality and suitability for casting opening the era of modern ceramics production. Wedgwood was not only an outstanding experimental scientist, but also a perceptive entrepreneur who realised that a large potential market existed for good inexpensive tableware. (Heskett, p.17.)

So it is that we see an early design studio with designers used to produce both form and decoration. However, the initiatives of technology improvements and innovation were apparently attributed to business or scientific acumen while ‘designs were applied to the process and not, in most cases, derived from it’ (Heskett, p.18).

At Wedgwood, then, design meant surface pattern and form, not new clays and ovens. By 1830, the government was sufficiently concerned over the growing foreign competition to take the decision to open schools to train designers, and to create art galleries and museums in an attempt to improve public taste. The Victorian middle class’ preference was for the highly ornate, which the government understood as poor taste. However, the new techniques of mass production in moulding and stamping meant manufacturers could produce highly decorative products at relatively low cost and they continued to find a ready market. Using these manufacturing techniques meant that fewer craftsmen were involved, which began the process of de-skilling the labour force. Apprenticeships and craft guilds became less valued.

The desire of the Victorians to distance themselves from industrialisation increased their desire for professionalism and this furthered the disregard of the guilds.

One after another, new professions, greatly influenced by the model of older ones [law and medicine], began to detach themselves from the world of business and organise themselves – civil engineers in 1818, architects in 1834, pharmacists in 1841, actuaries in 1848, and so on, all revealing an aspiration to use their claims of expertise and integrity to rise above the rule of the marketplace. ...The growth of the professions bolstered the emerging cultural containment of industrial capitalism. (Weiner, p.15.)

The concern over the existence of poor taste in manufactured goods increased throughout the early part of the century, accompanied by an increase in nostalgia for the past and a pastoral way of life. Instead of being able to see the criticism of manufactured goods in a positive way, a sense prevailed of turning against industry, seeing only that while it might be technologically impressive it was at the same time inhuman. This sensibility was finally pushed to its limit with the Great Exhibition of 1857, which forced those who were discontented with the state of things to act.

The Great Exhibition, 1851

Crystal Palace was built to house the Great Exhibition of 1851. With the backing of Prince Albert, what began as a national exhibition for industry became, in his words, 'A Great Exhibition of the Works of Industry of all Nations'. The Crystal Palace was designed by Joseph Paxton and was the first structure to use prefabricated iron and glass units on such a grand scale. The project was financed privately, built in only seventeen weeks, and covered an area 'four times that occupied by St Peters in Rome, was covered by 800,00 feet of glass fastened to a graceful structure of 3,300 iron columns and 2,300 girders' (Weiner).

Richard Stewart describes how Britain was technologically forward-looking and stylistically backward-looking:

Technologically, Britain outclassed thirteen European, thirteen American and seven other participating nations... To its critics, the first industrial nation had, inevitably, achieved another first, namely the embodiment of poor taste and dubious quality in cheap consumer goods... The all embracing concept of design did not exist, only "ornamental", "decorative" and "applied art". Many categories of design were subsumed under "art manufactures", a field which ranged erratically from foliage to furniture, from bronzes to bedsteads... Robust vernacular design had been abandoned in the exodus from rural to urban lifestyle. (Stewart, p.8–9.)

In the artefacts exhibited in the Great Exhibition the English discomfort with modernism and their solution to that discomfort was on display. Progress and technology were accepted as a necessary evil, and the compromise was "disguise" by the application of decoration that reflected an older order and the aspirations toward the lifestyle of the English country gentleman.

The Great Exhibition embodied to the world the new ideals that seemed to have become the national ideals of Victorian Britain. Industry was taking on an heroic aura...

Yet the generation of the Great Exhibition was to mark an end and not a beginning. It would see the high-water mark of educated opinion's enthusiasm for industrial capital. Planted within the Great Exhibition itself was a core of cultural opposition, represented by Augustus Pugin's Medieval Court. A sharper contrast could hardly be imagined than that between Pugin's Gothic furnishings and their iron-and-glass enclosure; yet they too were an expression of the period...

The Gothic revival was the most visible expression of a broader movement of reaction to the industrial revolution that traced back to the Romantic poets at the beginning of the nineteenth century. Blake, Wordsworth, and many lesser talents had feared the soullessness of urbanism and industrialism and the utilitarian and materialistic habit of mind these conditions represented... The aesthetic confrontation symbolised by the crystal palace and its Medieval Court was to be characteristically resolved in England by mutual accommodation. As aesthetic medievalism was popularised, it was parted from much of its ideological baggage; at the same time, modernism in English architecture and

technique ceased to be a major cultural force. England never again hosted an important innovative world exhibition of technology or architecture after 1851.

The deaths of three giants of British engineering – Isambard Brunel, Robert Stephenson, and Joseph Locke – within months of each other in 1859-60 heralded the end of an era. If the Great Exhibition of 1851 had been the high noon of British technological leadership, these deaths hinted of a yet-distant dusk. (Weiner, p.28–30.)

The Arts and Crafts Movement: William Morris

The Arts and Crafts movement was beginning to have influence by 1880. William Morris is the name most commonly associated with the Arts and Crafts movement. Unlike Josiah Wedgwood, Morris was from a wealthy background, very remote from industry. Herbert Read in *Art and Industry* describes Morris as poet, craftsman and socialist. He describes how Morris became influenced by Ruskin, an influence that was to endure throughout his life. Ruskin's book, *The Stones of Venice*, made a significant impact upon Morris. I include an extract from *The Stones of Venice* taken from Herbert Read. The extract is a discussion on the nature and properties of glass.

No material is so adapted for giving full play to the imagination, but it must not be wrought with refinement or painfulness, still less costliness. For as in gratitude we are to proclaim its virtues, so in all honesty we are to confess its imperfections: and while we triumphantly set forth its transparency, we are also frankly to admit its fragility, and therefore not to waste much time upon it, nor put any real art into it when intended for daily use. (Read, p.81 & 86.)

In this quote we can see a pragmatic and honest approach to keeping integrity within materials which Ruskin, and in his turn Morris, saw the machine age overturning in favour of dishonest artifice. If this was the position on materials which the Arts and Crafts movement adopted then there was another aspect with regard to people described here by Herbert Read.

Most objects are made up of several units, and under machine production each unit may be the product of a separate machine tended by a separate individual. This was one of the main indictments brought against machine production by critics like Ruskin and Morris, and we still frequently hear it. Aesthetically it is argued that an object cannot be a work of art which is not the direct product of an artists vision and will; art as we have seen is so definitely controlled by such subjective factors as a sensibility to the physical nature of the raw material, that this control is more than likely to disappear when distributed among several individuals. (Read, p.140.)

This honesty in the use of materials and the need for the artist, designer or craftsman to have control of the total process was the basis of the Arts and Crafts movement. This movement is particularly important to an understanding of design in British industry, because of the influence it has had upon the shaping of design education.

Arts and Crafts personnel also had a strong influence on the elementary, technical and arts schools, where handicrafts, in contrast to industrial arts in America were taught. Ashbee (Charles Robert Ashbee was a founder member of the Guild of Handicrafts), for example, founded the Campden School of Arts and Crafts while Lethaby (a president of the Arts & Crafts Society) was one of the first inspectors to the LCC Technical Education Board and became Principal of the new Central School of Arts and Crafts. In practice many members of the Arts and Crafts movement were trained architects who had extended their talents to furniture, fittings and interior design. But while discerning patrons commissioned their work and schools evolved a craft tradition, the general public remained largely unaware. Few were engineers, a fact which, coupled with the Luddite sympathies, regrettably minimised influence in that direction. (Stewart, p.87.)

Art and Manufacture and Engineering

Fundamental to the Great Exhibition of 1851 was the application of engineering to manufacture; locomotives, steam hammers and other machine tools were prime exhibits. In fact, if many consumer goods were grossly over-decorated, then these mechanical artefacts were elegant often with a fine sensitivity of form. Early engineers like Stephenson were self-taught; inventiveness combined with practical experience were their hallmarks. Mechanical engineering gained professional status in 1840. During this period the word “construction” was adopted to describe the work of the civil engineers. Those men who had built the Crystal Palace or the Eiffel Tower could not comfortably be called architects, and the term that came into being was “construction engineer” and their work was termed “constructive art” (Read). Schools of Design pre-date Schools of Engineering and although there were attempts to link the two activities no link between the two ever gathered sufficient momentum. An example of how development occurred is given in Janet Wolf’s description of how awareness of art, design and engineering was brought to Manchester.

The Royal Manchester Institution (RMI) was founded in 1823, with the initial object of providing annual exhibitions of works of art in Manchester... Although the initial impetus for the founding of the RMI came from a group of artists, attempting to emulate the success of the exhibitions of the Northern Society in Leeds, businessmen and leading members of Manchester society were soon involved, including Benjamin Arthur Heywood, a member of a family of Lancashire bankers. The Council of Governors was to include men of commerce, like G.W. Wood, as well as local members of the gentry and aristocracy (Sir Oswald Mosley, the Earl of Wilton, and the Earl of Stamford and Warrington as first President). In the case of the founding of the School of Design in Manchester in 1838 (initially in the basement of the Royal Manchester Institution), the role of local manufacturers was particularly marked. The Schools of Design were set up throughout England as a direct result of the work of a Select Committee on Arts and Manufacture which heard evidence in 1835... In the early years of the Manchester School were such manufacturers as George Jackson, manager of a decorating business and honorary secretary of the School, Edmund Potter and James Thomson, both calico printers and

members of the council. Benjamin Heywood, banker and nephew of the Benjamin Arthur Heywood of the RMI, was the founder of the Manchester Mechanics Institution which dated from 1824 and which, among other things, provided instruction in art; also involved were William Fairbairn, engineer, Richard Roberts, mechanical inventor, and G.W. Wood, George Phillips and Joseph Brotherton, all businessmen. (Wolf, p.63–75.)

Many of the first engineers had experience of drawing and the fine arts. The engineer who designed the steam hammer, Nasmyth, had attended the School of Arts in Edinburgh for five years, although he apparently discounted these years as wasted. The engineer Joseph Whitworth was involved in the Manchester School of Design. It was he who finally provided the first chair of engineering in 1867 at the new university in Manchester (Stewart).

This step put engineering education on a completely different trajectory from that of art and design. Joseph Whitworth, an exhibitor at the Great Exhibition with his machine tools and perhaps best known for his standardised screw-threads (Stewart p.36) was asked by the government to make an official visit to the New York World's Fair of the Works of Industry of all Nations in 1853. He returned to tell the government that Britain was lagging behind the rest of the industrial world in scientific and technical education: 'the working classes have less sympathy with the progress of invention, partly because of the abundance of labour and partly because of the lack of scientific and technical education' (Stewart, p.36).

By the time the British government recognised the need for technical education, Germany, Britain's most effective European competitor, had established education for engineers, managers and industrialists. In 1852 a German architect living in England, Gottfried Semper, had published a pamphlet called *Science, Industry and Art* in which one of his propositions was that craft traditions had to be swept away, and a new aesthetic sought, based upon the acceptance of mechanization. Semper's proposition became one of the most influential of the century, but it fell on deaf ears in Britain. For the next phase of the development of design we have to turn to Germany.

Development in Germany

German concern for design became manifest in 1907 with the creation of the Deutscher Werkbund. This institution's aim was not unlike the British government's original aim, 'to improve the design and quality of German goods' (Campbell, p.10). However, the Werkbund was perhaps more pragmatic and less paternalistic than the earlier British initiative had been. The Werkbund acted as a broker between artists, architects, craftsmen and industrialists and in addition ran a programme of lectures, exhibitions and public education. Whereas in England the major protagonists of aesthetic values held onto past romantic craft values (as expressed by Morris and Ruskin), in Germany they were searching for new forms, that would be a visible expression of the inner driving force of the age. Two individuals were key to the German development, Hermann Muthesius and Henri Van de

Velde. Both these individuals held strong views and although different from the idealism of the romantic tradition in England, it was nevertheless idealism that eventually con-founded the Werkbund. The values that Muthesius and Van de Velde held were at odds with each other – Muthesius was a modernist and Van de Velde an Arts and Crafts man.

Muthesius, who worked for the Prussian government, believed that it was vital to establish aesthetic types or standards. He was wholly committed to the principle that the laws of mechanised mass production should dictate both the appearance and the symbolic or cultural function of the mass-produced, machine-made object. His purpose was to ensure a high standard of mass production to meet the needs of the German export trade, although the effect of his works was to encourage the development of standard types.

Henri Van de Velde, a Belgian living in Germany, was a protagonist of Art Nouveau. This movement shared many values with the arts and crafts.

He [Van de Velde] was strongly influenced by Ruskin and Morris, and although discarding their overt nostalgia for the past, sought to develop their moral and social principles, arguing that objects could not be considered separately from the processes of production and utilisation, and that artists must be controlling influences to ensure the predominance of human needs. (Heskett, p.87.)

It is easy to appreciate why these two men could not agree. As a part of the Werkbund, Van De Velde's opinion was that 'Industry must not think that this idea of beautiful work and of the good qualities of materials can be sacrificed in favour of an increase of profits. We (the Werkbund) will have no kind of responsibility for objects that pay no attention to perfection, to the materials used, and that are carried out without pleasure in work' (Heskett, p.89–90).

Since most of the membership of the Werkbund was artists and craftsmen, the Muthesius proposition of 'formal standards and of commerce was interpreted as a threat to their independence and integrity' (John Heskett, p.90). Van de Velde found favour with a majority of the membership. So in the first instance the principles favoured by the Arts and Crafts movement, dominant in Britain, also dominated Germany. However, there was an acceptance of the modernist principles of Muthesius in the new industries.

The new aesthetic was best received by manufacturers for whom no aesthetic tradition existed. It appeared most frequently, therefore, in electrical appliances, objects of transport and functional buildings like railway stations and factories. (Sparke, p.61.)

Peter Behrens, an architect of the Werkbund, is probably the best known example. His work for AEG designing kettles and other small consumer items, and also the AEG buildings and corporate identity, became a modernist model of good design practice.

The Bauhaus

Apart from isolated instances such as AEG, it was at the Bauhaus School rather than in industry that the machine aesthetic took root. Many of the Werkbund architects had favoured the machine aesthetic while the craftsmen went with Van de Velde; the architects found like minds in artists and sculptors of the day.

By the 1920s many architects had looked not only to the work of the engineer and to the machine as sources of symbolic inspiration but also to the technological advances in building construction in formulating their new aesthetic. In the USA the steel-framed building placed the priority upon structure rather than decoration and a number of architects advocated as a cultural necessity (Adolf Loos) the removal of decoration. Increasingly also they began to look to modern architecture to provide an aesthetic for mass-produced consumer goods as well. The fine arts, painting and sculpture also became machine-conscious in this period and, like architecture and design, began investigating their own internal properties in the search for a new aesthetic which would ally itself, metaphorically at least, to the newly mechanised mass environment. (Sparke, p.45.)

The Bauhaus was founded in Weimar in 1919 and its first director was architect Walter Gropius who was a Werkbund member, as were many of the staff. In 1926 Walter Gropius described the Bauhaus thus: 'the Bauhaus workshops are essentially laboratories in which prototypes of products suitable for mass-production and typical of our time are carefully developed and constantly improved.' This was not exactly untrue, although not many of the prototypes reached mass production.

In sum the list of industrial products emanating from the Bauhaus was hardly sufficient in range or accomplishment to warrant the sweeping claims regarding its significance. In the context of the overall development of design in one of the world's leading industrial nations, moreover, Bauhaus products appear no more than a minuscule contribution from an avant-garde fringe group. (Heskett, p.103.)

However this strange and paradoxical mix of idealism and industry became a powerful educational methodology, and many books have been written on the teaching methods of the Bauhaus. 'Its educational significance, in contrast, has been enormous, its methods forming the basis of art (and design) education in institutions the world over' (Heskett, p.103).

Proof of its avant-garde position came from the threat it posed to Nazi Germany – which finally closed the Bauhaus in 1933. The teachers and proponents of the ideals of the Bauhaus fled the country for Britain and the USA, where they took key positions in design schools. Their influence is still to be seen in schools of design and architecture throughout the Western world. Though the point Heskett makes about the small number of products produced by Bauhaus members is true, many of these have in fact become significant and enduring classics. Most of us will have sat in "Bauhaus" chairs, even if we don't know it,

that are still in production; the most common is a tubular steel cantilevered chair with a wicker seat used in many dining rooms, and at least two other upholstered chairs and settees are commonly seen in company reception areas.

The Role of the USA

By the end of the nineteenth century, all the factors necessary for the emergence of industrial design in the twentieth century sense had surfaced. In both Europe and the USA the requirements for the expansion of mass production – mechanization, standardisation and the emergence of the mass market; and the emergence of a whole new range of products which made new demands on the manufacturer and transformed the life-style and expectations of the consumer, had become realities. Between 1790 and 1900, 600,000 patents were registered in the USA and although some of these inventions were British or European in origin, it was in the USA that most of them were developed... Among the many reasons for this explosion of inventions was the fact that the shortage of cheap manual labour in the USA meant that it was dependent upon mechanization to keep up with Europe. This was coupled with a shortage of manual help in the home which encouraged the development of labour-saving devices. Thus it was in US homes that objects like cookers, washing machines, refrigerators, sewing machines and dishwashers first flourished and the US office was the first to exploit the advantages of new products such as the typewriter, the adding machine, the cash register, the Dictaphone and the telephone... (Sparke, p.16, 23 & 24.)

It was therefore in the USA that there were many opportunities for industrial design. The first generation of US industrial designers, although committed to the visual realities of the “machine aesthetic”, were not committed to the political and social idealism that accompanied this aesthetic in Europe. Industrial designers in the USA therefore employed the machine aesthetic as a “style”. Manufacturers found the “machine style” sympathetic to mass production and were not hamstrung, as European manufactures were, by any accompanying idealistic social and political agendas which the European designers carried with them.

An article in the February 1934 issue of *Fortune* magazine serves to illustrate how industrial designers were positioned in the US commercial context.

The industrial designer’s field is something else again. As a phenomenon he came into being as mass production raised output to where one after another, industries hitherto without benefit of other than engineering design found their products matched by other manufacturers and the market consequently glutted. Furniture and textiles, their usefulness taken for granted, had long sold on their design. Now it was the turn of washing machines, furnaces, switchboards and locomotives. Who was to design them? Their own staff, the practical men who had built up the businesses were incompetent – or felt they were. So they began to look to the outside world – usually introduced to it by their advertising agencies. The ebullient agencies, always ready to coin a new profession, minted one for them and, without knowing exactly what the term meant,

stamped it “Industrial Designer”. In the field of mass production the industrial designer is to the plant engineer what, in building, the architect is to the contractor. (‘Industrial Designers’, *Fortune* magazine, February 1934.)

The first experiences of manufacturers using these new industrial designers were not entirely successful, as the *Fortune* magazine describes. ‘The first thing the new profession acquired was a black eye. Not a nice clean round-rimmed black eye, but a splotchy purple one administered by innuendo. Some of the fiascos were fantastic.’

The article describes a series of inappropriate and costly designs: a design for a new stove submitted on rice paper – with retooling costs of \$200,000, a foot operated handle for a refrigerator, which unbalanced the individual trying to open it, and so on. However, both manufacturers and designers lived through the learning curve and the *Fortune* article goes on to describe a successful product development story.

Story of a Stove

Three years ago (1931) Mr W. Frank Roberts who is President of the Standard Gas Equipment Corp. walked into the office of Mr Norman Bel Geddes, industrial designer. To Mr Geddes he explained that his stoves, long standard sellers in the industry were having a hard time meeting competition. From Mr Geddes he wanted a design for a new stove and for it he expected to pay, say, \$1,500. And he saw no reason why he shouldn’t have his drawings in a week or two.

To Mr W. Franks Roberts, Designer Geddes explained that he was not in the business of selling pretty pictures, that he would take the job only if he convinced himself that he and his staff could think up a better stove to be made for less, and that the job would take a year and would cost \$50,000 as an advance on royalties on the new product. Mr Roberts returned to confer with his directors. But he had the courage to see it through, shocked though he may have been by his first encounter with the serious new profession of industrial design.

When Geddes finally agreed to take (and got) the job, his first move was to put an engineer in the Standard Gas plant, set others of his staff to work studying rival’s methods. Corps of investigators interviewed hundreds of housewives and stove dealers – the field reports made a book of 300 pages. The first major hitch came six months later when Geddes recommended standardised units. Despite its title Standard Gas felt standardisation could be overdone. So once more Geddes assumed the role of salesman-showman.

He made some wooden blocks to play a game. Each block represented on a half-inch scale one of the stove parts currently stocked. Some he painted blue; these were ovens. Some he painted green; these were boilers. And so on – hundreds and hundreds of them. It was a tremendous array. When he had set them out you couldn’t get into his office for stumbling over them. Then, alarm in his voice, he summoned President Roberts. When President Roberts came, stubbed his toe on the blocks, swore, Geddes produced his own models for basic units. There were only sixteen of them. The contrast was inescapable. Mr Roberts summoned his engineers and his salesmen. They too were convinced, the work proceeded.

When the Geddes stove appeared on the market in January 1933 the story had

its happy ending. Mr Roberts' judgement was vindicated; housewives wanted the Geddes stove. Utilities that had never heard about the line before welcomed it. Sales rose, doubled, held their gains.

The story of the stove is typical only of the three dimensional quality of the new industrial design which is concerned not only with appearance but also with improvement of product and lowered costs. Geddes is unique in the thoroughness of his approach, in his theatrical gestures. Most designers are less radical: they supplement, do not duplicate company engineers, are more interested in reform than in revolution. But a characteristic of the profession is that no two protagonists work alike... The industrial designer has been easy game for satire... But the fact that he persisted, despite his often exaggerated sense of his own importance, was testimony to the soundness of the need. And in 1927 came a historic conversion, the greatest single recognition of change. Henry Ford, dedicated to the sale of transportation and transportation only, was forced, in the re-design of his car to acknowledge appearance as a sales factor. The movement had other victories, but in the twenties it was a decade ahead of its time. It is in the depression that the industrial designer has made his comeback... The product had to be made to sell itself. The designers were called in.

It was the need to improve competitive advantage, as it had been in England in 1832 and in Germany in 1907, that generated the growth of design in the USA. The emergence of the "industrial designer" could be seen almost as *ad hoc* or serendipitous. The propagation by advertising agencies of the term "industrial designer" was important, as was their idea of the use of designers to style products. So too was the adoption by American designers of the style of the "machine aesthetic", and their concurrent disregard of the political and social idealism that accompanied the "machine aesthetic" in Europe. Both these factors were significant in shaping the model for industrial design activity, and it has altered relatively little since.

Published also in the *Fortune* article is a comparative table of leading Industrial Designers that shows their previous experience, the size of the companies and a listing of some of their key clients (see table 1).

Of these ten industrial designers, only two, Sakier and Loewy, have an engineering background. The best known names in this list are Dreyfuss, Geddes and Loewy, and both Dreyfuss and Geddes were previously theatre set designers. They inevitably brought to the newly formed profession of industrial design much of the culture of the theatre including the role of the "prima donna". The idea of the designer as personality was born with this first generation of American industrial designers. Henry Dreyfuss (one of the set designers) also developed more detailed analytic approaches and these too are current day practice. Describing his design for the Bell telephone in 1937 John Heskett writes:

Meticulous preparatory studies and tests ensured that it was easy to operate. The simplicity of the moulding facilitated cleaning and servicing, and minimised the possibility of damage... At the core of Dreyfuss' success was his

Designer	Age	Years as Industrial Designer	Previous Experience	Compensation	Staff	Typical Achievements	Clients
Dohner	41	7	University Design Teacher	Cost of Design Dept \$75,000 per year	8	Vacuum Cleaner Mechanical Water Cooler	Westinghouse
Dreyfuss	29	5	Theatre Sets	Flat fee \$1,000 to \$25,000	5	Washing Machine Alarm Clocks	Sears Roebuck Western Clock Co.
Geddes	40	7	Theatre Sets and Costumes	Flat fee \$1,000 to \$100,000 royalties	30	Gas range Telephone Index Radio	Standard Gas Equipment Batiz Manufg Philco
Guild	35	10	Art Director Furniture Expert	Retainer fee \$25,000 Flat fee \$300 to \$25,000	4	Refrigerator Cooking Utensils Stoves to Rollerskates	Norge Corp. Wear Ever Aluminium Co. Montgomery Ward
Jensen	35	6	Artist	Retainer fee \$500 to \$20,000	3	Telephone Metal Kitchen Sink Water Heater	AT & T International Nickel Co. L.O. Isomen & Bros
Loewy	40	6	Electrical Engineer Freelance Advertising	Retainer fee \$10,000 to \$60,000 Flat fee \$3,000 upwards royalties	1	Motor Car Implicator Kitchen sink and bathroom units	Hopp Motor Car Corp. Gestetner (British) Sears Roebuck
Sakier	36	11	Mechanical Engineer Art Director	\$10,000 to \$25,000 income from design work retainers	11	Bathtubs Wash basins Bathroom units Vacuum Equipment	American Radiator and Standard Sanitary The Accessories Co. Schellwood Johnson Co.
Teague	48	6	Advertising Designer	Retainer fee \$12,000 to \$24,000 Flat fees \$500 to \$10,000	4	Cameras Furnace Mimeograph	Eastman Kodak National Radiator AB Disk Co.
Van Doren	38	4	Painter Ghost writer	Consultation fee \$100 per day Job executed \$500 to \$5,000	8	Scales Kitchen Grill Paint gun	Toledo Scale Co. Swartzberg Manufg Co. De Vilbiss
Vassos	35	7	Advertising Agency Illustrator	Retainer fee \$12,000 Flat fee \$1,000 to \$7,000	3	Drink Dispenser Turnstile Radios	Coca Cola Perry Manufg Co. RCA

table 1: Comparisons of a Few Leading Industrial Designers

belief that machines fitted to people will be the most efficient. (John Heskett, p.108.)

As the industrial design activity emerged, so the relationship between designer and company became more complex and interdependent, hastened as new materials (aluminium and plastics) arrived which, among other things, questioned established engineering solutions to problems. The industrial designers became the obvious form-givers for the products that were packaged in the new materials. The Westinghouse designer Donald Dohner said, 'imitating other materials may be an interesting technical stunt for some engineers but it robs the new material of its birthright, destroys its identity and natural beauty, thereby degrading it' (Sparke, p.130).

Penny Sparke describes the emerging role of industrial designers at this time as 'middlemen between the client and specialists like draughtsmen, model-makers, market researchers, or engineers... At the same time they also became public heroes, filling the pages of popular magazines that even described what they had for breakfast' (Sparke, p.98).

Bringing the Story up to Date

This US model of the industrial designer became the dominant model for industrial design practice and by the 1940s it had spread back across the Atlantic to Europe. But what had occurred in Europe in the intervening period between the Great Exhibition and the 1940s?

Britain

Through exhibitions, booklets and *Die Form* magazine, the Werkbund had spread across the Channel and reached at least a select group of enthusiasts. In 1914 several returned home from the seventh Deutscher Werkbund exhibition in Cologne, determined to found an equivalent organisation... In 1915 the privately formed Design and Industries Association commenced a determined though solitary campaign for "Fitness for Purpose", the enthusiasm of its members only matched by the indifference of manufacturers and seemingly bad taste of the public at large... Meanwhile in Germany the mass production of rationalised designs with standardised components had been firmly established, while in America gigantic corporations employed sophisticated private studios to improve their products and images. (Stewart, p.39.)

Through pamphlets, year books, exhibitions and eventually radio broadcasts the DIA strove to combat lack of interest in the nation. Something of its early philosophy, not to mention evangelical spirit, is captured in A. Clutton Brochs' 1916 pamphlet 'A Modern Creed of Work':

'We shall do nothing if we make up our minds that machinery is a device of the Devil, which must destroy all beauty and joy of life. Machinery is a device of man, and one which he cannot now do without. There is no reason why an object of use made by machinery should not be well made, or should not have the functional beauty of good design and workmanship. That is proved by motorcars, battleships, sporting guns, and a hundred other things. It may not be

universally true, but one may lay it down, as a practical rule, that an object made by machinery is better without ornament.' (Stewart, p.44.)

Among founder members of the DIA were Ambrose Heal, the owner of the Heals Furniture Store and Frank Pick, who was the Commercial Manager of London Underground Railways and responsible for establishing the corporate identity that is still in use today.

In 1934, Frank Pick headed up a new government body, The Council for Art and Industry, which became commonly known as the Pick Council and by 1937 this body had established a National Register of Industrial Art Designers. Richard Stewart describes how two particular British companies were actually able to challenge the continental sales of steel furniture by using the Register to employ two Bauhaus architects, Marcel Breuer and Walter Gropius.

One positive result of Fascism had been the influx of refugee architects and designers from Nazi Germany, including Gropius and Breuer. Until 1939 they were able to work on important projects with British colleagues. It was to be Britain's loss and America's gain when so many internationally known names moved to America at the outbreak of war. (Stewart, p.61.)

In 1944, the Pick Council gave way to the Industrial Design Council, and this has endured. In 1947 it was reorganised into two divisions, Industrial and Information, and the Industrial division absorbed the National Register of Designers, which by then had 800 approved designers who carried the qualifying initials NRD. There was an initiative to create the same status for NRD as that of C.Eng. or I.Mech.E. However, since establishing a system of monitoring standards proved extraordinarily difficult and did not appear to get any backing from manufacturers, the initiative failed. Instead in 1955 they renamed the list the Designers Selection Service. After consistent publicity this bore fruit. Among the companies who used recommended designers were the brewers Indes Coope, the sanitaryware company Shanks and the Ford Motor Company, which employed a young Terence Conran to select goods for a TV film. The Ministry of Civil Aviation commissioned furniture from designer Robin Day for its airports and thereby began a tradition of well-designed seating in British Airports.

However the ethics of the Arts and Crafts movement continued to exert powerful influence in Britain, so that the work of the US industrial designers was not well regarded by British designers, who considered their aesthetic style "vulgar" and their commercial approach distasteful.

The model of the design consultancy was adopted in 1942 largely by graphic designers. Even though there are now industrial design consultancies, it is the graphic design-based companies that are the most influential¹.

¹ During the Eighties, it was principally graphic design consultancies which came closest to reaching high status and recognition. Names such as Wolff Olin's, Michael Peters and Fitch Associates (for retail design) - these consultancies grew rapidly and rather publicly expanded into Europe and the US, whereas the successful British industrial design consultancies are quiet and quite small, unlike their US counterparts.

The Head of the Industrial Division of the Council, Mark Hartland Thomas felt the idea of Design Centres to be ill-conceived and not suited to the real needs of industry. Some people in the Treasury and the Board of Trade considered public money ought not to be spent on a Council of Industrial Design and that if industry required such a thing, then industry should pay for it.

Bursts of government activity, followed by considerable withdrawals have plagued industrial design activity in Britain and still continues. It is possible that this British model of institutionalising the notion of good design obstructs the entrepreneurial use of design.

Germany

Even in industrial design, Hitler's presence was felt. John Heskett describes how

In fact the National Socialist regime used aesthetics on every possible occasion, and at all levels of life, as a propaganda instrument for cultural legitimisation, and to secure suspension of rational judgement. Hitler's obsession from 1935 onward with making Germany self-sufficient meant that innovation and quality in design and production were constantly stressed and the aesthetics of goods and mechanisms were emphasised as a visible manifestation of German superiority.

Exhibitions of "Art and Technology" were frequent and an official journal for engineers and technologists, *Deutsche Technik*, included a regular feature "The Beauty of Technology".

In 1938 the German Prize, Hitler's answer to the Nobel Prize, was jointly awarded to four engineer-designers: Ferdinand Porsche of Volkswagen fame, Fritz Todt, head of the organisation that built autobahns, and the aircraft designers Ernst Heinkel and Wilhelm Messerschmitt. (Heskett, p.193.)

It is worthwhile reflecting that the understanding of design in Germany bridges engineering and aesthetics in a way which was not evident in Britain at this time. The Spitfire was designed by R.J. Mitchell but his name is not as well known as those of his German counterparts, Heinkel and Messerschmitt.

The legacy from this catastrophic period of German history is a very systemic and smooth flow between engineering and aesthetic concerns in design, if perhaps somewhat controlled and formalistic. The automobile companies of Mercedes, BMW and Volkswagen built their reputation on this formula as has Braun, the producer of electrical consumer goods.

In 1951 two brothers, Artur and Erwin Braun, took over the company. Interested in modern design, they used design to position their company's products at the upper end of the market. Their current design director, the now-famous design guru Dieter Rams, joined the company in 1955 and with others developed the characteristics we now associate with Braun products: no unnecessary detail, use of black, white or grey, and an appearance of strength and stability. Braun's industrial design capability is almost entirely in-house and works to a formalised set of procedures alongside the engineers.

Italy

There is a commonly held conception that good design emanates from Italy, so it is interesting to see that it was not until the 1930s that ideas about design and architecture began to filter into Italy from Germany and the USA. Even today Italy does not train designers but only architects. The first and most prominent example of the use of design in Italy comes from the manufacturer Olivetti. As Penny Sparke describes:

Adriano Olivetti became president of the company when his father retired in 1938... He had studied engineering at the Polytechnic of Turin and visited the USA to study its production and organisation techniques. His subsequent modifications to the Olivetti Company production line – which he altered from a piecework system to one which was organised on more modern analytic lines – accelerated its output at a remarkable rate, allowing the company to expand rather than retract its efforts during the Depression. (Sparke, p.182.)

Adriano put to commercial use the Bauhaus style, firstly in graphics, hiring a team to rationalise brochures and posters and subsequently in the product range, hiring Marcello Nizzoli.

'Nizzoli had already made his name as a graphic and exhibition designer in Italy... In 1936 Nizzoli took over on a consultancy basis the design of all Olivetti products. His major successes were, however, his designs for typewriters and office machines. Unlike his counterpart consultant designers in the USA, Nizzoli was not involved with production efficiency, market research or sales, but was employed simply as a sculptor to style the typewriter's body shell.'

The model for design at Olivetti is largely unchanged. Currently the design consultant is Ettore Sottsass. Ettore Sottsass promoted his own design aesthetic from his studios in Milan in the late seventies. Known as Memphis, this aesthetic was typified by highly colourful and eclectic forms, reminiscent of American style in the late forties and early fifties. It had a remarkable influence on design style across the world, marking the first moves away from the severity that came to represent Bauhaus style. The power and influence of the total Olivetti culture is an important factor in its use of design and it has inevitably meant that their resident consultant designer has become a powerful figure in design across Italy and the world².

America

During the 1940s the popularity of the industrial designers waned, and many manufacturers began to consider that it would be more cost effective to create in-house design facilities, and this gradually became the trend. Accompanying this trend was a general slowdown and then disinterest in manufacturing so that by the 60s and 70s, as a Business Week article devoted to industrial design describes,

² Olivetti expects its senior management to understand artistic as well as scientific principles. The company believes it should take a lead in the nation's cultural life and since the 1930s they have provided sophisticated health care, schooling and homes at Ivrea, their manufacturing headquarters.

Companies passed into the hands of financial managers, conglomerates proliferated and the product became lost in a snowstorm of numbers and statistics. What companies actually made became an abstraction, almost an afterthought, in the helter skelter of finance. (*Business Week*, April 11th, 1988, p.105.)

In the late 70s and early 80s the high technology companies in Silicon Valley and Boston's Route 128 provided a new generation of product-oriented, risk-taking CEOs. *Business Week* describes how 'In a replay of the 1930s they [the new CEOs] teamed up with a new generation of brilliant designers. The most famous duo is Steven P. Jobs and Hartmut Esslinger – Apple Computer Inc. and frogdesign inc.'

Another important partnership is between Apple Computer Inc. and Dave Kelley Design. Dave Kelley, an engineer with a master's degree in product design, is responsible for the design of the point-and-click mouse. He, Hartmut Esslinger and others like them may well herald a revival of industrial design in the USA.

Summary

The events described here were chosen to illustrate the emergence of industrial design, beginning with the concerns of Robert Peel in 1832 and culminating a hundred years later in the emergence of the American industrial designers. There is a consistency, on the part of designers and manufacturers, to understand design as being decoration, form and styling, which was first expressed in the way Josiah Wedgwood used design.

Industrial design has been understood principally as the adaptation of a dominant design while the development of a completely new product has been understood principally as invention. This appears to hold for engineers also, who can either "invent" or "design". The inventions made by Josiah Wedgwood on his kilns, and Adriano Olivetti on his production methods are understood as business developments, not as design, innovation or invention; these individuals, like Steve Jobs, are seen as entrepreneurs.

Surrounding new product development there are three groups of individuals, engineers, businessmen and designers, and within each group their activities could be categorised variously as invention, design, innovation, business improvements or entrepreneurship. However, pursuing the semantics of these categorisations is outside the scope of this chapter and so I will categorise designers as making a change to the decorative quality, the form or styling of a dominant design, i.e. automobile, refrigerator, ceramic ware, or office machine.

EDUCATION OF DESIGNERS

The above account of the history of design mentions in passing the education of designers. However, the most powerful theoretical principles of design emerged within the arena of education.

The Bauhaus School and its Influence

The first schools to educate designers were founded in Britain in the middle of the nineteenth century. They were government sponsored and the teaching of fine art skills and art history reflected government's concern with raising aesthetic standards rather than with the requirements of industry. In Germany education for designers became established first by Henri Van de Velde, but undoubtedly the most important event was the creation of the Bauhaus School in 1919. The Bauhaus School was pedagogically committed to the development of design for mass production, though in practice it was fine art- and craft-based but with strong ideological and philosophical beliefs in mass production and the emergence of new mass culture. Pursuing these ideologies through the vehicle of fine arts and crafts did not appear contradictory to the members of the Bauhaus.

Many of the teachers were artists, two of the best known being Kandinsky and Klee. In their own work these painters worked with the ideas of abstract simple forms and the juxtaposition of strong colours. Kandinsky described their teaching as the study of the "objective basic existence of form and colour elements." Both artists imbued their teaching with philosophical and spiritual ideals.

After a first year of this type of visual enquiry, students moved into craft workshops. These workshops were dedicated to metalwork, pottery, weaving, typography or carpentry. The architect Walter Gropius, who was the School's first director, said that "the teaching of craft is meant to prepare for designing for mass production."

In fact no one was quite sure how to teach design for mass production. In the absence of any established method what emerged was the teaching of individualistic craft and fine art skills with an accompanying theoretical position based upon the utopian ideals of a new social and political order brought about by mass production. All the arts, music, poetry, painting, sculpture and theatre during this period of 1910 to 1930 were similarly influenced.

As has already been mentioned, the Bauhaus School became the dominant model for the education of designers. Individuals associated with the Bauhaus left Germany for Britain and particularly America (Hitler closed the School completely in 1933). The reputation of the Bauhaus was sufficient for the staff to be offered key positions. For example, Walter Gropius was offered a chair at Harvard, Mies van der Rohe one at the Massachusetts Institute of Technology, and in addition several new institutions were created. Penny Sparke describes one particular school:

Like the Bauhaus before it, the high-minded idealism which inspired the Institute of Design removed it from the context of the professional designer and the commercial world of industrial design. No links were made, for example, with the US consultant industrial designers who had emerged during the Depression to service the manufacturers of the new mechanical and electrical consumer goods, as Moholy (ex Bauhaus) disapproved strongly of body-styling. (Sparke, p.166–167.)

After the Second World War another influential school was developed in Germany at

Ulm. It too, took the Bauhaus as its role model. ‘The emphasis moved away from creativity and simple problem-solving toward a vision of design as a much broader, cultural phenomenon and of designers as the transmitters of that culture’ (Sparke, p.167).

Although concerning itself more centrally with industrial design and with what one director termed “scientific operationalism”, the neo-functional aesthetic (a geometric and service aesthetic) which the school became known for has many of the hallmarks of the machine aesthetic and the Bauhaus tradition of strongly-held ideologies. (Dieter Rams, the Design Director for Braun, was trained at Ulm.)

The legacy of the Bauhaus and the pre-Bauhaus Arts and Crafts movement still strongly affects the design schools³. I close this section with Penny Sparke’s opinion on design education in Britain.

The gap between design education and the general efficiency of design within industry is particularly strong in Britain which educates more designers than any other country, but which gives a much lower profile to design in its manufacturing industry and its commercial life. These are the kind of realistic problems that confront design education today and which, in fact, threaten its very existence. There is a sense also in which the most far-reaching design educational experiments, like those undertaken at the Bauhaus and at Ulm, seem to stand ideologically in opposition to the economic status quo and thus to represent a threat to the very structure which, in modern capitalist society, supports the industrial designer. Throughout this century, design education has tended to swing between the two poles of utopianism and vocationalism, unsure, ultimately of its aims. It is a dichotomy which is still in evidence today and there are few signs of a solution to the dilemma that it presents to the design educationalist. (Sparke, p.172.)

Current Design Education and its Effects on Current Practice

We have discussed the emergence of the dominant model in design education and the maintenance of the philosophical traditions and crafts and fine art practice. This section will consider current teaching practice, the issues for design educators and the effect of design education on industrial practice.

Current Education

Compared to most higher education the process of learning to be a designer is much more experiential, and the learning steps are assessed indirectly rather than directly. Below is a description of the project process that is typical in industrial design courses.

Projects on the re-design of products occur continually throughout the three to four years a course lasts.

³This observation is partly based upon my own experience as both student and teacher. In 1965 I followed a two year “classic” Bauhaus design programme at a small art school just outside London; this was not unusual but the normal programme in a high proportion of British art and design schools.

The development of a cordless vacuum cleaner for the growing market of single householders is our example. This project might last two to six weeks dependent upon the amount of detail that the tutor in charge has determined is appropriate to the development of the student group.

The student group will commence by working individually or occasionally together under the general direction of a practitioner–tutor on the collection of various types of data: this could cover the market, the raw materials, the sequences of production, the tasks that the vacuum has to undertake. Once this basic data has been collected the students will work individually on their own concepts of the future product. They will be judged by the tutor for their skills in the analysis of market opportunities and in translating those interpretations into a design concept. Attention will sometimes be given to the extent to which the student appreciates the problems of production and sometimes emphasis will be placed purely on product feel. An important part of the socialisation into being a designer consists of acquiring an intangible ability to be in tune with changes in fashions and in cultural nuances in relation to artefacts: a “sensing” faculty. That faculty relies upon an aptitude for visual recall. The student’s eyes are trained to analyse, recognise and recall physical details. Gradually the visual information builds up into a wide vocabulary of visual elements so that minor shifts in their combining can be detected, mentally logged and the original source can be identified.

The learning process is built almost entirely upon practice. The prime teaching vehicle is the succession of practical projects and it is expected that the student will acquire increasing sophistication in problem recognition and in generating solutions, as well as acquiring certain basic manual skills. The prime mode of communication is not words or figures but diagrams, drawings, samples and models. The assessment, which is continuous, is through the application of fixed criteria to the pieces of project work. Unlike the typical undergraduate whose assessment is based on knowledge, the designer is assessed by practical solutions to frequently occurring routine problems. At an early stage students learn that a high proportion of design work tends to be the re-design of existing products rather than a total piece of design innovation.

The tutor typically uses a combination of collectively-based teaching to the cohort of students combined with individual tuition which is (in effect) public because the students work in environments where their activities are mutually observable. So tuition is individual, yet not private. The learning experience tends to induce the notion that the best method of understanding a design problem is through an individual line of reasoning which is backed by a certain degree of shared critical exploration and experiment. This learning experience shapes the individual tracks which designers are likely to reproduce when inside firms.

A designer is not usually taught or encouraged to be able to work flexibly. The method of design work places an emphasis upon an *inclusive* approach to interpreting events that affect product design. The inclusive approach and the implicit values of design teaching are however likely to foster a concern for robust designing.

There is a distinct lack of teamwork, although there is a sense of learning together and of learning from each other fostered by working to solve problems in the shared space of the design studio. It is hard to express and to assess

individual creativity in team working and since individual creativity is highly prized, teamwork is not a preferred model.

The project process imbues a student with a self-sufficiency and an individualistic approach to time management and idea generation. The comparison to a craft model of working is strong, but any attempt to marry this model to industrial working requirements would be doomed to failure.

Left to pursue his individualistic, process-based working model the good design student will arrive at a design solution that has a high degree of “product integrity”, for, let us say, the new cordless vacuum cleaner. It is likely that in the assessments integrity in “product feel” will be valued above other, more production-based criteria. But it is also true that in the classroom situation it is hard to adopt production-based criteria. (Dumas, 1988.)

Artists and craftsmen have what we might perhaps call a degree of myopia which predisposes them not to look beyond their own individual way of understanding the world. The non-conformity in a Picasso or a Bach can also be seen in the designers who become cult figures. Individuality is highly prized within the design community; the first generation of US industrial designers were in this mould, as were the Bauhaus figures, and leading designers today such as Ettore Sottsass in Italy and Hartmut Esslinger of frogdesign in the US. *Business Week* describes frogdesign thus:

Frogdesign’s whimsical ideas and disdain for the status quo have won it something of a cult following among industrial designers. But the firm has also wooed some decidedly mainstream clients. From General Electric to Eastman Kodak to 3M, frog is leaving its mark.

Frog’s got its critics, too. One frequently levelled charge is that its designs are gratuitously flashy. “Well,” muses Esslinger, “the critics have their point. We are colourful and not so rational.” He pauses, “But if we were too rational, I’d be dead by now. Intellectually dead.” (*Business Week*, April 11th 1988, p.105.)

The success of figures like Esslinger, who adopt highly individualistic work practices and operate within a design consultancy, influence the aspirations of students and reinforce the dominant model in design education.

Current Practice

It is clear that the dilemma of design in its relationship with industry is far from resolved.

During the eighties, the British government’s interest in design was rekindled and the government sponsored once again a variety of studies and working parties to consider how to improve the design of British products and the relationship between designers and industrialists. After a seminar for design educators in 1987 called ‘Design Education and Industry’, the Department of Education and Science in Britain published a report. The first extract here considers the issues of individual creativity.

A further question is whether the focus of design studies is right... some employers feel that courses over-emphasise individual creativity, and under-

emphasise teamwork both within the design team and between designers and those responsible for production, marketing, management and so on. The present system of recruitment to jobs, based heavily as it often is on the personal portfolio, could be held to over-emphasise this. It is sometimes argued however that courses are too related to a situation – rare in this country but perhaps more common abroad – where the designer works very much as an individual within a company, and fail to recognise the more common demand for teamwork. ('Design Education and Industry', p.2.)

Whether the focus of design studies is right seems a somewhat inadequate question to ask; the dominant model for design education could not be stretched to provide an alternative and the most famous designers are very successful using this model. Given the latter, it should be remembered that it is also the model that students want.

A comparison made by one industrialist, Merrick Taylor, who spoke at the seminar provides an interesting insight. He compares young designers with young ice skaters.

The ability to judge world competitive standards is just as important for aspiring designers as ice skaters... One needs always to be able to attract expert specialised help. Good presentation of the "what" you are trying to do attracts unexpected help – this applies to the industrialist, designer, or ice skater who will need an ice rink, expert choreographer, dress designer, even help with ice skates and music if the performance is to become world competitive.

Lastly, understand with humility how your performance will be judged. It's no good being right and irrelevant. The number of points awarded for artistic impression is *equal* to the number of points awarded for technical merit and considerably more points are awarded for – and everyone around the world pays to watch – the "free style" sector for something innovative. ('Design Education and Industry', p.20.)

This analogy puts forward a model of team working, and the use of specialists. It is hardly surprising to hear this from an industrialist, but designers have hardly any conception of Taylor's model. A final extract from this report provides a good example:

In its main findings the NEDO [government sponsored organisation] design working party has emphasised the need for design to be placed at the heart of a business, as a strategic weapon. For this to work there is a need for designers who think strategically. ('Design Education and Industry', p.32.)

The recommendation that follows this statement is for training programmes to be developed by the Society of Industrial Artists and Designers to train designers in strategic management issues. The dominant model of design, that of the individual active in all aspects of development and having all necessary understanding, has prevailed. They, the design educators, do not understand the world as Taylor did with his ice skater analogy. Taylor is less likely to see a need for designers to think strategically; to him, the goal of a designer is to design excellently and to look forward to more opportunities to do so. Someone else will have the task of strategic thinking.

On this evidence the dominant model in design education is unlikely to adapt effectively. This model of design which inherited more of the Arts and Crafts values than it did the values of technology, what Dr. Anne Hogg has referred to as the “William Morris inheritance”, is unlikely to provide anything but a reluctant or rather confused team player.

Education of Engineers

Any detailed account of the education of engineers and indeed of engineering practice is outside the scope of this thesis. However, as was discussed in the previous chapter on definitions, design is, in the minds of many individuals, as likely to refer to engineering as it is to the forms of design this chapter has concentrated upon. That they are so mutually exclusive in their education and in their practice is an illustration of the problems surrounding the understanding of design. This section will, by referring to a paper by Douglas Lewin called ‘On the place of design in engineering’, consider some of the reasons why the understanding of design is so confused.

...it is a commonly held idea that design is primarily concerned with the functional appearance of an artefact, that is from the aesthetic viewpoint. Hence the establishment of Schools of Design, such as that at the Royal College of Art, and the concept of the industrial designer. Perhaps more confusing, and certainly more damaging, is the mistaken belief that in some way design differs from engineering *per se* and requires a lower intellectual level of appreciation... But why should design be considered second rate and inferior to engineering? What is engineering if it is not concerned with the design of artefacts? ...In my view the main reason for this unhappy state of affairs in engineering design is that engineering is considered as an applied science and not as a respectable academic discipline in its own right with a corresponding philosophy... The traditional Baconian philosophy of science, based as it is on inductive methods and arguing from the particular to the general is not appropriate to engineering... In contrast to science, engineering is primarily concerned with the artificial world, that is, with the design and manufacture of artefacts... Without the essential design function, engineering becomes sterile and pointless... There is, however, a distinct danger that unless the engineering purpose and application are kept firmly in mind so-called engineering research will degenerate into scientific research – that is the accumulation of knowledge for its own sake. Even more important is that the engineering research should originate from the design function itself, that is as a result of specifying the requirements for a new artefact. Thus we begin to see why university engineering courses are so inclined towards the applied sciences – they are in reality educating scientists to research into engineering problems. Moreover, since science has its own well established philosophy and is considered more prestigious, it is easy to understand this attitude: unfortunately, this inevitably relegates design to a subsidiary position. (*Design Studies*, Vol. 1 No. 2, October 1979.)

Here Douglas Lewin suggests that confusion over the place of design is a result of the way engineering is taught using an adaptation of a model which is not suitable, in much the same

way as I have suggested that industrial design is taught using an adaptation of a model unsuited to its needs.

Separating design into two different groups, engineering and aesthetics, form and function, and subsequently teaching these groups with poorly adapted models of applied science and of arts and crafts, cannot be ignored in any consideration of the confusion concerning design. It is unlikely that these two models could ever arrive at a common understanding of design sufficient to unite the functional and the aesthetic.

A comment made by the Chairman of a major engineering consultancy, himself an engineer, reinforces this proposition but acts also as good illustration of the rivalry that exists between engineering and industrial design.

I personally regret the division that has grown up in people's minds between industrial and engineering design. They are different sides of the same coin and the skills should ideally be united in one person who has overall responsibility for engineering and styling. Appearance is important... The ideal product works well and has strong visual appeal. If you want classic examples of engineering design combined with what is now called industrial design just take a look at the Spitfire and the Concorde. Both are vivid reminders that it really is impossible to talk about efficient engineering without also talking about efficient design. (Sir Diarmuid Downs, Chairman of Ricardo Consultancy Engineers.)

RECENT EFFORTS TO IMPROVE THE USE OF DESIGN IN INDUSTRY

Over the past few years, the British government departments of Education and Science and of Trade and Industry have commissioned reports, set up working parties and held seminars all aimed at trying to determine what to do to improve the use of design in industry. These initiatives have explored the need for industrial design *per se* and the need for better ways to manage it. The next chapter is concerned with the literature of "design management" and the government initiatives in Britain, which were expected to improve the understanding of design management. This chapter will conclude by reviewing a report on the Industrial Design Requirements of Industry commissioned by the Department of Education and Science.

The Report was published in 1983, one hundred and fifty one years after Robert Peel expressed the need for a sense of design within industry. It was commissioned after a previous report had found a mismatch between the education of designers and the needs of industry. In his foreword to the report the Secretary of State for Education and Science the Right Honourable Sir Keith Joseph states 'these were suggestions (Carter Report 1977) that the graduates of United Kingdom courses in Art and Design did not fully meet the exacting demands of British industry and by implication, that this might be a factor in the difficulties encountered by industry in securing its rightful share of world markets.'

Research for the report is based upon interviews in eighty five UK and thirty continental European manufacturing companies, and the key findings are summarised in the report: it states that a majority of companies, 71 in the UK sample and 28 in the continental European sample, used industrial designers to a significant extent.

In their relationships with the companies, it was rare for industrial designers to give final approval to products and in total only twenty six companies had a designer at board level or equivalent. In the UK only twenty three companies had a separate budget for industrial design, though the percentage was higher in continental Europe (twice as many as in the UK, though just under half of those were in West Germany).

In terms of the tasks of designers, the UK survey gives the following opinion: 'respondents gave the highest scores to visualising the product concept and representing alternative design solutions... respondents were not happy about the extent to which designers were prepared to offer alternative solutions to a design problem. It was also felt that designers did not sufficiently appreciate the value of seeing the product in its market context' (p.9).

One perceived strength of current industrial designers was in the area of creativity. Perceived weaknesses were in the technical selection of new materials; in assessing cost effectiveness and safety; a lack of awareness of production constraints and the use of volume production methods; and lack of skill in recognising maintainability and reliability constraints.

Respondents also considered that industrial designers demonstrated 'an unwillingness to compromise and to accept the practical constraints of wider company needs' and were insufficiently skilled 'in collaborating with a multi-disciplinary design team' (p.10).

Respondents obviously considered commercial reality to be very important. Their perception of industrial designers was that they were poor at 'assessing the financial implications of design solutions – understanding how design affects product costs... designers were not sufficiently aware of market needs, and were too often guided by a desire to educate the public taste rather than respond to it' (p.10).

Of particular significance is that the authors of the Report failed in their comparison between the UK and continental Europe to find significant differences, particularly in respect of product performance.

In the UK weakness in project management was considered more important than in continental Europe, while the Europeans considered competence in a foreign language and assessing customer feedback to be more important than in the UK.

The findings are critical of design practices; it would seem that designers are considered to be competent stylistically but not otherwise. However it is important to remember that the perspective from which the questions were asked was within the framework of the dominant model for designers, the craft-type model in which designers are seen as universal men who can handle everything. In this sense, the respondents from the manufacturing companies, with little understanding of the dominant model of design, were merely pointing out the weaknesses in the current model of design education. The question which was not

asked was: how many of these activities should industrial designers perform and how many of these activities should others in the organisation handle as part of overall design and development? If the dominant model had been that of Merrick Taylor's ice skaters, then perhaps the Report would have come to different conclusions. One phrase used to describe designers' activities sums this up: 'Working in the process of industrial production the designer can thus be seen as a mediator between people and technology' (p.35).

The Report contains certain assumptions about the roles and responsibilities of the industrial designer and an implied denial of the contribution of others in the design development process. However, this report finally concludes – much to the apparent surprise of the author – that success is dependent as much upon markets, pricing, etc., as on design, and furthermore that companies understand the design contribution as important but limited to the visual element and to “designer flair”.

We have come almost full circle – the use made of design and the value placed upon it is, in real terms, little different now than it was in the time of Wedgwood in 1760, the birth of design education in 1830, or of the growth of US industrial design in the 1930s.

Chapter 3: The Context for and Emergence of the Literature of the Management of Design

The historical background of industrial design is relevant because the schizophrenic nature of the profession today reflects its split beginning. Philosophically, industrial design began as a profession of lofty motives; but in practice it was always becoming something else because something else was wanted. (Caplan, p.36.)

CONTEXT FOR MANAGEMENT OF DESIGN IN BRITAIN

The previous chapter closed with the findings of the report on the 'Industrial Design Requirements of Industry'. One finding, that there were no significant differences between the shortcomings in designers as identified by managers in the UK and continental Europe, surprised the report's authors. They had made the assumption that since continental Europe, and West Germany in particular, had much better design and new product development track records, then they must, *ipso facto*, have designers that were better equipped to serve the needs of industry.

A question that the report neither asked nor answered concerned the circumstances prevailing in British industry which caused shortcomings in designers to have a more critical effect than they did in continental Europe.

There is a persuasive discussion by Martin J. Weiner in *English Culture and the Decline of the Industrial Spirit* where he describes how the British turned their backs on industrialisation. The point made in the previous chapter, that the romantic Arts and Crafts model of design triumphed over the standardisation model of the machine aesthetic, supports Weiner's point of view.

Industry in other developed countries – the United States, West Germany, France, Japan – found it easier to recruit managers and technologists with high qualifications. An economist and a socialist – attempting in 1976 to explain why, in West Germany, a higher proportion of better graduates entered industry, the best of them frequently possessing engineering degrees – saw as "central" the status of industry: 'The ideas that industry is not a fitting occupation of a gentleman (old version), or for an intellectual (new version), seem not to have existed in Germany'... Similarly, in post-war France, the technocrat, combining technical and managerial training and roles, played a powerful role throughout industry and also in government. Engineers, managers, and civil servants did not form separate social categories, but shared a similar background, training and outlook... This also happened, in even more striking form, in Japan. There the twentieth century witnessed a dramatic reversal of social values, as the samurai contempt for merchants vanished without a trace, to be replaced by an integration of the businessmen – as

businessmen – into the elite power structure, an integration that was even more thoroughgoing than that in France or West Germany. (Weiner, p.136.)

In an elaboration of his point of view, Weiner considers the ideal of the educated amateur. This has a bearing on design and new product development.

Within industry, D.C. Coleman has argued, the growing influence of the gentlemanly ideal – the ideal of the educated amateur – helped call forth another ideal, that of the “practical man”. This ideal superficially opposed, but in many ways complemented, the first. The “practical man” was the defensive ideal of those who had not received an elite education, and who responded (not necessarily with logical consistency) by disparaging the value of education or formal training for their work – while, at the same time, aspiring to the ranks of gentlemen. The “cult of the practical man” was thus not what it might once have been – an alternative ideal – but a transitional ideology, for managers not yet become gentlemen. As such it posed no challenge to the growing hegemony of gentlemanly standards and indeed reinforced its economically inhibiting tendencies.

The twin cults of the educated amateur and the practical man strengthened resistance to science-based innovation... As they became successful directors, “practical men” became ever more interested in the immediate gratification of social ambitions, in the playing out of certain social roles, than in direct profit maximisation or innovational activity. (Weiner, p.139.)

The story of Shell is cited as an example of the “amateur”. Marcus Samuel (1853-1927), an East End Jew, built Shell into one of the leading oil companies. By the time he was forty-nine Samuel was established; he had bought an enormous country estate and was lord mayor of London. As a result he lost control of Shell when Dutchman Henry Deterding bought 49% of the company. ‘Deterding was utterly single minded’ in his management of Royal Dutch, seeking maximum profits; Samuel had other interests, many of which had priority over Shell. What were the early goals of which Samuel dreamed? ‘Eton and Oxford for his sons; affluence for his more remote descendants, a country house for his family, horses, gardens, angling, watching cricket in comfort, the devotion of subordinates and servants, the respect of acquaintances, the chance to be charitable on a large scale and to give generous hospitality.’ Not surprisingly then, as his biographer concluded, in business Samuel remained an “amateur”, whereas Deterding was a “professional”.

Weiner’s argument explains to an extent the shortcomings in product development and design in Britain. Directors, chairmen and senior management simply believed it inappropriate to be involved in new product development and implementation; these were concerns which should be held at arms length. Although these opinions have now shifted, the following comments from industrialists in the 1960s indicate that the shifts are fairly recent.

During the sixties Sir Tatton Brinton, Chairman of Brintons Carpets, said, ‘We are here to make carpets as pleasantly as possible.’ As late as 1969 the Chairman of ICI, Peter Menzies, admitted difficulty in getting his young scientists interested in ‘things which they may consider vulgar, like selling plastic zip fasteners’ (Weiner, p.50).

Exactly how Britain's cultural evolution affected industrialisation is beyond the scope of this thesis. Yet it is an important factor in the consideration of why sustaining design and new product development seems to be so difficult in Britain.

The Fielden Report on Engineering Design

In the early sixties, the government commissioned 'a small but high powered committee on Engineering Design' (Stewart, p.209) to counter concerns over Britain's decline in international trade, particularly in heavy engineering. The subsequent report known, as the Fielden Report, 'emphasised that design was not sufficiently appreciated by managements of engineering businesses. The engineering profession had a lower social and economic status in Britain than in any other highly industrialised country and technology attracted fewer able school-leavers than science' (Stewart, p.210).

The Fielden Committee made a total of fourteen recommendations of which five directly concerned design. One recommendation was to increase the prestige of design and the status of designers within the engineering profession. The government did little with the report, though it did generate some activity at the Design Council, which sponsored an exhibition called 'Design in Engineering' in 1965, giving a prime position to the BMC Mini.

Consumer Awareness

During the same period, however, the status and prestige of industrial and in particular graphic designers did change, for reasons that are discussed below. Paradoxically the lack of concern on the part of British industry to give priority to development of new products coincided with an increase in consumer awareness and consumer demand for greater quality and more variety. Between the mid-fifties and late sixties consumer attitudes changed significantly.

The Festival of Britain in 1951 had had the effect of increasing the general public's awareness of contemporary styling, particularly in areas of domestic products, wall papering, lighting, furniture and fittings. Six years later, consumer awareness was given a critical boost with the first issue of the consumer magazine *Which?*. In discussing a report on electric kettles, Jonathan Woodham found that 'the concern was for product safety, efficiency, practicality and soundness of construction' (Woodham). Only three of the ten kettles tested were recommended. The National Consumer Council was set up in 1963 and during the next five years government legislation significantly increased consumer protection.

Design: a Concept in Mass Media

During the sixties change occurred in the general public's perception of design, linking it far more strongly to fashion and style. '[Design became] a named concept in the mass media' (Sparke). Terence Conran opened his first Habitat shop in London in 1964. London

became a focus for fashion and pop culture. The swinging sixties saw the advent of The Beatles, increased use of avant-garde film techniques in advertising and commercials, and a plurality in acceptable styles.

In 1967 the Director of the Design Centre, Paul Reilly, wrote about the difficulties they were experiencing in selecting goods for Design Centre approval:

We are shifting perhaps from attachment to permanent universal values, to acceptance that design may be valid at a given time for a given purpose to a given group of people in a given set of circumstances, but that outside those limits it may not be valid at all; and conversely there may be contemporaneous but quite dissimilar solutions that can still be equally defensible for different groups – mini-skirt for a teenager, something less divulging for the matron; painted paper furniture for the young, teak or rosewood for the ageing – and all equally of their times and all equally susceptible of evaluation by a selection committee. (Paul Reilly, 'The Challenge of Pop', *Architectural Review*, Oct. 1967, p.256, quoted in Woodham.)

The Design Consultancies became Established

The upsurge in product differentiation contributed to change in British designers' circumstances. The perception of a designer moved closer to that more usually associated with the people in advertising, fashion and photography. Successful designers joined the fashionable circles of the avant-garde. Design consultancies, particularly graphic design and retail design consultancies, grew in both number and stature. Working relationships for designers changed, due in part to the fact that many companies had created a marketing function.

The effect of all the changes was that the environment for design and new product development in many industries shifted quite dramatically. However, the circumstances that had brought about the changes also created difficulties. Marketing was still finding its feet in many industries. Engineering and manufacturing were low in status and manufacturing had lost control of new product development, in many cases, to the marketing function. Designers were, in the public's eye (and the engineers' also), associated with fashion and style and were perhaps seen as frivolous and irresponsible. Some individuals recognised that a new approach to managing the whole process of design was needed and in 1966 the first book on managing design was published.

THE LITERATURE ON THE MANAGEMENT OF DESIGN

This section will review books and papers that are concerned directly with design and management issues in industry, published between 1960 and 1986. There are five books directed towards the business community and one or two directed towards the design community, though in reality all books are most likely read by the design community. The books could be described broadly as "handbooks" to help managers and/or designers to manage design projects more effectively, with perhaps one exception where the emphasis

is towards designers' potential in markets and product strategy. None of the books is based on rigorous academic research, although most include case studies, and one the result of a questionnaire survey.

The books will be considered chronologically, and will be quoted from extensively. This has been done to enable the reader to get a sense of the concerns and stance of each author, which is important because each book has in its time had quite considerable influence on what was considered best or at least desirable practice. It is also worth noting that none of these books were written by individuals who had been trained in or practised design. The five books are:

Design Management by Michael Farr, published in 1966

The Management of Design Services by J Noel White, published in 1973

The Management of Design Projects by Alan Topalian, published in 1980

Managing Product Design by Mark Oakley, published in 1984

The Design Dimension by Christopher Lorenz, published in 1986

Before discussing these five books, it is worth considering a book first published in 1961 which became the classic in design administration for designers. Prior to this book, there was no notion of a general need for a standard approach to undertaking design administration. *Professional Practice for Designers* became "the" handbook. Its influence has been significant and it will become apparent that the recommendations made in the above five books observe much of this early approach to practice. *Professional Practice for Designers* was first published in 1960. In the foreword to the 1971 edition, retitled *The Professional Practice of Design*, the author Dorothy Goslett says

When I wrote the first version of this book in 1960 I did so in the hope that it would be of some use to the freelance designers, except those old hands who had come up the hard way and had learnt it all by experience. There was little sign then that anyone had begun to realise that it was a subject which students needed to know about too. But in ten years there has been marked change. Great efforts are now being made to give students some knowledge of professional practice and design administration. (Goslett, p.10.)

The book uses a framework which Dorothy Goslett sets out in the introduction and which she calls an "anatomy of design administration".

Every job of designing something by a designer for a client goes through three phases in the designer's office and each of these phases again divides into three. This invariable sequence of events can be set out as a simple pattern or chart which could provide a framework... the pattern is one which must be constantly kept in mind by the practising designer... whether the job he is working through is interior design with a five-figure fee, or a letter heading for a few pounds, an egg-cup or an aeroplane, a pack or a power station. (Goslett, p.14.)

The Anatomy of Design Administration

- Phase One: The fee contract**
- (a). Being briefed
 - (b). Writing the fee letter
 - (c). After any intermediate negotiations, receiving the written acceptance of it
- Phase Two: Progressing the job**
- (a). Setting up the job, research, preparation and submission of preliminary designs, followed by first invoice
 - (b). Design development followed by subsequent invoice/s
 - (c). Finished working drawings, supervision of production, followed by subsequent invoice/s
- Phase Three: Winding up**
- (a). Publicising the job
 - (b). Final invoice
 - (c). Filing essential records

Design Management by Michael Farr, 1966

The environment for design in the mid sixties was positive. As Dorothy Goslett points out the work practices and opportunities for designers were changing. Michael Farr's book, to be successful, had to be clear and pragmatic. The following extracts give a definition of design management and describe the task and the roles for, and responsibilities of, a design manager.

Definition

Design management is the function of defining a design problem, finding the most suitable designer, and making it possible for him to solve it on time and within an agreed budget... (p.3.)

Task

But the design manager, as such, is still rare in industry. His job, in brief, is to investigate, from the designing point of view, the requirements for a new product, set a time and budget for the design development period, find and brief the designers (or team of designers), and other specialists who can aid designing, set up and operate an easily understood network of communication between all parties concerned in the new product, and be responsible for the co-ordination of the project until the prototype reaches the production line and the designing of the packaging and supporting printed matter is complete.

Throughout any design project there is the tension of conflicting forces – the

marketing manager may be in a hurry for results while the works director does not want his existing, profitable operation disturbed – and in countless cases these tensions have succeeded in spoiling or shelving the designer's work. It is the design manager's job to resolve these forces, preferably by anticipating them, so that, to put it simply, the designer can give of his best and the company can receive it.

[The staff design manager] should have a status that allows him to be on equal terms with the works and sales managers. He should be directly responsible to the managing director. ...[This] could mean that the design manager is, in fact, on the board of directors. (p.4.)

Design management supplied from within or without the factory is needed here to effect the integration of the right designer, at the right time, on the right premise... (p.30.)

Design management, as a consciously organised activity in industry is only just beginning. The role it plays is original, the methods it uses are not established by years of practice... [The design manager] can be a neutralist in every specialist empire and yet a committed entrepreneur where the project itself is concerned. The design manager stands on a knife-edge alternatively (or simultaneously) sharpened by the managing director and by the designer. (p.158.)

It is easy to claim too much responsibility for the design manager. This is not the intention here. Seldom, if ever, will he manage such specialists... (designers, methods engineers, market researchers, ergonomists, model-makers, packaging specialists, printers)... in the sense that he is totally responsible for their activities. His job is to ask questions and ensure that he gets useful answers... (p.160.)

In effect Farr describes project management from the designing point of view. Within this he identifies the newness of the activity, the need for integration, the existence of conflicting forces between marketing and operations, the "knife-edge" qualities of the role of design manager and the tendency to over-claim his responsibilities. There are examples in the form of case histories, so that the impression of the book is one of integrity as a handbook for those industries who decide to appoint a design manager, whether as an employee or as a consultant.

The Management of Design Services by J. Noel White, 1973

J. Noel White in his introduction chooses to emphasise not the role of the design manager, but the role of the manager in relationship to design.

When a new idea is developed there inevitably comes a moment when the conception must be interpreted in terms of hardware, or print or a series of objects in an appropriate environment. There is in fact a design problem which has to be managed.

In this sense designing is an activity which is organised by management in order to further the objectives of the enterprise... Frequently the manager does

not realise that he is involved in the design process and so fails to enlist the appropriate skills at the right moment... (p.13.)

When the manager accepts that designing is one aspect of problem solving, he will begin to develop his own ability to recognise the design aspects of any problem. In many concerns much effort is put into research and development without the basic realisation that as soon as research becomes development then designing begins and professional designers are required...

The lack of precise definitions is always a handicap to any discussion on design. (p.14.)

Like any other business activity the design process has to be integrated by management with many other aspects of the organisation, technical, financial and marketing, so that it makes the maximum contribution towards the objectives of the enterprise. One of the difficulties is that there is very little information on designing presented from the point of view of a manager within a business organisation. What does exist is mostly scattered throughout periodicals and conference reports. (p.17.)

Whereas Michael Farr's book was largely descriptive of the design manager, J. Noel White's is prescriptive for the general manager. One chapter, 'Design As a Process in Business', is a good example. This chapter sets out very clearly the procedures that should be adopted by a manager in using and controlling the work of a designer and identifies where the problem areas will lie. Four procedures or stages are described: Statement of Requirements, Collection of Information, Analysis and Synthesis, and Selection and Evaluation.

A statement of requirements is described as having two functions: to initiate design activities and to monitor them. The starting point is a "product policy" from top management to circumscribe the design brief, followed by a "product programme" undertaken by managers. This statement is then considered as a framework; approval for it is a board-level responsibility.

The technical development must serve the statement of requirements. 'The production engineer who is casting about for an excuse to use a new technique may be invaluable, but the manager will keep a watchful eye on him to ensure that it serves an identifiable need.'

Once the statement of requirements has been accepted by the board as consistent with product policy, it is suggested that it is worth reviewing afresh with the designers the products on the market before instructing a programme of data collection. Managers are reminded that time is the most valuable commodity and although there should be some flexibility, a target date should be set and a sense of urgency introduced. It is made clear that the statement of requirements and the collection of information stages are the responsibility of managers and policy makers and the next two stages are the work of designers.

'When both are complete the emphasis of the project begins to change from administration... at the end of stage (b) [collection of information] to creativity.' In preparation for stage (c) the policy group needs to hand over to designers, production engineers and marketing men.

It is suggested that the manager's role changes from that of the organiser to that of the impresario dealing with creative talent. Understanding the design process is considered important, but being a designer may be a disadvantage, since he might be considered a competitor in the creative process and he is unlikely to have good administrative skills.

'The easiest way for the manager to integrate himself into this stage is to adopt the role of scorer, charting the development of design ideas as formally as possible, checking their advantages against the list of requirements.'

This stage assumes that several solutions have emerged and that the use of evaluation techniques, including rating against performance criteria, will enable selection of the optimum solution. The design team produce the drawings, models, etc. for this stage, but 'the project now reverts again to its administrative character with the manager firmly controlling the activity.'

An evaluation group meets several times, but this group has not been a part of the design team and it is pointed out that if the manager does not ensure good communication, the optimum solution can be rejected.

Evaluation can become a dogfight if not skilfully stage-managed... The marketing side will become actively involved, and the salesmen apprehensive. The production engineers will concentrate on the snags which have to be ironed out and may be worried by the degree of retooling required and the consequent delay. ...Accountants will resent the outlay and the risk... The manager furthermore will have to be careful to protect the design team from an overdose of random criticism... The vulnerability of the project during evaluation is one reason why administrative responsibility at this stage reverts to the policy groups.

In his introduction, J. Noel White makes some very insightful observations on the way managers are inevitably involved in the design activity. 'In this sense designing is an activity which is organised by management in order to further the objectives of the enterprise'; 'frequently the manager does not realise that he is involved in the design process.' Having made these observations, the body of the text sets out to convert the design process into a set of senior management procedures and responsibilities. His insight returns as he describes the problems that will be caused by the sequential stages and procedures that he himself recommends.

The statement of requirements is a senior management and board-level activity. Noel White refers to them as a "policy group". It keeps technical development at arms length and Noel White anticipates that a bright production engineer, with a bright idea, who has been kept out of this stage may need a manager to 'keep a watchful eye on him'. The next stage, collection of information, is also proposed as a senior management responsibility. Noel White identifies that the problem area will be when the senior managers, the "policy group", hand over to designers, production engineers and marketing areas. Analysis and synthesis is understood by Noel White to be the "creative" stage. His recommendation for a manager

is that to integrate himself, and adopt the role of “scorer” and ‘chart the development of design ideas as formally as possible’. Not surprisingly, given Noel White’s procedures so far, the selection and evaluation stage can become a “dogfight”. He proposes it be skilfully “stage-managed”, or orchestrated by senior managers, since the project will be vulnerable at this stage and responsibility therefore should revert to the “policy group”.

It is not really possible to ascertain with any certainty whether Noel White’s propositions were actually a formalisation of emerging practice at this time or entirely his own ideas for the managing of design. What can be said with certainty is that a number of major companies who became “committed to design” did have “policy groups” that operated at board or senior management level and who functioned in much the way that Noel White describes.

By the mid-seventies therefore, there existed formal recommendations on managing design with a set of control procedures, largely the preserve of senior managers in a policy group.

The notion of a senior management policy group was often adopted by those companies who already had a design manager working at lower or middle management levels, and usually an in-house designer as well.

The Management of Design Projects by Alan Topalian, 1980

Alan Topalian’s book is based upon the texts of eight lectures on the management and evaluation of design projects. Much of the information for the lectures came from a study he conducted in 1976 which included a brief questionnaire. This appears to have been the first time that managers were formally asked about how difficult design was to manage. The questionnaire and the results are given in the book as an appendix; they are described here briefly.

Twenty-eight statements were made about the possible reasons why design projects were difficult to manage. Respondents were asked to rate them by agree/disagree ratios. The questionnaire was conducted in Britain and Canada among managers both experienced and inexperienced in managing design projects. Alan Topalian asked the same set of questions of a design audience. The results show that amongst managers there was only significant agreement on five out of the twenty-eight statements whereas there was much higher agreement amongst the designers.

To summarise, there was agreement among managers that managing design projects required wider involvement than originally anticipated; that senior managers rarely appreciate what is involved and management generally is insufficiently prepared; that the territory is unfamiliar and that there is insufficient information at the outset. There was no agreement on issues such as whether it was hard to define design problems or evaluate them, whether there was usually inadequate finance or whether it was difficult to work with designers.

The significant lack of agreement points to the confusion that surrounded the subject in 1976. Of the study, Alan Topalian says that ‘far from being critical of designers, managers

admit to a disturbing unease about their understanding of, and skills in handling, design projects' (p.2). That some of the issues surrounding design projects do not lend themselves to simple categorisation, Topalian makes clear when he takes specification as an example: '...does a performance specification for a product, for example, constitute part of the definition of the problem or part of the solution? For a brand new product concept, the drawing up of a performance specification might well be considered part of the solution, where an existing product is being upgraded a similar specification would almost certainly be considered part of the definition of the problem' (p.10).

Getting even further back to basics, he discusses the confusion that surrounds not only making the right choices in identifying the problem to be solved by design, but also the problems of effective communication of that problem.

A manager becomes aware of a problem by way of a stimulus. Through his knowledge and familiarity with the particular circumstances... the manager diagnoses the problem... The manager will interpret what he considers to be the designer's needs and will form an opinion as to the amount of data and detail a designer can assimilate... This articulation of the problem becomes the project brief... If now the designer decodes the messages he receives differently from the way they were encoded (which is highly probable) then there is clearly a further confusion. (p.35.)

Most of this book is devoted to descriptions of orderly procedures which Topalian suggests, if adopted, would eliminate much of the confusion and inefficiency. The procedures are built around the following topics: the selection process of a designer, the different roles of a design manager and a "design responsible", the make-up of a design project team, the need for Corporate Design, the need for documentation and general control, and the need for evaluation and cost control. Some examples from these sections are given below.

On the selection process, Topalian describes how the client should prepare a preliminary brief, decide how to handle the project and draw up a specification for a designer. The client would then visit suitable designers and some of these would be asked to submit a proposal. 'The most interesting proposals should earn the authors an invitation to the client company... This procedure need take no more than three to four weeks' (p.56).

On the roles of design manager and "design responsible", Topalian describes how the design manager's role centres on day to day administration of design projects. 'This narrow "mechanical" interpretation of the role is deliberate.' The "design responsible" is described as having 'wider management responsibilities, such as the formulation of design policy and the establishment and maintenance of design standards,' fulfilling a similar function to J. Noel White's "policy group" (p.58).

On design project teams Topalian describes two modes. 'At one extreme, projects are operated in a sequential "mechanistic" mode... At each stage, the decisions made are aimed at limiting the options in succeeding stages. ... This mode of operation is often accompanied

by sequential communication up and down the hierarchy... Responsibility and authority remain firmly at the top... Such an approach tends to suit routine, short-term projects: those in which the work is highly structured, and where solutions are not expected to be out of the ordinary... At the other extreme, project teams adopt an integrated, “organic” approach meeting regularly *as teams* to work through problem areas and points of detail... This mode of operation is best suited to projects which involve complex, open-ended problems which may be unfamiliar or very advanced technically... (p.72–74).

On Documentation and Control, Topalian suggests that ‘in a high proportion of design projects, the only common ground the designer and client share is when dealing with project administration.’ On Evaluation Topalian is emphatic that... ‘through rigorous evaluation, management understanding of design and design projects will increase,’ that the way of describing designers as having “flair” or a “feel” for what is right is unfortunate and not to be encouraged. Evaluation, he believes, can also be used to identify where fragmentation of projects occurs and what the causes for fragmentation are. ‘If evaluation is to be a useful operational and planning tool, it must help determine *when* fragmentation occurs as well as the causes of fragmentation.’

Topalian’s questionnaire study represents a significant advance over previous publications, in that it recognises the existence of real confusion amongst managers. However, the book appears to be concerned only with increasing controls rather than increasing understanding. This is particularly clear in his description of the two modes for design project teams. He can be little interested in types of organisations or structures, since his suggestion of two different modes of project structure is dealt with in a paragraph or two. This issue of the choice of organisational structures for developing new products affects, and is affected by, the total structure and culture of the organisation. In the late seventies, most organisations would not have been in a position to simply choose on the basis of project complexity and be assured of project success.

Managing Product Design by Mark Oakley, 1984

Mark Oakley takes the issue of organising for design activities a little further. He quotes Burns and Stalker on the organisational aspects of firms involved in the design of new products.

Mechanistic forms of organisation are not likely to prove satisfactory when applied to design units, which need flexibility in many respects. Here organic systems are more appropriate and, as Burns and Stalker observed, such systems improve the prospect of success for new products... Managers responsible for product design departments need to consider how they can promote “organic features”.

Typical features of organic systems:

1. Unifying theme is the “common task” – each individual contributes

special knowledge and skills – individual's tasks are constantly re-defined as the total situation changes.

2. Hierarchy does not predominate – problems are not referred up or down, but are tackled on a team basis.

3. Flexibility – jobs not precisely defined.

4. Control is through the “common goal” rather than by institutions, rules and regulations.

5. Expertise and knowledge located throughout the organisation not just at the top.

6. Communications consist of information and advice rather than instructions and decisions.

Promoting such features may be a delicate matter, especially within those firms which are otherwise organised along precise and inflexible lines. Even in situations where they do not have the opportunity to develop ideal systems, managers should be aware of the actions they can take to assist creative work so that organisationally desirable features predominate. Whitfield, discussing a range of issues associated with creativity and innovation, shows that design teams are likely to be most effective where:

- All members make a full contribution; co-operation is accepted as the way of achieving the best result.
- Short term leadership tends to rotate according to the immediate needs of the job.
- Decisions are made by the people who are best informed on the subject. These are not necessarily the most senior present.

It is important to understand that mechanistic and organic styles are categories of organisation which are unlikely, in practice, to be found in “pure” forms. (p.54–55.)

The quote given here marks the first occasion when knowledge from the management field is used to inform design management.

In his foreword Mark Oakley explains his reason for writing the book as, ‘the observation that too many British Companies are failing to exploit product design... design as a resource is frequently misunderstood and misused by both managers and companies.’ The book acknowledges design as spanning engineering and aesthetic design. ‘Design for productivity is just one aspect which managers may not exploit to the full. Another is what might be called design for consumer appeal’ (p.2).

Oakley, like Topalian and Noel White, proposes a set of procedures to follow. The procedures fall into two categories, the process of designing and the management of that process. On the process of designing, Oakley says, ‘design must be viewed as a circular process – or more realistically as a spiral process if we wish to stress that design is an evolving activity’ (p.16). His four activities are Formulation, Evolution, Transfer and

Reaction. The procedures he advocates for the management of design, however, suggest a more “mechanistic” than “organic” approach.

A summary of Oakley’s “scope for design management” is given below.

Formulation

Before any technical design work can be carried out, a “specification” or “brief” must be prepared which will set the limits and requirements of the product.

Evolution of product design

Transfer

Once an effective design has been achieved in the design department, there remains the problem of successfully transferring it to the production system and from there to the customer.

Design Policy Management

This is a prime responsibility of the board of every company...

Setting design objectives

Deciding the role that design should and can play in the company’s activities... the company must decide whether it wishes to satisfy many different design tastes or to concentrate on a single area.

Defining, setting and maintaining design standards

Design standards relate to *how* the results will be achieved. Top management must decide which area of excellence it wishes to develop...

Standards should be defined in quantitative terms where possible.

Maintaining standards is also a top management responsibility... The best way to do this is to compile a design manual...

Audits of design

From time to time, senior management must review design activities to ensure design objectives and standards are being maintained... Providing the purpose of the audit is made clear – to check out design directions, resources and results, rather than personal effort or performance – there should be no adverse reaction.

Organisation for design activity

...it is probably best to advocate, at a minimum, the allocation of responsibility for design matters to a named director.

...Not every company has, or needs, a fully-fledged design department. For some firms, providing there is an individual who understands the design problems that require attention, it may be quite satisfactory to sub-contract all design activities... decisions about organising for design within the firm are the most important aspects of design policy making.

Evaluation of design results

...Although difficult, the problem can be tackled at board level by developing guidelines to direct the evaluation process. (Oakley, p.1–15.)

Senior management and the “board” carry much of the decision making, even though previously Oakley refers to the benefits of organic systems for design (‘control is through the “common goal” rather than by institutions, rules and regulations’). As is the case with the other books, the problems and complexities of managing design are acknowledged; the proposed solutions to those problems are to increase controls, particularly from the top down.

The Design Dimension by Christopher Lorenz, 1986

The final book to be reviewed here adopts more of a market orientation. In the preface Christopher Lorenz describes his purpose as to ‘explore the commercial potential of industrial design’. Lorenz is concerned to demonstrate that industrial design has a vital role to play as companies compete on a global scale, and not only in those companies with premium products such as Porsche, Rolex and Braun, but in companies such as Philips, Olivetti and Sony who ‘can all boast successful products which were conceived by industrial designers working informally as product planners and project leaders.’

Lorenz suggests that industrial designers have a particular set of skills which make them invaluable, not only as a source of ideas but as facilitators, co-ordinators, evaluators and completors. He suggests that the co-ordination of design and new product development projects is either ‘very formalised but [an] inefficient procedure of interdepartmental communication or is concentrated in the hands of a project team leader or product manager who probably lacks imagination and has an inadequate understanding of the various specialist skills at his or her command.’ In comparison he believes industrial designers have:

A set of unusual personal attributes and skills. Some are inborn, others are learned. They include imagination; the ability to visualise shapes and the relationship between objects in three dimensions; creativity; a natural unwillingness to accept obvious solutions; the ability to communicate through words as well as sketches; and finally, the designer’s stock in trade – the ability and versatility to synthesise all sorts of multidisciplinary factors and influences into a coherent whole... [the company] must make new connections between the market and the various elements of Kotler’s “design mix”: performance, quality, durability, appearance and cost.

For these connections to be made successfully requires a team effort in which the industrial designer’s imagination, synthesising skills and entrepreneurial drive are given equal weight to the tools of the engineer, the financial controller and the marketer. (Lorenz, p.2–9.)

A greater part of *The Design Dimension* is devoted to case histories of how industrial designers, both in-house teams and consultants, have been used in the way Lorenz describes at Sony, Philips, Olivetti, Ford and others. Lorenz also describes the case of Wilkinson

Sword, who used a consultant designer to help in the development of product strategy. A summary of the story is given below.

[Kenneth] Grange certainly favours what he calls “declared simplicity” in domestic appliances... He disagrees with the argument that products should be stripped of everything superfluous to their function, and says that ‘part of the purpose of a product is to give pleasure. That is one of the designers key contributions’.

This certainly applies to Grange’s work for Wilkinson Sword, one of the main offshoots of Allegheny International, the American steel-to-consumer-durables conglomerate... Wilkinson, an old English family firm... hit the international scene in the 1960’s when it produced the world’s first coated razor blade. ...Both Gillette and Wilkinson were sent reeling by the smash-hit success of yet another new type of product: the disposable razor, made available to an eager world by Baron Marcel Bich, under the brand name of Bic. (p.127–128.)

...He had an influential voice in the company’s decision to create an entirely new product, and use new tools and assembly machinery, rather than to adapt existing designs and machines. Together with the development engineers, he was also very much responsible for the product’s key competitive advantage.

...The design team... created a device which enabled the blade to be snapped forward for use, and then retracted afterwards. This, and the ingenious construction of the sculpted handle, allowed Wilkinson to cut manufacturing costs to the bone, and to price the product – called Retractor – squarely in competition with Bic and Gillette...” (p.129.)

By the time Retractor was launched in 1983, Wilkinson had recognised Grange’s strategic value in two significant ways: he had begun to report directly to the chief executive, as well as continuing to liaise with the head of development, and he had been appointed consultant design director.

...Grange several times played a catalytic role in creating cohesion between the often conflicting new product concepts of subsidiaries in different countries. One such case was in the design of the first unified line of garden pruners for Wilkinson and Allegheny’s American garden tools manufacturer. Grange’s analysis of the possible range within which trade-offs could be made between product features and price became known as “the Grange diagonal”. It was a marketing tool, supplied by an industrial designer. (p.130.)

All the stories are similarly well-documented and persuasive, but they are essentially snapshots, with Lorenz at pains to describe the positive aspects of industrial designers. Perhaps some of the special “synthesising skills” Lorenz sees as the preserve of the designer are also to be found in a “creative” manager.

All the literature is similarly exclusive in that it suggests that design should be understood as something “special”, with special understanding or procedures needed to manage it. With certain exceptions, the vast body of mainstream management literature does not seem to be considered by any of the authors as able to provide insight into issues of managing design.

Design Innovation Group

Less influenced by the body of design management literature is the Design Innovation Group, which began in 1979 and is sponsored by the Open University and the University of Manchester Institute of Science and Technology. The members of this group are much closer to management academics and researchers, more in the mode of commentators or observers using conventional survey techniques.

An example of their work is a paper, published in the *Journal of Marketing Management* in 1988, on the relationship between competitor products and re-design.

An interesting finding was that competitors' products were a major source of design ideas to one third of UK firms and two-thirds of the foreign firms surveyed. Some British and foreign firms admitted to imitating other firms' products (6%) while 46% of them said they would adapt or try to improve on the competition. It was perhaps surprising that firms that won most design awards were significantly more likely to have got design ideas from competitors, while overall financial success was associated with the imitation, adaptation or improvement of competitors' products.

Does this mean that commercially successful design does not involve the creation of novel products? Or that creative design is unimportant?

This depends on a firm's capability and strategy. For example, the acknowledged design leader in one of the sectors studied (office furniture), produced highly innovative products and was also very successful in financial terms. But the majority of firms do not aspire to be the design/technology leader. For them, modification of competitors' products, often involving joint development with suppliers, can be a successful method of design. And also a creative one: 'creativity lies in integrating available components in a new way' said one designer. A "follower" strategy based on evolutionary design also requires creative thinking to make the detailed improvements and additional features that give products a competitive edge. (Walsh, Roy, and Bruce, p.201–216.)

CAN MAINSTREAM MANAGEMENT LITERATURE INFORM DESIGN MANAGEMENT?

The design management literature reviewed here does not explore issues such as the effects of structure, or the contribution that a manager might actually make to the design and development process. Authors have preferred to prescribe formal control systems and senior management policy-making groups and when dysfunction becomes evident, to prescribe yet more of the same. As yet, there is no debate in the field of design management on the relative values of formal and informal systems as there is in the general body of management literature. In fact the existing management literature is given scant recognition in the myopic community of design management. But there is a wealth of information on company structure and marketing strategy which could be used to inform both managers and those in design management and it is certainly relevant, as the examples below demonstrate.

In their *Harvard Business Review* article of July/August 1980, 'Managing Our Way to Economic Decline', Robert Hayes and William J. Abernathy discuss how the principles prized by American managers, of 'analytical detachment and methodological elegance over insight based on experience' have in effect prevented technological and new product development. They point to causes in the pre-occupation with control, and its historical beginnings in financial portfolio management.

When applied by a remote group of dispassionate experts primarily concerned with finance and control and lacking hands-on experience, the analytical formulas of portfolio theory push managers even further toward an extreme of caution in allocating resources... The argument that no new product ought to be introduced without managers undertaking a market analysis is common sense. But the argument that consumer analyses and formal market surveys should dominate other considerations when allocating resources to product development is untenable... A market-driven strategy requires new product ideas to flow from detailed market analysis or, at least, to be extensively tested for consumer reaction before actual introduction. It is no secret that these requirements add significant delays and costs to the introduction of new products. It is less well-known that they also predispose managers toward developing products for existing markets and toward product designers of an imitative rather than an innovative nature.

The value of this form of debate is undeniable, yet it does not appear to have informed the opinions or approach adopted in design management.

Hayes and Abernathy are of course not alone in their views that the formal planning models needed to be reconsidered. James Brian Quinn puts the case for incremental decision making and describes the failings of formal planning systems in *Strategies for Change: Logical Incrementalism* (1980). Here he discusses analysis versus intuition.

High-level commitment to a somewhat less quantitatively optimised set of concepts will often achieve more progress in desired directions than lesser commitment to more analytical refined goals. Observers have noticed that management gestalt – that is, its subconscious feel for all the factors, their importance and relationships – is marvellously tuned by intuition. (p.182.)

Even those individuals committed to formal planning systems, Igor Ansoff for example, have made a reassessment of formal planning. Ansoff proposes in *Managers, Systems, Structures* (1984) an extrapolative management system based 'on extrapolation of the past into the future'. He summarises formal methods thus:

Planning establishes purposes, guidelines, strategies and constraints for the firm. Implementation is the process of causing the firm to behave in accordance with the purposes, guidelines and strategies. Control evaluates the organisation's performance and determines the needed adjustments in planning and implementation. Management by control thus inhibits aggressive forward-looking exploration of future opportunities. (Ansoff, p.260.)

The parting shot made by Hayes and Abernathy in their *HBR* article seems also to be an appropriate analogy for the management of design: 'In our pre-occupation with the braking systems and exterior trim, we may have neglected the drive trains of our corporations.'

Section Two

COMMENTARY

In each of these studies there is evidence of the existence of the lost or “silent” sense of design; in the case study of Home Furnishings the implications of a lost sense of design become manifest.

The pilot studies in chapter four, Pilot Study Part 1: Forms of Managing Design, were conducted with companies in both service and manufacturing sectors where there was known to be a senior management commitment to design. One of the original purposes of the study was to look for the elements of design management which could be identified as best practice. The different forms of managing design were identified first, followed by the patterns of designer and manager activity. In chapter five, Pilot Study Part 2: Charting the Contributions to the Design Development Process, a set of three matrices were developed to chart these activities. These matrix charts acted as an analytical framework from which the contributions made by both designers and managers could be studied. The extent of the managerial contributions was far greater than was expected and this was coupled with a total absence of acknowledgement of these contributions as design decisions. It seemed that two senses of design existed, one acknowledged and one unacknowledged – a “seen” design activity and a “silent” one. The questionnaire study in chapter six, Questionnaire Study: The Organisation of Design in British Industry, gathered information across a wider sample of companies where there was no particular design commitment. Here all managers believed design to be important. Differences were found between service and manufacturing sectors and there were also differences between those companies with in-house design studios and those with no in-house design facility. The results demonstrate that responsibilities for design development are principally to be found vested in senior managers, often in marketing, while designers are considered important as catalysts in decision making, reinforcing the existence of both the unacknowledged and acknowledged senses of design. In the case study of Home Furnishings in chapter seven, Courtaulds Textiles: Home Furnishings Study, we gain a powerful insight into what can go wrong when the “silent” sense of design is paralysed and the “seen” sense of design is placed on an isolated pedestal.

Chapter 4: The Pilot Study Part I – Forms of Managing Design

DESCRIPTION OF THE COMPANIES THAT WERE APPROACHED

Twenty companies were approached to participate in the pilot study: ten from service industries and ten from manufacturing industries. In the service sector five retail businesses and five transport concerns were approached, and in the manufacturing sector, five apparel manufacturers and five electronics manufacturers.

From these twenty, sixteen initially agreed to participate, and fourteen actually did participate. Of the fourteen, six companies arranged for a sufficient number of interviews, which was somewhere between four and seven, to make completion of the matrices viable. The other eight companies arranged for one to three interviews which was not sufficient to complete the matrices accurately. While this suggests that these companies were not really willing to participate, those individuals who were interviewed spent a longer time on interviews – two to three hours was quite usual. In one company, where only one individual participated, he devoted the entire day. Some reasons as to what this indicated about these companies' attitudes towards managing design will be discussed later.

Of the six companies which arranged sufficient interviews for the matrices to be completed, four were from the service sector and two were from the manufacturing sector. In the service sector, these were British Home Stores (prior to ownership by the Conran Group) and W.H. Smiths (*Retail*), Sealink (owned by Sea Containers) and British Rail (*Transport*), and in the manufacturing sector, Clarks Shoes and Courtaulds (*Apparel*).

Of the nine companies which arranged for one to three interviews, four were in the service sector, Penhaligons, Habitat, Mothercare (*Retail*), and British Airports Authority (*Transport*), and five were in the manufacturing sector, Warner UK and Vantona Viyella (*Apparel*), and Philips, British Olivetti and Case Communications (*Electronics*).

All the interviews took place in the last six months of 1985. They were arranged so as to be convenient for the schedules of companies and participating individuals which meant that interviews did not occur sequentially, beginning and ending in company *x* before beginning and ending in company *y*. For this reason, work on completing matrices began in the new year of 1986. What was learnt from the interviews prior to completing the matrices will be discussed first.

THREE FORMS OF MANAGING DESIGN

The arrangements for managing design in those companies interviewed can be categorised into three broad forms – Champion-led Design, Design as, or within a Function, and Design as a Policy or Guideline. Within these forms, however, companies displayed a variety of arrangements and perspectives. To an extent, these could be accounted for because many companies used two of the three forms, for example one as the major operational determinant and another in a minor operational capacity though perhaps more influential culturally or attitudinally. One of the oldest design-committed companies used all three. There seemed to be two other significant factors: the traditions of the industry, which was particularly evident in apparel manufacturing, and the effect of entrepreneurial leadership which lent what can only be described as an entrepreneurial overlay to design management arrangements.

Companies in the Three Broad Types

a) Champion-led Design

Retail:	Transport:
Penhaligons	Sealink (Sea Containers)*
Habitat–Mothercare	

b) Design as or within a Function

Retail:	Apparel:	Electronics:
British Home Stores*	Courtaulds Contract Clothing*	Case Communications
	Clarks*	
	Warner UK	

c) Design as a Policy or Guideline

Retail:	Transport:	Electronics:
W.H. Smiths*	BAA	Olivetti

d) Companies which fall into two or more categories

Transport:	Apparel:	Electronics:
British Railways Board*	Vantona Viyella	Philips

* Denotes companies for which matrices could be completed.

The list shown above places companies into one of four categories. A description of the significant features of each of the four are given below.

CHAMPION-LED DESIGN

Champion-led Design describes the arrangement whereby the approval of one individual, frequently the chairman or managing director, is critical and other considerations are subjugated. In practice, those individuals whose job it is to implement design are good at second-guessing the champion's preferences, or perhaps only those who are good at it

remain involved with design implementation. In this way design proceeds quite smoothly through the system. Of the three companies displaying this type of design all had entrepreneurs as chairmen. Design in these companies reflected the personal tastes of the entrepreneur, but probably the more significant point was that the approach to design was consistent with the approach adopted toward many other management issues. Therefore the overall effect of the entrepreneur is a decrease in the number of different perspectives – in the case of design, it is encompassed within a single vision.

In the smallest company, the perfume manufacturer and retailer Penhaligons, all aspects of the business were controlled by Sheila Pickles, the managing director (later in 1987/88 Sheila Pickles sold the entire business to Laura Ashley). The individuality and character of Penhaligons is indicated by this extract from a speech by Sheila Pickles at the Royal Society of Arts in 1982: 'I have always worked very closely with the designers at all stages and follow it through to execution...' Talking about the launch of one perfume and the introduction of perfume bottles she says,

At the time we introduced Bluebell our market was still very much in England and we kept in touch with our customers through a highly personalised mailing list. It is very hard to launch a new scent unless someone can smell it, so we perfumed a beautiful silk and lace handkerchief with Bluebell and sent them out to all our customers. Whilst this was a tremendously expensive way of promoting a new item to a very small number of people, for no known return, the outcome was a triumph in sales terms and it has been a success ever since. Antique [glass and silver] perfume bottles was a side of the business I started in 1977. Customers may buy them and we fill them with a scent of the customer's choice, and refill them when they are empty, thus making each purchase unique in itself.

Terence Conran of Habitat–Mothercare and Jim Sherman of Sea Containers share with Sheila Pickles the tradition of "doing everything". Though the large size of the companies run by Terence Conran and Jim Sherman prevents this from occurring practically, this form of leadership is so pervasive that other individuals carry out the tasks without breaking the consistency of the champion's vision.

Sealink owned and ran passenger ferries that connected England with the Continent and Ireland. Sealink had not long been owned by Sea Containers (it was previously a part of British Rail), yet in many of the interviews, the approach to design reflected that of the entrepreneur and not that of the bureaucracy it had so recently left. During one interview, when talking about how at British Rail a design committee would take the final decisions on design, a naval architect said 'James Sherman is the Design Committee here, he is involved in everything. I have known him since Sea Containers was a three man operation. He had a lot to do with this building [Sea Containers House] and the interior, and it reflects his taste.' The marketing director, William Vaughan Lewis, described how he felt that as far as ship refits were concerned they were in the position where they had to make quick expedient decisions to signal the change in ownership. However, each ship was to be a

harmonious whole and not reflect a house style, and they would learn as they went along. The communications director Jim Hannah described a current brochure that he had carefully researched for market preference, however, he said he doubted he would get it through because he felt Jim Sherman would demand something more upmarket irrespective of the market survey findings.

No one at Sealink communicated a sense that they were being robbed of initiative by the close involvement of Jim Sherman, but rather a sense of being privileged to be part of his team. Another instance where leadership by an entrepreneur has had a significant effect is in the empire of Terence Conran. This began with the furniture retail outlet Habitat and now includes the Mothercare stores which sell baby care products, and the Richards chain of dress shops. Interviews held with individuals from both Mothercare and Richards readily endorsed the design philosophy of Terence Conran. At Habitat–Mothercare Terence Conran has an in-house design studio which shares his headquarters offices. This studio undertakes all design work in the spirit of Terence Conran and therefore the relationship between design and other functions displayed tendencies similar to the category *Design as or within a Function*, which will be discussed next. Consequently, although everyone mentioned the value of Terence Conran's approach to design, the feeling was expressed that the initiative given to the design studio was sometimes misplaced. Clearly therefore the visionary leader has to actively participate.

Champion-led design is recognisable by the absence of formalisation, whether functional or in documentation, and an immediacy borne of the champion's design enthusiasms, which appears to allow others in the company to act in the spirit of the champion.

DESIGN AS OR WITHIN A FUNCTION

In this section are described those companies which have design as a separate function, or recognise a discreet design element within a particular function (which could be production or marketing, although in this sample there is no instance of design within the production function).

The traditions of an industry can have a pervasive effect on the organisation of design and this is particularly evident in the apparel companies. For this reason I will consider apparel manufacturing separately and then go on to consider arrangements in the two other companies, Case Communications and British Home Stores.

Apparel Manufacturing

In all the apparel companies in the study there was a well established design studio headed up by a design manager. Apparel companies have had design management for a very long time, although the form of design management is restricted to managing a studio of designers. The Chairman of Contract Apparel at Courtaulds described how they came to include design about fifteen years ago.

Factories were experiencing difficulties in filling order books; it was a hand to mouth existence, waiting for retailers to come to you rather than you going out to them. At this time it was the retailers who had the designers, so a ready-designed garment would be handed over to the manufacturer. Manufacturers could not benefit from any value “added” by design. So they opened design studios, often poaching the designers from the big retail chains.

It is important to recognise that these manufacturers did not re-configure design as appropriate to manufacturing businesses, but merely added design capability to their businesses using the same structure that the retailers had evolved in their use of design. As a consequence of this arrangement, in apparel companies sales and design people work as small teams, often going on joint trips to trade fairs, sometimes accompanied by their client. The relationship that design has with the production process is not as close, as that with sales. An example of this situation was described by one factory manager: ‘In garment manufacture, the detail design of component pieces like pockets and collars can be critical to achieving efficiency. Frequently stitching details result in slight puckering which means pressing by hand rather than the steam machine. Lines change so frequently that the need for extra procedures is commonplace; this of course means additional “work minutes” per garment.’ The factory manager described how he had approached the designers with the suggestion that they work together. He would make up a selection of components such as pockets and collars which were less likely to cause extra procedures, the designers would make comments, and he would make practical revisions until a solution was reached which suited both the designers and manufacturing procedures. The designers apparently found the idea abhorrent; the factory manager found the designers’ dismissal of his idea and his enthusiasm for design development perplexing¹.

It can be said with some certainty that design as a function in apparel manufacturing has changed little since it left the retailers. It fulfils the same function – effectively manufacturers just control more of the total process, they have not increased the synthesis into manufacturing. The absence of product engineering may be a factor.

In apparel manufacturing, the role of product engineer is limited by comparison with other manufacturing industries² (the car industry, for instance). The industry is largely based around girls on sewing machines and the interpretation of a sample garment into a production garment is a relatively simple procedure. Pattern cutting has seen innovations to make the most economical use of fabric with investment in technology, but it should also be noted that in the plants visited there was no working relationship between the design studio and pattern cutting.

Shoe manufacturers appear to make a similar use of design, particularly in the role of the

¹ It is not surprising that the designers saw the factory manager’s proposed intervention to be overstepping the mark. This is discussed in more detail in the next chapter.

² The lack of complexity results in there being in effect no “design engineering” in this industry. If the industry required design engineering, it is likely that it would have two separate design functions reflecting the different design expertise of engineering design, for example robotics in manufacturing, and the design expertise of the clothing designer. It is unlikely that these two design skills would be able to comfortably share a common base.

design studio. However, there are differences where production is concerned. There is an engineering function of sorts in the interpretation of a sample shoe, known as a “drape”, into a production shoe. The relationship between the designer and these production engineers suffers from a certain degree of adverse prejudice on both sides.

Time pressures in the garment and the shoe industries, caused by the need to produce at least four ranges a year and to cope with the fickleness of the fashion business, are the reasons given in these industries for the concentration of design at the front end of marketing and selling.

Warner UK is an example of a company using two forms of managing design. While it has a design function, its managing director is a former designer and clearly undertakes the role of champion. The American Warner company was exporting lingerie to Britain as early as 1930, on an agency basis. The merchandise was strictly American with no adaptation for the UK market. In 1960 they set up a factory in Northern Ireland, having recognised an increased market potential. However the style of merchandise was still American and the so-called designers employed in Northern Ireland were mainly employed in pattern cutting work.

In 1971, the UK Warner business acquired the lingerie company Gordonia de Brett. At this time a former couture designer, Nigel Howland, was Product Manager of Gordonia de Brett and with two designers he was supplying customers such as Dorothy Perkins and British Home Stores.

Warner UK recognised that there was a need to interpret the American designs for the local UK market. Howland and designer Pat Conway began to design co-ordinated ranges of lingerie for Warner UK, and based on this success Howland took over as Managing Director of Warner UK in 1976.

Howland’s new role caused some conflict; up to this point he had provided a large slice of the design input. A new design team had to be built up and Howland had to move away to give the team a freer hand, while, as he commented, still keeping his right to give direction. Design teams were based in Nottingham, and there was a French Product Manager who travelled between England and Paris, where there was also a French design team. The French merchandise, sold under the “Aigle” label, was manufactured in the UK and in Northern Ireland.

During 1982/83 Howland successfully negotiated with Marks and Spencer to be sole manufacturers for them in the private label business, thus cutting out everyone else.

Warner US apparently had a very different policy in the use of its designers. Responsible to the Merchandising Director, they were kept in isolation from one another, working in individual offices where they had to lock all their work away. The Merchandising Director then picked out designs that he/she wished to develop. Howland resisted pressure to use this system, preferring a model where a designer works on a sector of the business in close liaison with the Marketing Manager.

Howland believed that designers create business and are there to create business, but that

designers rarely realise this. A designer's contribution to profit is the key to success. Design needs to be one step ahead, and product managers don't always see the potential. A design is not finished until it is in the store. The traditional view of the use of the designer, which Howland would challenge, is that once the idea is on paper the designer's job is over and he is not consulted again.

Case Communications UK Ltd

Case communications had functionally compartmentalised design into three different activities. This young high-tec company and the apparel manufacturing industry share an immediacy in their relationship to their market places – both experience rapid change and operate in that environment.

Case Communications is a data communications company producing integrated systems from modems through to highly complex message systems. Typically it sells large communication systems to corporations such as Citibank so that they may maintain a consistency in their data communications throughout the world. At the time of my visit it was wholly independent; at the time of writing it is a part of Doughty. Design appears in three different functions, Research and Development, Public Relations and Corporate Strategy.

Research and Development was responsible for the design of circuit boards, casings and badge engineering (the positioning of the corporate mark on the machine). There was a design office where drawings were produced for the casings and the printed circuit boards. The design expertise was that of engineering.

Public relations was responsible for the design of all corporate communications, including the annual report and other literature aimed principally at investors. The person in Public Relations who had this responsibility reported directly to the managing director. The design work was always commissioned from consultant designers.

Corporate Strategy was responsible for the design of exhibitions, advertising, technical publications, stationery, signing and fitting out of new buildings. There was a person with the title of design manager who reported to the director responsible for corporate strategy. The design work was principally commissioned from consultant designers although some of the work was done in-house on Apple Macintosh computers. There was no direct relationship between any of these forms of design and there was no recognition of a need for consistency between the output from public relations and corporate strategy.

The design manager in corporate strategy had a degree in design and an MBA. She was conscious of the three-way split in the organisation of design at Case. However she recognised that any move on her part toward the other two design activities was regarded with suspicion. On occasions she had worked co-operatively with one or other of them. She gave this as an example:

Once our products have been purchased they are unlikely to be seen: usually they are installed in a cupboard, store room or under the stairs. However, we sell at many trade exhibitions, so the visual impact of the product has a role to play, certainly in the purchasing process. In principle, the cases are basically overcoats or harnesses for the P.C.Bs, its racking and Faraday Cages and there must be access from both back and front, but our cases were very utilitarian with endless rows of bolts. They didn't convey anything of the care and sophistication of the inside; I felt they should look like we cared on the outside.

There was no company mechanism for doing this, but I asked my director if we could spend £5,000 for an industrial designer to re-style the casing, he agreed (he could do this because he was a founder director and a shareholder). The project was a success, the people in Research and Development were quite open to the idea, liked the result, and adopted it as an approach to casing in general: I consider this was one of my successes.

The design manager also made this general comment: 'there is a lot of informality in this company, you couldn't impose a system of design. A person in my position must work within the spirit of the company.'

In Case we see an approach to design which gives recognition, whether consciously or not, to the existence of different types of design and a decision to keep them simple, held and managed in different operational pigeonholes.

British Home Stores

British Home Stores are principally retailers of apparel. They have a small quantity of housewares, plastic kitchenware, towels and lighting.

The buyers sourced all the merchandise and had traditionally had greater flexibility and freedom than, say, the buyers of similar merchandise at Marks and Spencer³. Design of merchandise is undertaken by the manufacturer, for example, Courtaulds Contract Clothing would be a supplier to British Home Stores.

Design decisions taken by British Homes Stores principally surround presentation and packaging (this includes the layout and decor of their stores).

A recent re-organisation had relocated design responsibility within a newly-formed marketing function (it had previously been in packaging). These changes came about because of the introduction of a stronger emphasis on design, endorsed by the chief executive, and a decision to attempt to produce greater consistency across environments, ranges of merchandise and presentation and packaging.

There was one in-house graphic designer who used to work for the buyers and report to the director responsible for merchandise. She now reported to the marketing director. The marketing director would work more strategically with buyers and involve the graphic designer when appropriate. In effect the influence of the graphic designer had remained

³The interviews for this study took place before British Home Stores was taken over by the Conran-owned Storehouse Group.

constant but power for decision making in design had shifted from buying to marketing. Much of the design work is now and was in the past done by external consultant designers.

In all companies where design is a function itself or is within a function, the design tasks are seen as simple and the resulting relationships direct. Design in these situations is not apparently conceived of as an agent capable of making changes, nor a strategic tool, nor an integrator of any kind: it holds a pragmatic, operational role.

DESIGN AS POLICY OR GUIDELINE

This form of design was found more frequently in companies where there were issues of size and/or complexity. However, many of the companies with design policies or guidelines also employed one of the other two forms, champion-led or as a function. These hybrid companies will be discussed separately. After some consideration three companies, W.H. Smiths, Olivetti and British Airports Authority, all appeared to rely upon managing design on the basis of policy and guideline, though as I outline the mechanisms in place it will be seen that there are elements of both champion-led design and design as a function. All had individuals who managed design; they did not manage design in the form of the design function as discussed in the previous section, but as management of the policy and/or guidelines. Aspects of a form of Champion-led Design are evident, but this seemed to be more as an embodiment of the policy or guideline than as direct action. In the case of Olivetti and W.H. Smiths, championship was embedded in the heritage rather than in the living chairman as is the case in BAA. All three predominantly used external design consultancies. In W.H. Smiths and BAA there were small architect teams to manage aspects of the buildings and their maintenance. It could be said that these constituted in-house design teams, though they were not categorised as such by the companies themselves. At Olivetti, design and product engineers are not categorised as having any direct relationship to design – in fact the Design Director at Olivetti when asked about the role of engineering considered that the question was not highly relevant. He said engineers had a great respect for the design tradition of Olivetti and consequently were always prepared to work to the idea that came from design.

There were similarities in the approach to the design policy or guideline at W.H. Smiths and British Airports Authority⁴. We could call it the “British” model. Olivetti’s “Italian” model was very different. However both W.H. Smiths and Olivetti share an aspect of heritage. W.H. Smiths, for example, believed they had a heritage of design commitment from Sir John Hornby, an ancestor of the present chairman. Sir John Hornby had joined W.H. Smiths in 1893 and was a craftsman in his own right⁵. The heritage aspect is an underpinning in much of the approach to design in Olivetti today, and this will be discussed after a consideration of the British model.

⁴ British Airports Authority and Olivetti will be discussed in detail here. W.H. Smiths is one of the six companies where matrix sets were completed, so it will be discussed in greater detail in the next chapter.

⁵ Sir John Hornby was a printer and a member of the Arts and Crafts movement.

Design Policies and Guidelines, the British Model

At British Airports Authority (BAA) there was a Design Policy Statement within the corporate plan, a design committee chaired by the Chairman and a design manager with a small team to co-ordinate and implement the formal methods of managing design recommended in 'Implementing a Design Programme' (Peter Gorb, 1984). Similarly, at W.H. Smiths there was a Design Policy Committee chaired by the Chairman, a Design Review Body and a design manager with appropriate access to managers. Extracts from the design documents give an indication of how these organisations structured and handled design.

BAA

A design committee of the Authority was set up in 1979 and had established policies for guidance to management and external consultants, as below:

The importance of design in our business is a factor which all managers must understand, acknowledge and promote.

To develop and uphold a high standard of design in every aspect is fundamental to remaining an efficient enterprise. It is an essential ingredient of passenger service and good working conditions.

Good design is to be achieved through an effective process of managing the selection and specification of elements and materials. The aim is to create appropriate individual solutions within a coherent background.

Design, in its broadest sense embracing all disciplines, and more specifically specialist elements, e.g. Bars, Restaurants, Shops, Lounges, Uniforms, Ancillary Furniture, etc., must inter-relate with other Airport functions and systems combining to form an integrated environment which comprehensively states the corporate identity of the BAA.

The functional requirement for each aspect will be clearly established at the outset and should be met, taking proper account of relevant operating experience at our airports, and including necessary provision for fire, safety and security as required by existing legislation.

The appropriateness of design shall include consideration of the requirement for a coherent, rational, attractive, efficient and cost effective solution of high quality.

All elements of design from concept to detail should consider effectiveness, both in initial cost and life cycle cost, and design style should be consistent with the expected life span of the facility.

Designers will be expected to put forward innovative and imaginative solutions within limits of cost and practical briefs.

General design standards adopted are kept under regular review by the Design Committee of the Authority.

The fifth paragraph in this document indicates the range of design and while not so broad as to include engineering, it certainly extends to the three categories in the original matrix of products, environments and information.

How then, on a day to day basis, does a manager approach design within British Airports Authority? What is the effect of a formal design policy?

The Engineering Director gave a description of design at BAA along the following lines.

The present chairman thrust an attitude to design on the organisation because he personally believed it to be important. The Design policy statement, now incorporated into the corporate plan, has taken its place in BAA corporate objectives and targets as a set of motherhood statements, along with terrorism and other issues. The objectives are very broad and this initially caused confusion – Although the message is gradually being understood, there are still some significant misunderstandings, one which is that the design manager maintains that design doesn't have to be expensive, but design always means expense.

A misunderstanding arises over costs. The budgets for any new project are with the line managers (here these are the terminal managers). They are expected by the policy statement to commission design consultants to produce a high standard of design. If they don't do this then they contravene the terms of the policy statement, but if they do they are likely to go over budget.

Another misunderstanding arises since we assume the line managers are all literate in design, and they are not. We need to create awareness and understanding, and we haven't as yet. There is another complexity for the line managers and that is in the retailing and catering areas. These trading departments wield a lot of power because of the revenues they bring in, and so far they seem to have adopted a very selfish view and their attitudes to design style are very different from the corporate one.

There are also issues over the allocation of space; trading are very greedy and the operating people loose out. The first stab at internal layouts are done by the people in trading, but the design consultants also claim that they have the merchandising experience to do these layouts.

We use consultants for architecture, interior design, engineering and lighting; there is a manual for architects on operating requirements.

The committee is better than nothing, although the membership is not satisfactory. Basically it is any board member who happens to attend – so in effect it is a board of one – the chairman and his strength of opinion.

The design review meetings occur at each airport terminal. A large number of people attend, both the committed and the philistines, which is no bad thing since they help to maintain the process of design within the realities of the economic environment. The meetings perform another function too, which is that they tend to pick up the loose ends – the housekeeping issues – so they keep managers on their toes.

The Engineering Director referred to himself as one of those committed to design, although he never once alluded to design in respect of engineering. I met one of the line managers who was committed to design, the manager of Terminal 4, who said this of design at BAA: 'Design has more of an impact on my workload – because of the problems.' He was, as he said, not "a philistine", but he clearly had experienced many frustrations and disappointments, some of which were ongoing during the fitting out of Terminal 4. Many of these frustrations were focused on the relationship between himself and his team and the design consultants. For example, in duty-free shop fitting he thought the design consultant

had learnt a lot at BAA's expense, that the fittings were totally inappropriate, that there was a lot of "design hype" and that unnecessarily expensive materials had been used.

He described the design manager very positively as a catalyst, but not as someone who he expected to help resolve either implementation issues or the operational complexities arising from, for example, the power of the trading departments. It seemed he expected to have to do these things himself and was frustrated by his lack of knowledge. He held the purse strings and was responsible for the money spent – so he considered he should be in the position to challenge design decisions. He gave this story as a simple example: one of the enamelled wall panels for the corridor between the terminal and the Underground had been damaged. A new one was ordered but would not arrive in time for the official opening. One of the maintenance people proposed they use a laminate panel as a temporary measure. A panel was made, it was an identical match in colour, did not need to be specially ordered, cost considerably less than the enamelled panel and could not be damaged so easily. Why, he found himself asking, did they have enamel panels? He had been responsible for the decision in as far as he had agreed to it but he had not been in possession of sufficient knowledge to challenge that original decision.

To conclude, it would appear that the steps taken at BAA to manage the process of design were no deeper than a veneer. At the level of the terminal manager there appeared to be no support for the responsibilities that he was charged with. However, the terminal-by-terminal design review system suggested that they expect him to sort out the design problems. Rather than increasing commitment from managers, the resultant frustration of what they are charged with would seem more likely to decrease any real commitment to design or any pleasure in achieving good design solutions, placing it in the role of an onerous, difficult and unrewarding task.

W.H. Smiths

The Design Policy Committee was responsible for all major design policies across the entire retail Group. The identification of design needs may have originated from the committee itself or from the individual businesses but whilst the individual businesses were free, within the guidelines laid down by the Policy Committee, to brief designers, final proposals could not be implemented without the approval of the Policy Committee.

The Design Policy Committee had what was in effect its "sub-committee" which assisted in the day to day interpretation and implementation of Policy on an ongoing basis. The principal interface between this sub-committee and general management took place at what were termed Design Workshops.

There was a second committee, the Design Review Body. Each business was required to present retrospectively on a cyclical basis every new product or change to store design made since last presenting. To the low volume businesses, this would normally mean an annual presentation; the high volume businesses would normally present every 6 months. In the presentation to the review body, if a business had not been achieving a very good standard

and had failed to attend Design Workshops for advice, then they would be instructed to do so and to return to the Review Body more frequently to ensure that things had indeed improved.

The Design Workshops took place one day every fortnight, and were run by the Design Manager and the Design Consultant who advised the Chairman. At these sessions any manager who wished to discuss the re-design of a product range, or the work of a consultant designer or any other issue concerning design could do so. All managers knew, however, that the Design Consultant was extremely close to the Chairman and any challenge they made to the wisdom of these two would be reported rapidly to the Chairman.

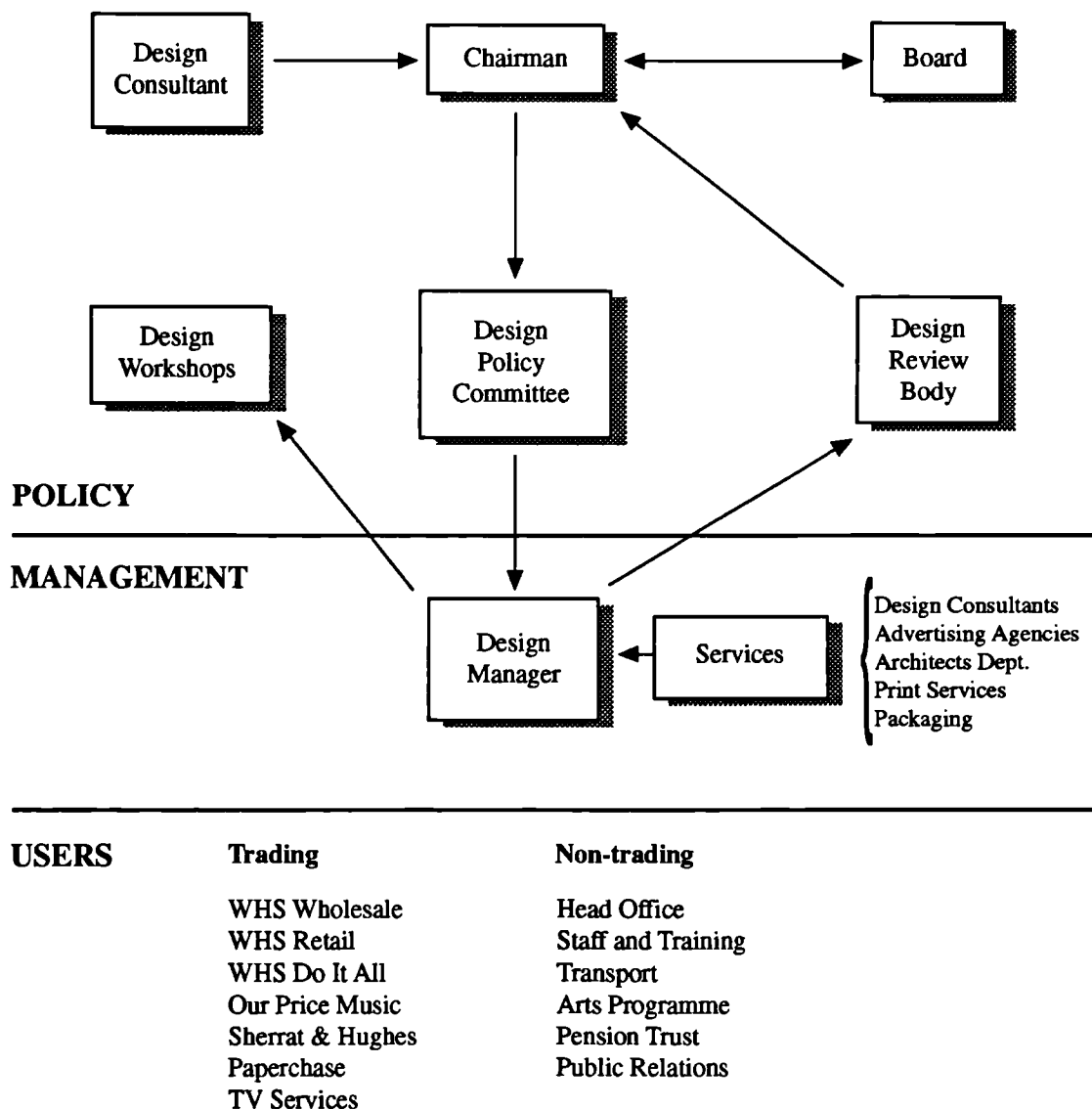


figure 3: W.H. Smith organisation chart

Both W.H. Smith and BAA demonstrate a typically formal approach to design policy, with a tendency towards motherhood statements and mechanisms to allow the organisation to check up on managers who may have overstepped the mark.

W.H. Smiths' design workshop days added a human dimension, giving managers an opportunity to discuss what might constitute 'a high standard of design' or 'an appropriate

individual solution within a coherent background', but with the knowledge that the Chairman would get to hear about it. BAA managers did not get such an opportunity.

At W.H. Smiths the formal design structures experienced a small but significant organic evolution as a result of changes of location, diversification, and business acquisitions. W.H. Smiths had moved from the City of London out to Swindon in Hampshire. With many new business acquisitions, W.H. Smiths had acquired many new managers and new management styles which threatened the traditions of the company. A manager from Do-It-All, a recent acquisition, said that he felt 'there had been a very bureaucratic feeling in W. H. Smiths generally, which was particularly in evidence in committees like the Design Review Body.' Aspects of the design policy were forced to become more open to interpretation, as had other aspects of the business. The number of design workshops doubled, and their role became more interactive as managers sought help in making design interpretations appropriate to their businesses while attempting to stay within design policy. The new style workshops appeared to have increased positive attitudes to the use of design, but also to have increased constructive criticism of the shortcomings of the design policy.

Was there a detectable heritage effect at W.H. Smiths? The answer is probably yes. Senior management had a patriarchal attitude, somewhat like that of the "Victorian Father". This attitude permeated the design workshops and is captured well by a statement made by the current Chairman: 'What my grandfather's generation taught us was that to keep up standards there must be total commitment and there must be iron discipline' (Simon Hornby, 1979).

The Italian Model

The differences between the British and Italian models can be summed up by analogy with the British and Italian patriarch. Both are disciplinary, but the Italian model has pathos while the British has reserve. At Olivetti the disciplined, formal approach prevails, as it does in W.H. Smiths, but it enables communication of ideals and aspiring intentions – intentions perhaps no better kept than at W.H. Smiths or BAA, but what a difference in emphasis.

At Olivetti all design is centrally controlled. There is a Design Director, and many central documents are produced concerning all aspects of design. Camillo Olivetti, the founder, is famous as a champion of design – the design of their first typewriter is rated as a classic. Design, however, cannot be cited as a major contributor to financial success. Financial health comes about via the prudent pruning and acquisitional flair of Benedetti who came from Fiat to put the ailing Olivetti back on its feet some years ago.

In a subsidiary such as British Olivetti, which is principally a selling and services subsidiary, there is an individual who takes responsibility for design. This is the Director of External Relations and Corporate Image. One of his roles is to ensure visual consistency in the buildings they occupy, in the promotional literature, in the paintings in the offices and in any promotional activities. As an example of the inspirational quality of his activities, the British Director, an Italian by birth, arranged for an exhibition of the Lions of Venice to visit

London. The Venetians did not wish to let the Lions travel, but the British Director asked the Duke of Wellington to underwrite the safety of the Lions, and with this assurance the Lions were permitted to make the trip. This is typical of the cultural activities which underpin the commitment to design, which is then followed through with far more pragmatic activities, such as sitting on education committees and providing student sponsorship. In short, the cultural heritage is given a profile. Both the British Director responsible for design and the Director of Design at the Italian headquarters are “Olivetti” men, not designers.

The Design Director is based at Olivetti headquarters in Italy. He is an Italian holding a PhD, and a senior Olivetti man. He has figurehead responsibility for the design of products and for all cultural activities. Within the international design community he is a respected individual, undertaking all the duties of a figurehead. This establishes the internal structure of design at Olivetti, and through this structure the corporate identity is maintained. Each country has flexibility, and there is little need of pernickety rules; the power of the patriarchal heritage is vested in “Olivetti men” such as the British Director, and although individual countries display differences, an overall visual integrity is maintained.

Design of products is differently structured. In a classical “Milan yellow” urban villa in a courtyard is the design studio of Mario Bellini and Ettore Sottsass. Olivetti keep Bellini and Sottsass busy for eighty percent of their time. In many respects therefore Olivetti do have an in-house design studio, although the arrangement provides a significantly different relationship to that of, say, Philips in Eindhoven. Many young designers dream of working for Bellini or Sottsass in Milan.

In effect, Olivetti encourage their “in-house” designers to be independent “superstars”. Olivetti use their own cultural heritage in design, and that of Italy as a whole, to promote the value of their products. This relationship is managed expertly by the Design Director. During a conference I had the opportunity to ask the Design Director about the relationship between design and manufacturing, he expressed surprise that I should ask and maintained that this relationship was unimportant. Once design had arrived at the blueprint for a new product, it was handed over to manufacturing. As far as he was concerned, there the matter ended. It was “over the wall”.

HYBRIDS: THOSE COMPANIES WHICH FALL INTO TWO OR MORE CATEGORIES

There are three companies described in this section, British Railways Board, Philips and Vantona Viyella. In all three cases design is both a function and is managed by a design policy. Size and/or complexity seem to be significant factors.

British Railways Board is a surprisingly large organisation, employing more people than Xerox does world-wide. Within the organisation, design is considered to be a factor in station environments, in rolling stock and in brand identities. (Brand identities have

increased in importance since sectorisation, when the sectors such as Intercity, Network Southeast, and Railfreight came into being.) Design is therefore more complex than in comparable transport concerns such as British Airports Authority.

Philips manufactures a wide range of products from fashion-styled audio units through to state of the art medical equipment. They are a world-wide organisation. Size and product breadth are significant factors for design.

Vantona Viyella, the last company in this category, shares much with comparable companies such as Courtaulds, but differences arise from their retailing aspects which increase the complexity of their use of design.

Two of the companies are discussed here, Philips and Vantona Viyella. British Railways Board participated in the “matrix” aspect of this study and is included in the next chapter. However, it is worth noting here that engineering was not included in any documentation on design policy. The engineering function, which has traditionally been extremely powerful in British Rail and, with research and development, has also been at times highly innovative if not entirely successful (as with the APT), is not considered to be concerned with design. There was no discernible formal connection made between the two aspects of design, engineering and industrial design.

Philips

The Design function at Philips is large and well established. It is called the Corporate Industrial Design Organisation, known as CID, and has its own headquarters building. The managing director of CID is the Design Director; he has five senior staff who work as a team to manage the entire CID organisation. There are six product divisions, each with a design manager with up to five design teams reporting to him. Design has always been an accepted factor at Philips. Gerard Philips, the founder, was influenced by his own work experience at AEG, and copied the model used at AEG whereby an architect (Peter Behrens) was employed to design buildings, products and graphics. The Dutch architect Kalff became responsible for architecture, product and graphic design at Philips in 1925. Kalff was succeeded by another architect, Versema in 1954. By the sixties, sixty percent of design work was centralised in Eindhoven while the remaining forty percent was undertaken in design studios in the home markets. This was known as “local for local”. The product strategy in the late sixties and seventies was to move all design into the centre. By 1985 “local for local” had been reduced to a negligible two percent⁶. At this time staff at CID numbered over a hundred, with the Design Director reporting directly to the Board of Management.

CID worked with the Product Divisions and the National Organisations and was involved with these groups in the development of world-wide products and policy. The only anomaly

⁶ It is worth noting that this time period accords with the development of the design management literature advocating central controls.

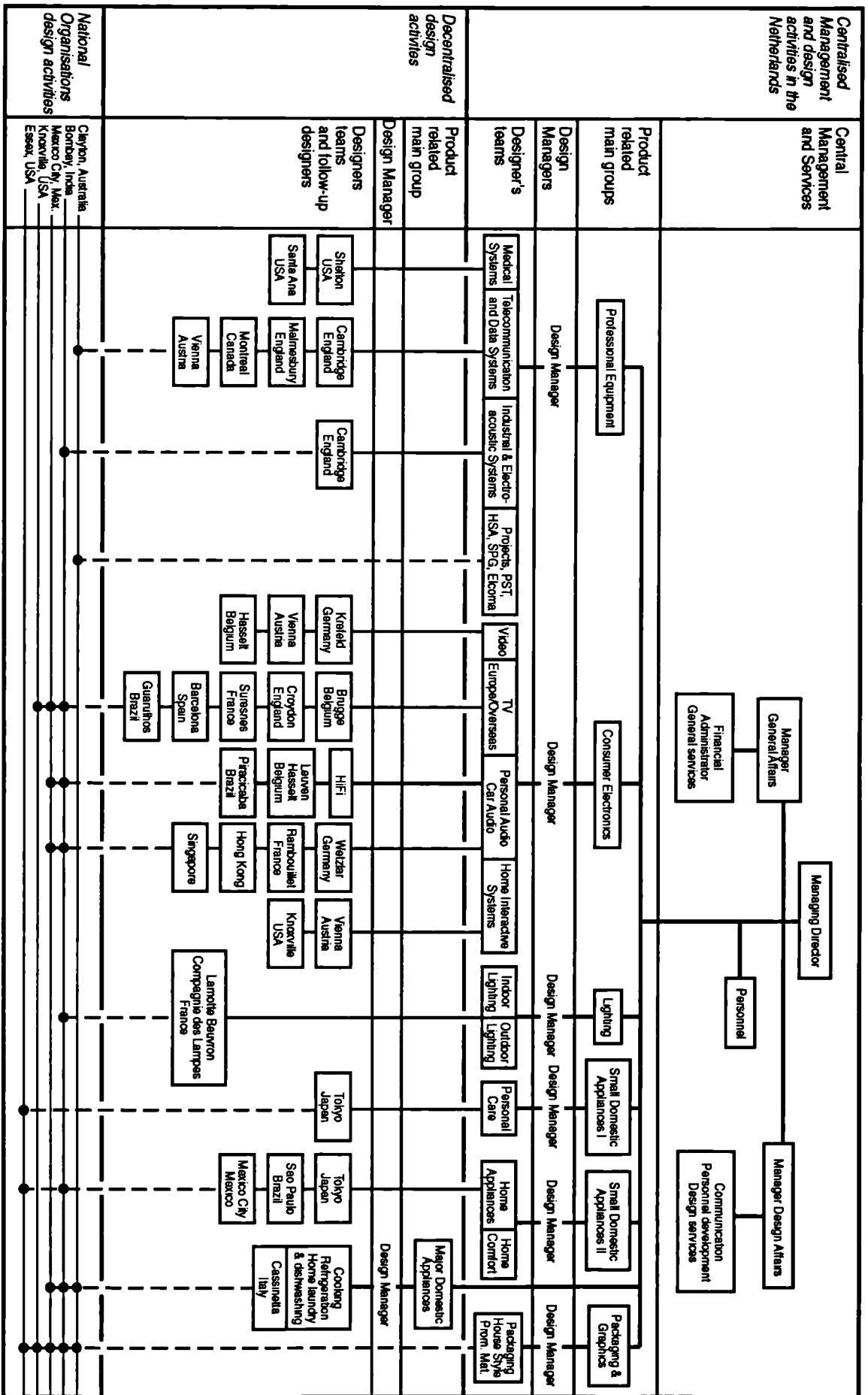


figure 4: Philips organisation chart

in the part played by CID was with Major Domestic Appliances, where both the factories and the designers were based in Italy because Philips acquired the Italian company Ignis.

There were six major product-related design groups, each of which had a design manager who was believed within CID to have a great deal of responsibility and power. Below him were the design teams. These teams also had managers. The Manager, Design Affairs was at pains to point out that they had negotiated for a salary structure which enabled a senior designer to have a career structure which did not entail him becoming a manager yet recognised his experience. He felt this was very important in giving designers a recognisable status and preventing designers from feeling obliged to become administrators/managers in order to further their careers. As an adjunct to this he also felt that the product divisions failed to realise, and had to be constantly reminded, that designers were entitled to the same opportunities to move about the company as they (the management) enjoyed. The logic behind the product-related groups was one of “culture”. As an example the Professional Equipment group worked in areas where product style needed to be cohesive and classic and where quality and reliability were vitally important. In Small Domestic Appliances, Personal Care, the product life was far shorter and fashion played an important part – of course the product needed to be reliable but the criteria for reliability were very different from say Medical Systems (part of the Professional Equipment Group). Younger designers were in the main more appropriate in Personal Care and fitted better into the culture within the Product Division. Since each Design team worked very closely with the Product Division this was very important. The Manager, Design Affairs stressed that at Philips it was irrelevant to adopt a design stance such as that at Braun because of the widely different perspectives within the Product Divisions.

In managing personnel the Manager, Design Affairs saw his job as achieving a balance between the individual designers, the design team and the product division. A designer could begin to be compromised (in design terms) if he became too much a part of a product division, particularly if he was working alone: he might make friends in the division, become part of the team, become too close to the problems and begin to design to accommodate those issues. Then the management would fight to keep him and wouldn't accept another designer easily. Consequently some designers would be moved before a situation became too cosy. It seems therefore that CID accommodated the “culture” of a product division only up to the point at which it challenged the “culture” of CID. The need for what was effectively a personnel manager was bound up with the decision to keep all design work in Eindhoven, which made for a cumbersome and overly bureaucratic beast.

CID seemed well resourced, and there was also some benefit from the heritage factor. Philips Industrial Design Policy document was five pages in length: beginning with Mission and Goal, it continued into Objectives, Organisation and Policy. The following extract from the Objectives section indicates that there was a high degree of clarity about the tasks of the design function and the skills that employed to undertake the tasks.

Meeting users' expectations: CID will utilise its specific skills and professional expertise in giving visual expression to products. These skills are: aesthetic sensitivity, sensibility for and expertise in the execution of form, dimensions, colours, environmental requirements, and psychological needs, (such as cultural background, visual trends, symbolic values) and human factors. CID will apply these skills to satisfy the expectations and sensibilities of the ultimate users of Philips products.

Meeting production and marketing requirements: CID is responsible for integrating the above-mentioned characteristics into products, product systems and the packaging development process. CID will utilise its understanding of marketing, technology, materials, industrial and production processes in order to meet the other required functions.

Continually defining product design quality: CID will initiate and develop ways to carry out a continuous dialogue about the understanding of those criteria and characteristics that achieve qualitative design. Consciousness of product design quality will be strengthened both within CID and with colleagues throughout the Philips organisation.

The Policy section is equally clear and, in comparison to the British Airports Authority policy document, is much more concise than a series of motherhood statements or changes to general managers.

CID overall policy must conform with the Philips corporate policy. Since Philips is a dynamic organisation in which change is continuous, CID will adapt its overall policy accordingly. Organisational adaptation, location adaptation, selection and development of personnel will take into account the fluidity of the Philips organisation as a whole.

CID industrial design policy must complement the specific product policies of Product Divisions and their business units. Specific aspects of CID policy which are inherent to the relationships with Product Divisions are as follows:

- The industrial design function forms a multidisciplinary product team with the product management function and the product development function.
- The industrial design function contributes, on an equal basis, with its specific skills, such as aesthetic knowledge (forms, dimensions, colours, environment, etc.), human factors knowledge, and understanding of psychological needs, (cultural trends, visual trends, symbolic values, etc.) to the product policy, specification, conceptualisation and visualisation as defined by the multidisciplinary product team. A well defined product policy, planning and specification should precede the product development process.
- Evaluation at critical stages of the process must be built into the process so that the solutions can be systematically checked against the defined policy, planning and specification.
- Industrial design quality must always be judged as an integral part of the total quality of a product, product system, or packaging.

Responsibilities and procedures with respect to the design policy

- The Managing Director, assisted by the Manager Design Affairs are responsible for the management of the overall CID design policy, personnel development, general information/communication, design services and corporate tasks. The Managing Director is the connector between the Board of Management, the Managing Directors of the Product Divisions, National Organisations, staff organisations and all CID design groups. In this role, the Managing Director provides continuity for long term strategic planning for product design programmes.
- The Design Managers, assisted by the contract designers and their design groups, have a delegated responsibility for the design quality of the products, product systems and packaging of their design groups. They are responsible for defining and maintaining design references against which they can give guidance and management to product quality concepts, their visual manifestation and operability. Those design references must correspond to the respective Product Divisions and their business units' policies.

Overall, the Philips Industrial Design Policy gave a clear and unambiguous account of how the Design Function operated; what it did, how it would act and how it would interface with product divisions. This, therefore, gave guidelines for both designers and managers and appeared to have all that was necessary for successful interchange. However, another document, internal to the design function, suggested that even with all of the above, the Philips design function experienced aspects of the same isolation and communication gulf experienced by other companies which had less comprehensive, less accomplished forms of design. A document of which an extract is given below was circulated to all design managers in the form of an internal memo on improving communication and product responsibility.

- Work towards involving CID (Design Manager – contact designers – senior designers) on a structural basis in product-policy, product-specification, product-concept in all areas and promote their acceptance by members of the policy groups of the Product Divisions such as article teams, product planning committees and development meetings.
- Convince the commissioners (budget suppliers) that only the right balance between design problems and available budgets guarantee the required design input.
- Establish direct contacts and increase working together on common policies with other corporate departments such as Institute for Perception Research, Nat. Lab., Strategic Planning, Marketing Research, Advertising Department, etc.
- Establish direct contacts with National Organisations, in a structured way via or in dialogue with the Product Divisions, in order to get direct feedback about what happens at the point of purchase and what the real needs and reactions of the users are with respect to the products and packaging we have designed or will design.
- Increase design research activities by proving to our commissioners that these activities can contribute to innovative ideas. Design research and pre-

development work can also speed up the daily activities, because considerable basic thinking has already been done before a commission starts.

- Work towards representative CID membership in the Concern Quality Steering Committees.

In reality, then, design at Philips would appear to have been perceived by those managers outside the CID function as important to Product Divisions, but not in respect of product planning and development, nor in respect of financial allocation for the design element in a new product development project. The Design Function was sophisticated within its own context but the forms of managing design they had employed appear not to have effected significant change in managerial practices in the product development process. Clearly, although CID maintained that these design managers were powerful, the internal document which began most statements with “work towards” suggested less power than we were led to believe.

Vantona Viyella provides a very different example, yet the outcomes can be compared to Philips. In Philips, increase in policy documents matched an increase in design work from a central location in Eindhoven. In Vantona Viyella, increase in documentation matched an increase in design work because of Vantona Viyella’s move into retailing.

Vantona Viyella: Apparel Manufacturers

In the previous section, Design as or within a function, the chairman of Courtaulds Contract Apparel described the situation in manufacturing that led to the addition of design studios. Here we see a further step in that evolution as described by the Chief Executive of Vantona Viyella: ‘In clothing now you don’t have a viable network because retailers have become brands. There is room for successful brands but retailers screw you to the ground so there is a need to get your own access to the customers.’

Vantona Viyella had recently taken their Viyella Women’s Wear into the “shops within shops” concept in leading department stores and were now opening independent shops. They had become retailers. This extension of the business had affected the role of design and had extended it in certain respects. The extension was broadly in managing the brand identity; there appeared to be no increase in the role regarding manufacturing.

The senior person responsible for design carried the title “Design Director”, had a seat on the board, and was a fashion designer. The design function was centralised. The Chief Executive described three primary roles of the Design Director. The first and third are typical of the roles of a design function, the second reflects the increased need in this instance for brand identity and relates to design policy.

First Role: to respond to product and commercial briefs for marketing, retail or product managers. This included promotional, advertising and graphics related to the product. Responsibility for the design studio. (In the design studio there were approximately eleven fashion designers, and other specialists were brought in when necessary.)

Second Role: to be “Keeper of the Corporate Tablets” on brand identity. There was a corporate design guide which covered presentation and graphics. It was the responsibility of the design director to ensure that individuals kept within the guidelines laid down. However, the Chief Executive described the practice, as opposed to the principle, in the following way: ‘if the design director considers that an art director [usually from an advertising agency] makes a proposition outside the corporate design guide, she jumps up and down. She is often overruled, if we like what the agency proposes.’

Third Role: it was within the design director’s brief to initiate new ideas, which could be nothing to do with the business as it stood, but could look towards a new venture. An example was the newly opened Viyella shops, which were very much a design-inspired and design-led project. This role was important but the Chief Executive said, ‘it is important not to over-emphasise this role’. The extension of the tasks for the design director appeared to have a direct relationship to the brands and their extended visibility due to the ownership of retail outlets.

Viyella, Jaeger and Country Casuals are the three most visible branded businesses. The design director maintained consistency between the design of merchandise, the design of brand information, labels, swing tickets (price labels) and promotional information, and the design of the retailing environments.

Range Planning Procedures: A commercial brief was the responsibility of the product manager. The margins required on product might have already been defined but might also be decided by the product manager. A typical approach to a range was as follows:

- 70% would be repeats of models, or minor detail changes that updated a model that sold well.
- 20% would be new models, but with styling and aesthetic values that were “safe”, easily comprehensible by the consumer and easy to wear.
- 10% would be high fashion which was not expected to sell, certainly not in volume.

The Chief Executive described the value of the high fashion 10% in the following way: ‘it does so much for the business – it is the icing on the cake. Our customers like to identify with this kind of fashion, and then buy something more conservative.’

Product had to be re-invented every three months and so there were significant timing pressures, and a disciplined approach towards the planning calendar was required with little room for flexibility. The merchandising manager took responsibility for the range, in respect of making profit on it. The operations manager took responsibility for the retail outlets.

The Chief Executive had this to say about spending money on design: ‘design is a highly visual cost, but it should be compared to R&D in consumer goods and written off as an overhead cost like advertising. How much you should spend is a difficult question. One way to consider the question is: what do you need to service next year’s business plan? Design costs are actually people costs and I believe design is driven by the business.’ On the one

hand he compares design to basic research, yet on the other hand he treats it as an overhead cost – which might seem paradoxical. The accounting description of design as an overhead affects the way the design studio is perceived by other parts of the organisation, and in the design studio's own eyes underrates its importance.

Even though the devices adapted to manage design can be categorised and described it is clear throughout this chapter that many decisions critically affecting the process and outcome of design are occurring outside of the formal mechanisms. Why action occurs outside the formal mechanisms is as yet unclear, though it is easy enough to surmise that the reasons for doing so are pragmatic business ones. If formal mechanisms will not contain design decision making then we must look beyond the mechanisms to the wider decision making activities to see which decisions actually drive design.

Chapter 5: The Pilot Study Part II – Charting the Contributions to the Design Development Process

This chapter looks beyond the accepted definitions and boundaries that surround design, and attempts to chart decisions and actions that seem to progress the ongoing design development process.

Design decisions and actions are often enmeshed in decisions or actions that fulfil other requirements. Dissecting decisions or actions for the design part is not legitimate since it ignores the context of the decisions, and the context is important. It is perhaps more appropriate to approach the whole business not as if dissecting individual aspects of decision-making, but with the intention of gaining an understanding from another perspective. An analogy might be as follows.

When a yachtsman navigates a sailing yacht around the coastline, the yacht will sail at 4 to 5 knots, and he will be sitting a metre or so above sea level. Bringing a motor boat through the same waters, the boat will be travelling at 25 to 30 knots, and the sailor will be sitting 4 to 5 metres above sea level; he will experience a shift in perspective which may be disorientating. The sense of the coastline and the navigational marks is different in the two experiences. If he is more used to the sailing yacht than the motor boat then he will find that the difference in speed alters the sense of timing of the sequence of the navigational marks, and the change in height alters the angle at which the marks are seen, making them look unfamiliar. There is a difference in perspective even though the physical conditions are the same.

The approach adopted in this chapter, to continue the analogy, is one of navigating an unfamiliar vessel through familiar waters. Rather than looking at the design development process from, for example, the perspective of the design function of an external consultant, I will attempt to take a fresh perspective, unaligned with any particular function, to chart *all* contributions made to the design development process.

The term “charting” is used here, instead of “mapping” or “recording”, to suggest a process of plotting the features of an environment which has not yet been fully “discovered” or defined. This point is important because this study is intent on observing activities which contribute to design development but which may not be acknowledged as design decisions. So charting is employed in an attempt to record activities which the interview data suggests contain a design decision of sorts, or at least a decision or action which progressed an ongoing design development process.

Three charts were developed, each a set of matrices, the two axes representing steps in

a design development process, and broad artefact types, products, environments and services.

DEVELOPMENT OF THE MATRICES

Development of the matrices began with a consideration of what there was to be recorded.

In recording company activity in design it was important to capture as much as possible of the company's interpretation of the way they managed design not to make a separate interpretation. To achieve this matrices were compared with interview notes that captured individuals' perceptions of their activities – in other words how *they* described them. I endeavoured to keep activity matrices as free from interpretation as possible and to use interview notes to capture individuals' accounts of how their activities were interpreted by them as design management.

I tried to make the range of activities on the matrices as clear as possible. How individuals co-ordinated their activities with others was important. What was also important was whether, if two activities were interacting, there was a lead activity, and if so what caused one activity to lead or push another.

An early matrix (Gorb, 1985) developed as a tool for helping companies with design management arrangements was used as a basis from which to develop the new matrix charts.

The stages Peter Gorb described as follows:

- To Audit – an attempt should be made to audit every product with a view to ensuring that it adheres as closely as possible to the design principles of the organisation.
- To Advise – it will certainly be useful prior to or during an audit procedure to offer advice on design modifications which will help this happen.
- To Plan – better still, as part of the general planning process for all products, attempts should be made to establish design planning guidelines.
- To Specify – as a more rigorous planning procedure for certain products it will be desirable to establish actual specifications for the design of those products.
- To Demonstrate – as a way of demonstrating the effectiveness of a specification, it is sometimes useful to design directly and make either a model of the product, or the first of a production run, or a fully completed detail. (An example might be the first of a chain of shops for which a specification has been established).
- To Implement – the deepest level of involvement: actually undertaking the implementation yourself.

Gorb's seven stages were evaluated for their suitability for this study, and changes were made as follows. The word "stages" was replaced by "steps" to move away from the idea

of a linear sequence. The word “audit” was replaced by “evaluate” to remove the connotations of consultancy that the word audit carries, and the description was changed from ‘an attempt should be made to audit every product with the view to ensuring that it adheres as closely as possible to the design principles of the organisation’ to ‘artefacts in relation to principles and objectives’. This widened the scope to include more forms of product evaluation.

Seven Steps in Design Development

***Step 1* Evaluate**

Evaluation of the organisation’s products and processes in pursuance of its corporate objectives.

***Step 2* Advise**

Specialist contribution to either evaluation of existing artefacts or in planning for new products.

***Step 3* Plan**

Strategic planning for the generation of new product concepts and/or improved products.

***Step 4* Specify**

Development of specifications.

***Step 5* Supervise**

Process and operational planning.

***Step 6* Demonstrate**

Prototyping and testing of artefacts.

***Step 7* Implement**

Pre-production and/or testing of operating systems.

		Artefacts									
		PRODUCTS				ENVIRONMENTS			INFORMATION		
Input by Designer		R & D	Engineering	Process	Sourcing	Building	Space	Equipment	Operational	Product	Corporate
Steps	EVALUATE										
	ADVISE										
	PLAN										
	SPECIFY										
	SUPERVISE										
	DEMONSTRATE										
	IMPLEMENT										

figure 5: Matrix 1

Matrix 2

Two matrices were developed to record interactions. Matrix 2 records interdependencies between activities. Each box divides into two (with the dotted line) in order to record the existence of interdependent relationships. Two activities may be mutually dependent, an activity might demand response from another, or may operate in isolation. A separate matrix diagram was used for each of the steps, so that up to seven of these were completed for each company. This enabled each step to be considered separately as a set of relationship types and for patterns of consistency or variance to be looked for across the categories in the horizontal axis.

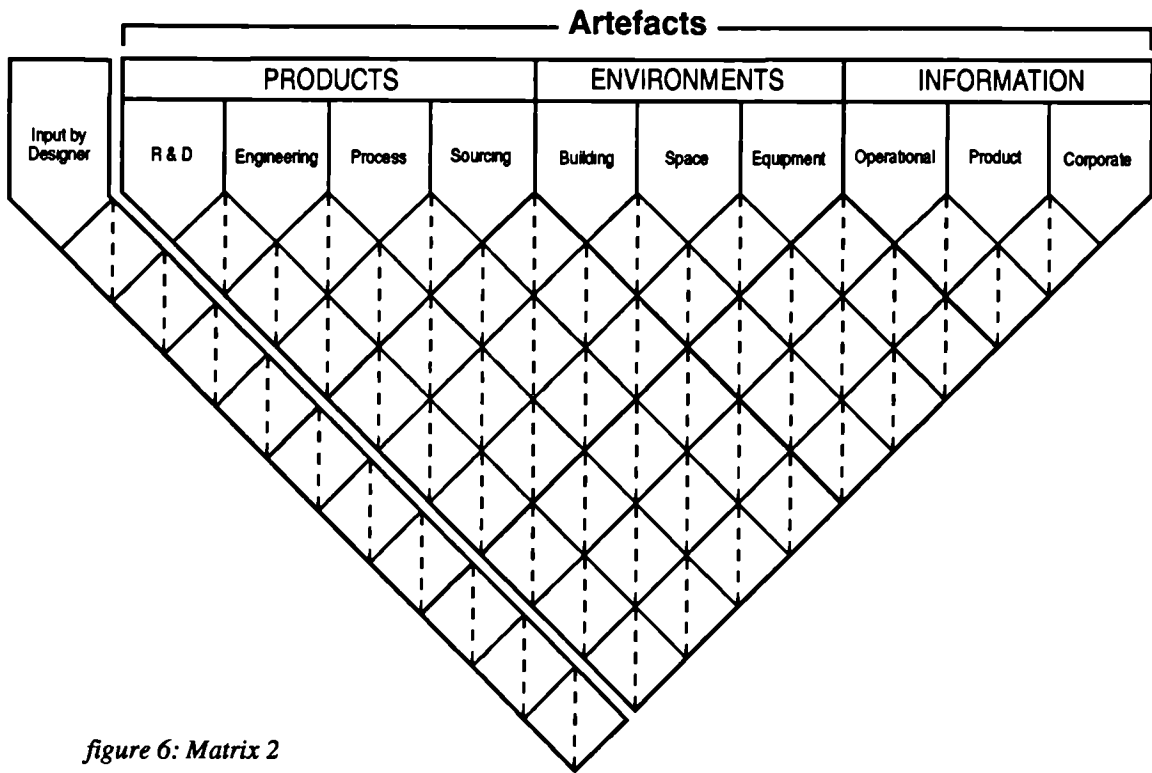


figure 6: Matrix 2

Matrix 3

The third matrix was developed to record interactions between individuals. This can only be understood by implication in the previous matrix. Matrix 3 records the activities of up to twelve individuals over the seven steps, so that it is possible to see the frequency of activity and interactivity of particular individuals, and indicates where this activity begins and ends, for example whether someone who is involved at the time of evaluation is also involved at the time of specification.

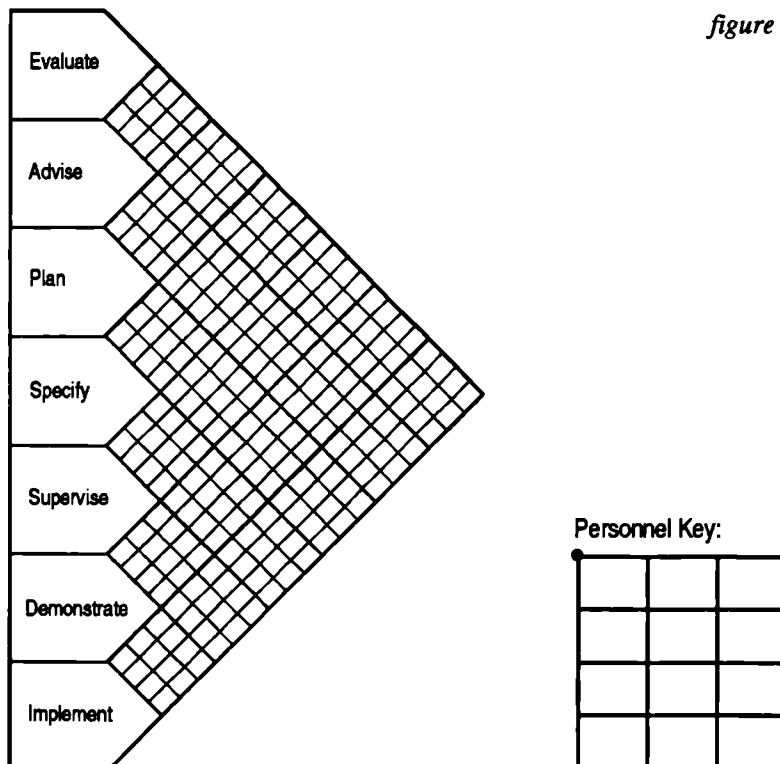


figure 7: Matrix 3

USE OF MATRICES AND PROPOSED INTERVIEW METHOD

The next stage was to fill-out the matrices, completing one set per company. The matrices were discussed during interviews with a range of individuals from chief executives down to individuals at middle and operational levels. During these interviews, individuals were asked to discuss their job in general and their role in relationship to some of the categories mentioned in the matrices, and then to discuss where, if at all, they felt they were involved in the design development process.

Decisions on who should be interviewed and the sequence of interviews were discussed with each company. This arrangement enabled the research to follow the route of design responsibility as the company understood it. Typically, individuals involved in deciding who should be interviewed were chief executives, managing directors or marketing directors. In general, between one and six interviews were arranged and all were at senior or middle management levels. Each interview was scheduled to last approximately one hour (although in practice many took longer).

RESULTS FROM SIX COMPLETED MATRIX SETS

This section looks at design activities with the use of Matrices 1 to 3. Six companies participated in the matrix completion process: two manufacturing companies, both in apparel, and four service companies, two retail and two transport.

Manufacturing	Service	
Apparel	Transport	Retail
Courtaulds Contract Clothing	Sealink	British Home Stores
Clarks Shoes	British Railways	W.H. Smiths

table 2

Between the six companies are represented all the forms of managing design but, as can be seen, design as or within a function is best represented.

Champion-led Design	Design as or Within a Function	Design as Policy or Programme	Both Function and Policy
Sealink	Courtaulds Contract Clothing	W.H. Smiths	British Railways
	Clarks Shoes		
	British Homes Stores		

table 3

Matrix 1 is considered first, in each of the manufacturing and service categories and the four forms of managing design already identified.

Then, using Matrix 2 and Matrix 3, the Steps are looked at in three groupings – the first three steps, Evaluate/Advise/Plan, the second three, Specify/Supervise/Demonstrate and the last step, Implement. In each case two questions are asked: who is involved, and in which artefact group, Product, Environment or Information?

Finally Matrix 2a, which is a summary matrix, is used illustrate the spread and extent of activity, mapping out hot spots and cool spots in the actions surrounding design.

Matrix 1: All Seven Steps

Matrix 1 simply charts all design content in decisions or actions across all categories on both axes. We can see evidence of some differences between manufacturing and service.

In the two manufacturing companies, Courtaulds Contract Clothing and Clarks Shoes, there are two entries in the Implementation step. This is high in comparison to the service sector but is low overall; many traditional manufacturing plants experience isolation in the design development process. The Advise step entries are low. There are many possible reasons: both companies relied heavily on their design studios, both had managers who managed the studio but did not represent design at board level, and both were companies in the fashion industry where time to take stock is considered a luxury that cannot be afforded. This is perhaps balanced out somewhat by the high entry in the Product Process subheading. Typically in the apparel industries ranges of products are made up as samples, the sample process being continuous, which accounts for the consistency of entries in the steps Plan through to Implement within the inclusion of the Evaluate step.

In the service sector, the entries in the steps Advise and Specify are high. All four companies used external consultant designers, architects, engineers and other specialists where appropriate. There are uniformly high entries in Specify, probably because companies appeared to use formal specification as a major control mechanism. Entries are on the high side in the Environment Space and Equipment subheadings, reflecting the importance of these issues to service businesses. Also in the two transport businesses there are high entries in the Product Engineering subheadings – reflecting the need to maintain and to commission new rolling stock and ships. In all six companies, designers in one form or another – e.g. designers, architects, naval architects and design engineers – were involved in specification, but in only one company were designers involved in evaluation and in only two companies were designers involved in planning.

Turning to the forms of managing design, no patterns emerge that would suggest that the form of managing design is powerful in shaping the design content in decisions or actions. However, given such a small sample, this is nothing more than a passing observation. For example, in W.H. Smiths there are equal entries for the three steps Evaluate, Advise, and Plan, which might suggest the effect of a design policy, but then again British Railways also

had a design policy and there is no such consistency, so while this may have applied to the W.H. Smiths design policy, it does not necessarily apply to design policies in general.

Matrix 2 and 3

The First Three Steps: Evaluate/Advise/Plan

These three steps represent what could be loosely termed the strategic part of the design development process: from evaluation, which in most instances will be some form of review procedure, through advising (which inputs new information probably, from an expert) through to planning, where the review and the input of new information together create an intelligence pool from which to plan a campaign. In most management contexts, strategy-making is the task of senior management. How then do they deal with the design aspects of strategy-making in their products, services and information?

From the Interview Data

At British Homes Stores, the Director of Merchandise had this to say about design : ‘There are four approaches to design: Corporate Approach, Colour and Styling, Intrinsic Shape, and Design for Display. Colour is the most important input. The Board has authority on colour. In May and June the colour consultant works towards colour agreement. By October there is liaison between buyers. A chain store operation needs consensus; there is room for open discussion but there has to be rigid discipline. With the October agreement comes a “colour palette” for each clothing sector and the colour emphasises the style difference.’

The Divisional Director, Marketing described the role of marketing: ‘Marketing has close contact with Strategic planning. At the merchandising level, the role of marketing is to segment the market. Recently we have begun to do this by attempting to describe customer types visually to buyers – “people in boxes”. In the box goes wine, books, records, clothes, hobbies and sports. These permanent visual stories act as fashion signals. Buyers come with items from all over the world; we hold group discussions which helps to focus things. At the selling level, the role of marketing is involved with store design, merchandise siting, display impact. General location and consistency with the merchandise and the right tone of the environment is important.’

The Evaluate/Advise/Plan process at Clarks Shoes was described by a product range builder in the following way. Firstly the market situation was analysed, followed by decisions on what ranges would continue and where to put new design effort; considerations included price, age range, and particular sector. Then a brief was developed, but this was not cast in stone and things could alter along the way. The time scale was one week for writing a strategy plan; two weeks later, a formal market plan would be ready, and four weeks later designers would have design solutions.

The design manager at Clarks, who had been with the company for twenty years, described how his team would respond to a brief from a brand manager by making

“pullover” (prototype shoes). Shortly before the time the interviews took place the product range builders and the designers had begun to share the same working space. The range builders said they found it a stimulating environment, and the design manager said he was more likely to be invited to meetings and it gave him an opportunity ‘to fight the design corner’. At Clarks the Evaluate/Advise/Plan process was driven by brand managers who reported to the marketing director.

At British Rail, the managing director at the time said, “Good management, good marketing, good design, are inseparable. Design should be removed from its cocoon of exclusiveness.” The following diagram was used to suggest the process:

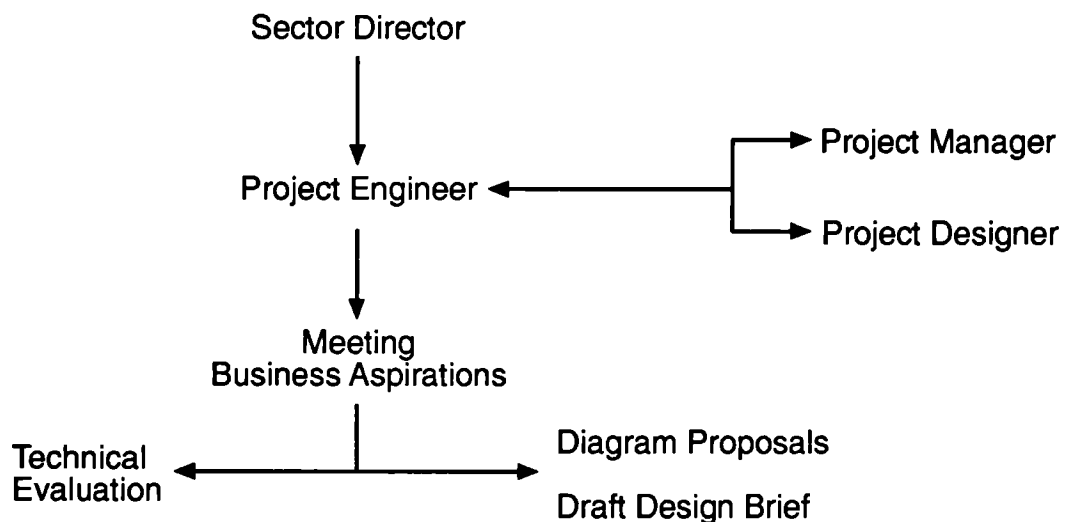


figure 4

In terms of senior management time, it seemed there was agreement that business influence must come in right at the beginning. There could then be a period of hands-off, but the senior management had to be back at the critical point. One Sector Director said ‘Style is highly relevant, people have a choice. Things are important, particularly since we have little control over the people who present the image¹. Standards have to be met on quality, cleaning is particularly important and a comfortable seat.’

The Development Manager for W.H. Smith Retail described his responsibility as ‘How W.H. Smiths will look in the future’, which automatically placed design as a central concern to him. In discussion on what the new W.H. Smith image should be, he said, ‘an image that maintains current customers but increases the leisure shopping without allowing us to look like followers of the High Street aesthetic [he refers here to the style of design groups such as Conran or Fitch].’ The Marketing and Buying Director for W.H. Smith Do It All said that he felt designers did not have the detailed expertise of, for example, his business, which is where his own resources came in. The Design Review Body played a role in the Evaluate/Advise/Plan process. Although quite formal, through the design clinics and workshops

¹ At this time sector directors did not have control over the station or train personnel since Personnel was under the control of regional managers. In the change from a regional structure to a sector structure, Personnel was the last issue to be changed.

individuals such as the development manager could discuss and consider different avenues to adopt in design terms.

At Sealink, the Marketing Director of the Passenger Services Divisions described how his division had the remit for the total design within ships: they were planning to spend £7 million to £8 million over the following six months. The new managing director had come from the brewery business and had brought the marketing director with him. They were both particularly looking to commission design consultants with expertise in pub design. One of the directors of the naval architecture practice, which was a wholly-owned subsidiary of Sea Containers, commented while discussing the decision process on ship interiors that 'the time scales are so ridiculously short that decisions have to be made in two days, so consultation would be quite impossible.'

At Courtaulds Contract Clothing, the Chairman described how sales and design worked as a team, often going together to trade fairs and shows across the world, and how also a client representative would accompany them – so it was a close working relationship. The chief executive of the Leisurewear divisions reinforced this when he described a recent visit to Miami and Florida. The visit was made by a team of sales executives and designers from Courtaulds, and buyers from British Home Stores and Marks and Spencer. They had seen some ideas for swimsuits which both the designers and the buyers liked. Courtaulds then made 100 dozen for limited in-store trials. A full order would only follow if the trials proved successful, minimising the financial risks for both sides.

From Matrix 2

Some comparisons between the six companies can be made by looking at Matrix 2. In the step Evaluate entries on the charts principally reflect the business concerns of each company. In general designers are less involved here than in the other steps, with the only exception being W.H. Smiths. At W.H. Smiths, the two formal aspects of their design policy played a role. The Design Review Body sat periodically and reviewed all projects that had used a designer. If the project did not appear to have met W.H. Smiths' standards, then there would be some form of enquiry with the manager concerned. On the Design Review Body sat the Chairman, the Managing Director, their external design consultant (who was on a retainer) and the Design Manager. The Design clinics were held one day every fortnight, the external design consultant (who reported direct to the Chairman) and the design manager running them. It was expected that managers would attend the clinic for advice when they had a new project to develop which could involve design. The involvement of the well-respected external design consultant, who had the ear of the Chairman, had a significant effect on the evaluation procedure in the minds of managers.

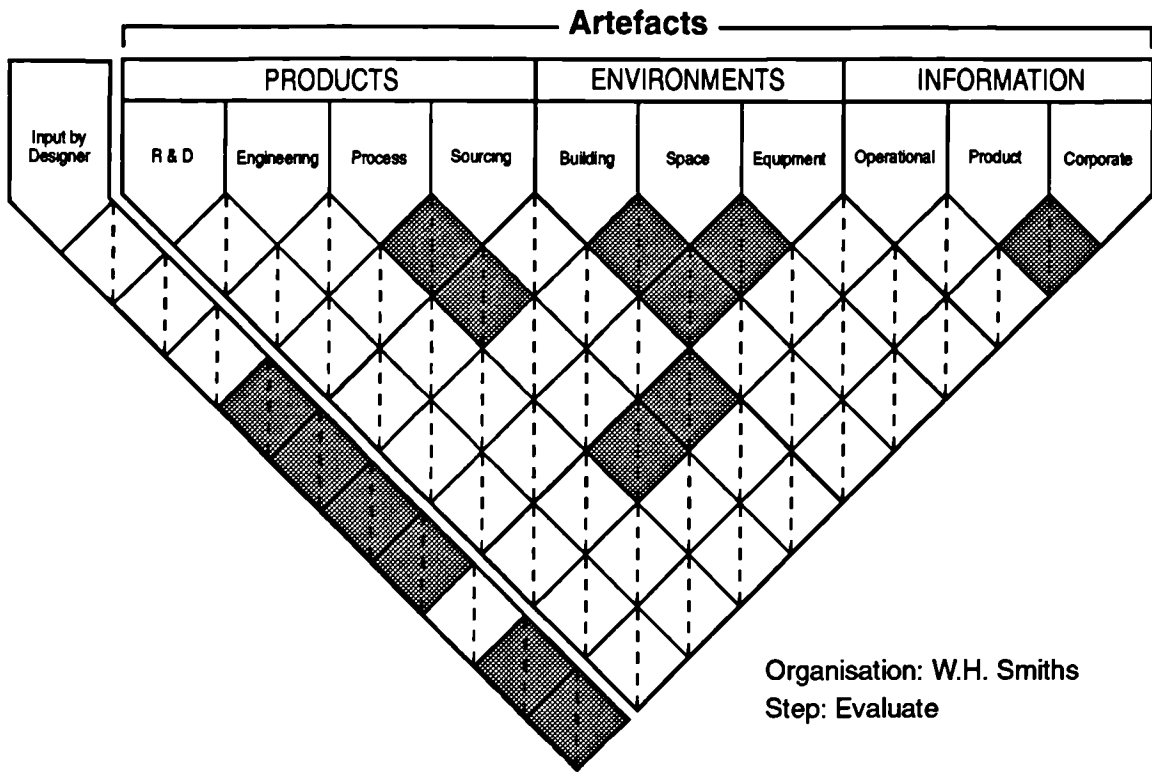


figure 8: Matrix 2 for W.H. Smiths, Evaluate step

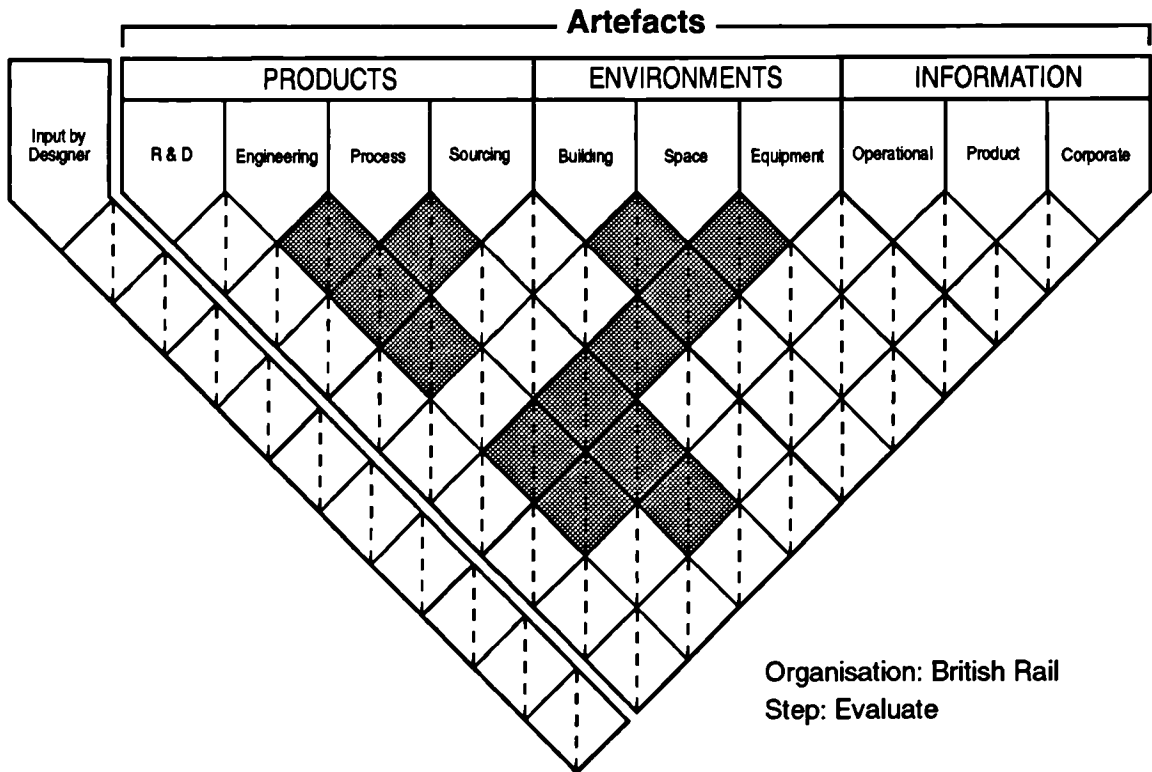


figure 9: Matrix 2 for British Rail, Evaluate step

British Rail also undertook a lot of evaluation. Following sectorisation, change had been almost continuous: branding and general improvements to service were high priorities. Government pressures on investments and reviews should not be underestimated. Significantly, for all new projects British Rail, together with the Sectors, developed cases for capital investment and performance specifications. However, the government awarded the contract and the supplier who won the contract was then free to manufacture to his own specification. The effect of this was to increase the importance, particularly at Sector Director level, for the case that went to the government to be put in great detail. This was echoed in the description of new projects by one of the managing directors of British Rail, given earlier.

In the Advise step it can be seen that all six companies involved designers. In the majority this involvement was not particularly a two way process, the nature of the transaction being, as described by many of the companies, where a designer responded to a brief and provided a solution which was then given back to the management team to deliberate upon. The situation only varied at British Rail, where the circumstances described above had an effect, and at Sealink, where the role of the naval architect was having an effect coming between the styling design and management team transactions.

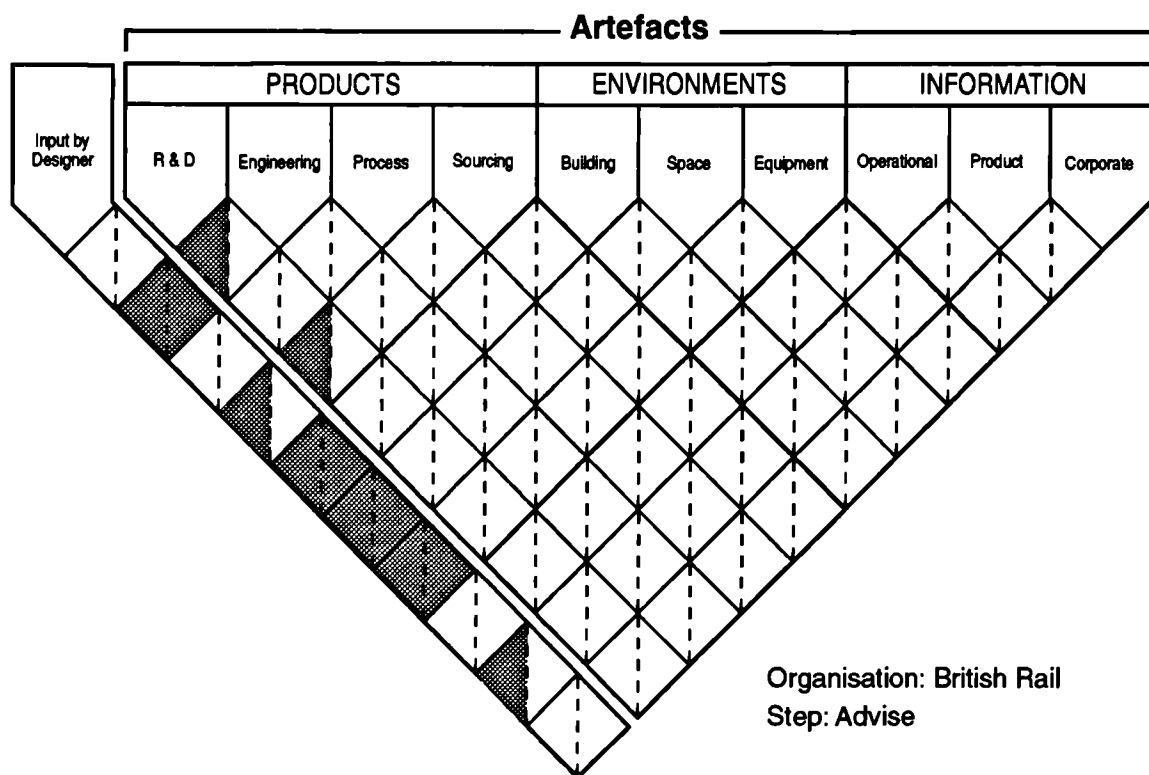


figure 10: Matrix 2 for British Rail, Advise step

In the Plan step there appeared to be little overall activity. Designers were not heavily involved and with the giving of advice phase over, the design they provided became a variable in the management team's planning process. The original design could be affected during planning. At Clarks, research and development was involved at this planning stage

in a two way process. To give a typical example of the process, a potential range was to be sourced, in terms of leathers and manufacture, in Brazil. Sample shoes and samples of leathers were assessed for quality and workmanship by Research and Development, and they then made recommendations and suggested changes to the management team which may have had an effect upon the design.

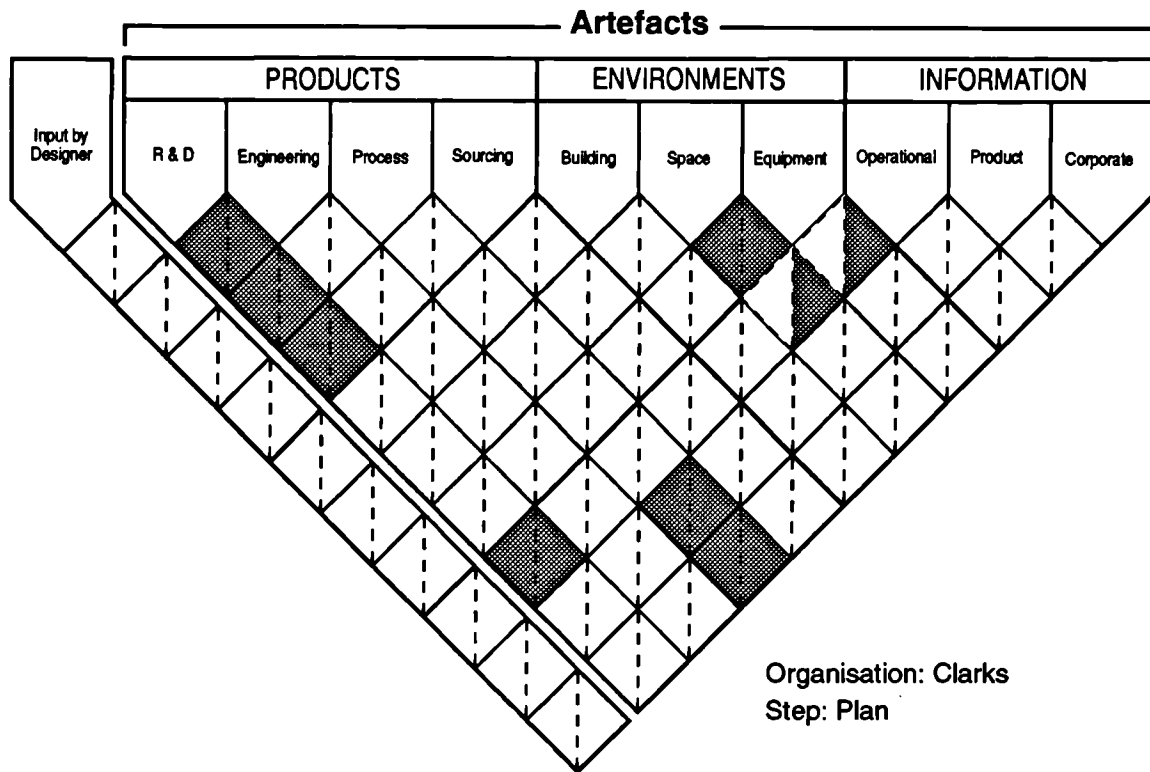


figure 11: Matrix 2 for Clarks, Plan step

Making technological improvements in the soles of shoes has been important at Clarks, particularly in men’s shoes with the “air sole”. As improvements and new developments come through from R&D they were whenever possible integrated into potential new ranges. In women’s shoes, this was sometimes viewed as a considerable constraint by range builders planning for new ranges. What appeared not to occur frequently was experimental work between R&D and Design outside the product planning process managed by range builders.

From Matrix 3

Matrix 3 looks at which individuals were personally involved. In the Evaluate/Advise/Plan steps in these six companies, the individuals involved were all, with the exception of W.H. Smiths, senior managers – chief executives, managing directors, marketing or merchandising directors/managers. The companies differed in their conventions over naming their senior managers as managers or directors. Those senior managers engaged in the marketing or merchandising tasks were apparently involved in more interchanges than chief executives or managing directors.

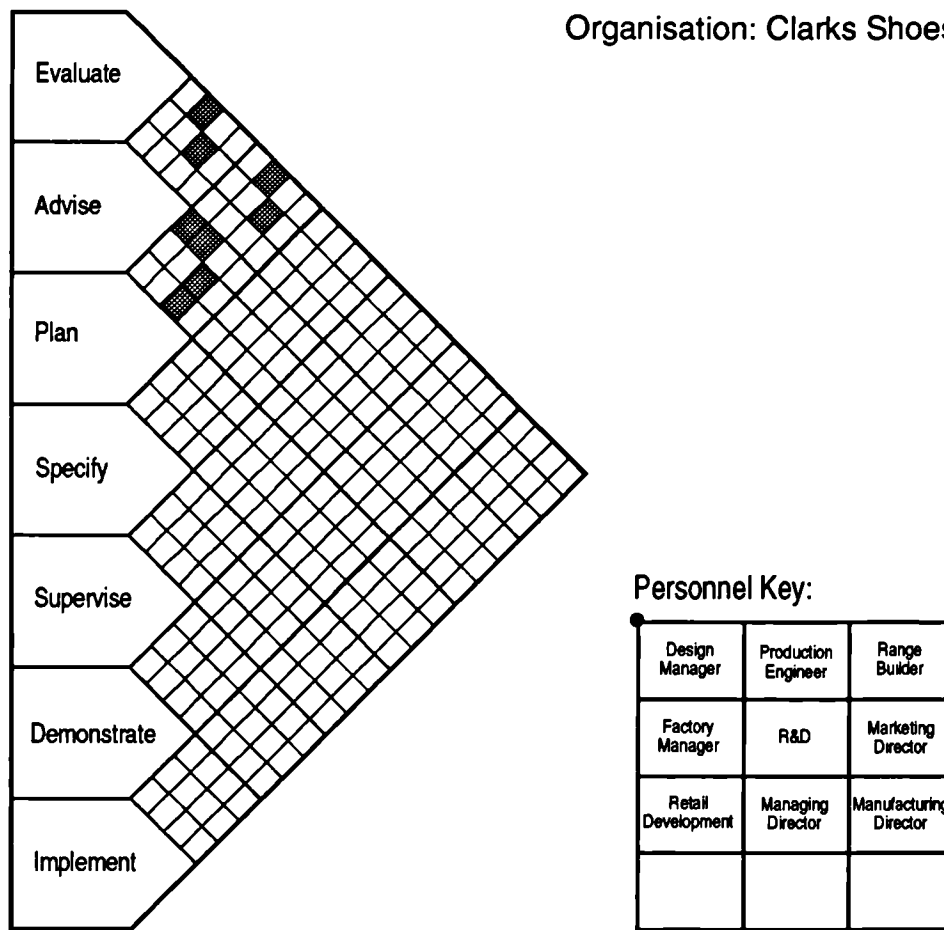


figure 12: Matrix 3 for Clarks, Evaluate, Advise, Plan steps only

However, something rather confusing was occurring as in many of the previous descriptions senior managers acknowledged design as an element and yet seemed not to acknowledge the effect of their actions in relationship to the design element. This is perhaps summed up best by the comment given earlier by one of the managing directors at British Rail, who said ‘design should be removed from its cocoon of exclusiveness’. So far, within these three steps as charted, design in reality does not appear to be so simply identified. In fact, in considering the entries into the matrices, it is perhaps doubtful whether it is “exclusive” at all.

The Second Three Steps, Specify/Supervise/Demonstrate

From Matrix 3

In the first three steps in Matrix 3, senior managers were in general interacting with each other. Who then was involved in the next three steps?

Certain senior managers were involved in some or all of these next three steps, but not the *most* senior. The individuals involved in more than one of the first three steps and involved in more than one of the second three were, for example, the Project Director, Engineering at Intercity and the Chief Executive of the Leisurewear division of the Contract Clothing Division at Courtaulds. Many individuals in these roles were involved at the

specification and demonstration steps but not at the supervision step. Their role was therefore more one of being reported to before final decisions were taken, giving go aheads to projects and handling financial control.

Who acted operationally in these three steps, and who was it who reported to individuals such as the Project Director, Engineering and the Chief Executive, Leisurewear?

If we look at Clarks Shoes, the Specify and Demonstrate steps are crowded with entries.

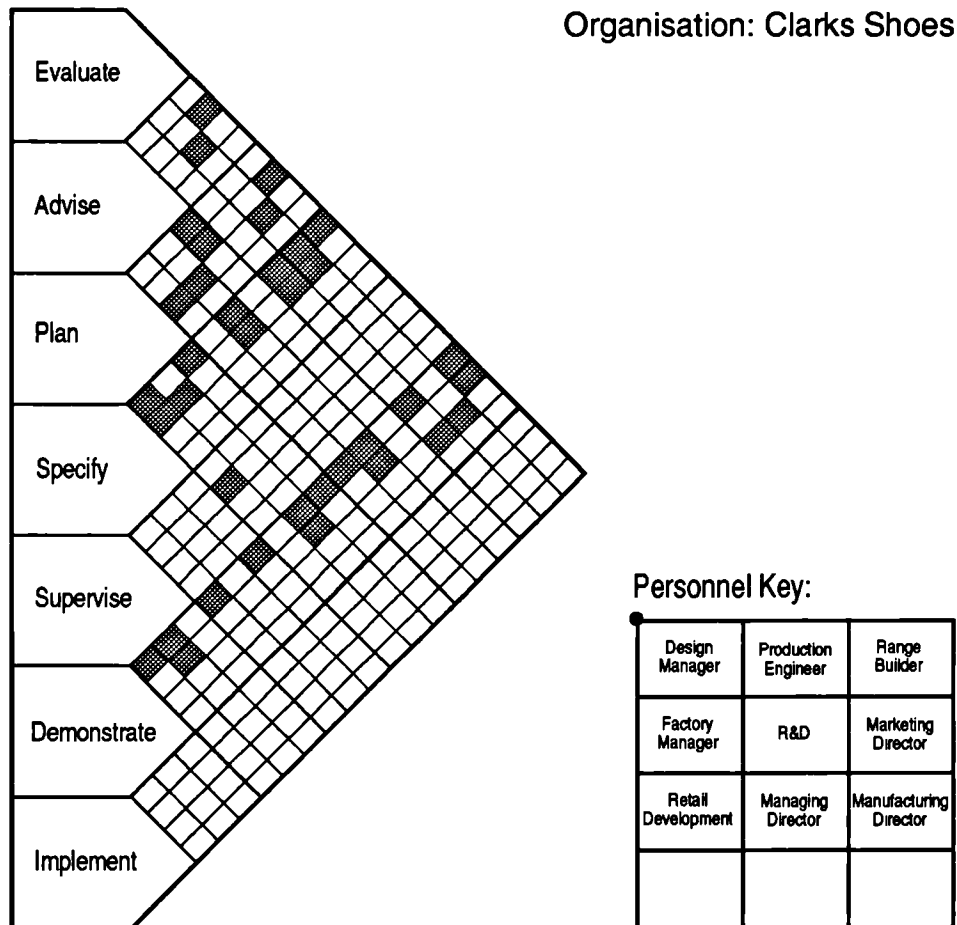
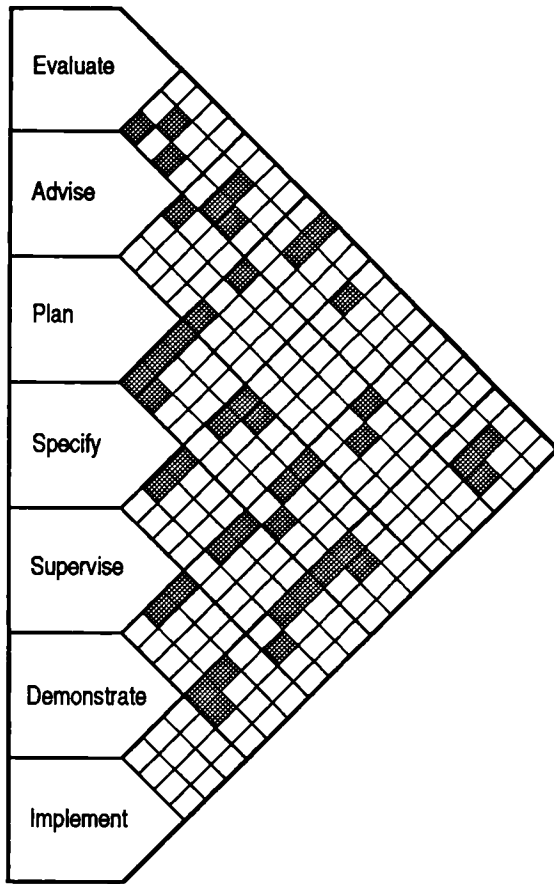


figure 13: Matrix 3 for Clarks, with all steps except Implement

Here the design manager, the product engineer and the factory manager become involved. The marketing range builder maintains his involvement as does the individual representing research and development. Here most upwards communication went via the marketing range builder and the research and development individual. However, the evaluation of potential ranges through making samples, the demonstration step, regularly brought the marketing director into play and occasionally also the managing director. In all six companies design managers and design consultants have many entries across the specification and demonstration steps. In Courtaulds, most of the interactions for design managers or design consultants were with factory managers and fabric technologists, while at BHS most interactions were with buyers and functional packaging.

Organisation: Courtaulds
Contract Clothing Division

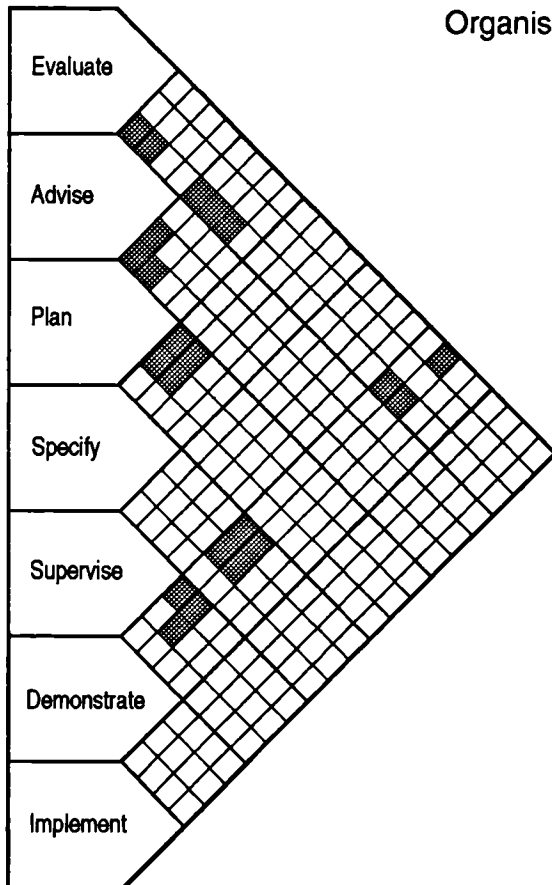


Personnel Key:

Fabric Technologist	Factory Manager	Design Director
Chief Executive South Wales	Chief Executive	Sales
Chairman		

figure 14: Matrix 3 for Courtaulds

Organisation: British Home Stores



Personnel Key:

XXXXXX Director	Buyer	Packaging
Marketing	In-house Designer	Design Consultant
Chief Executive		

figure 15: Matrix 3 for British Home Stores

At times when specifications and demonstrations of prototypes were to be evaluated against a plan, senior managers become involved. For example, at W.H. Smiths the development manager appears as an entry in Plan/Demonstrate and Evaluate/Demonstrate.

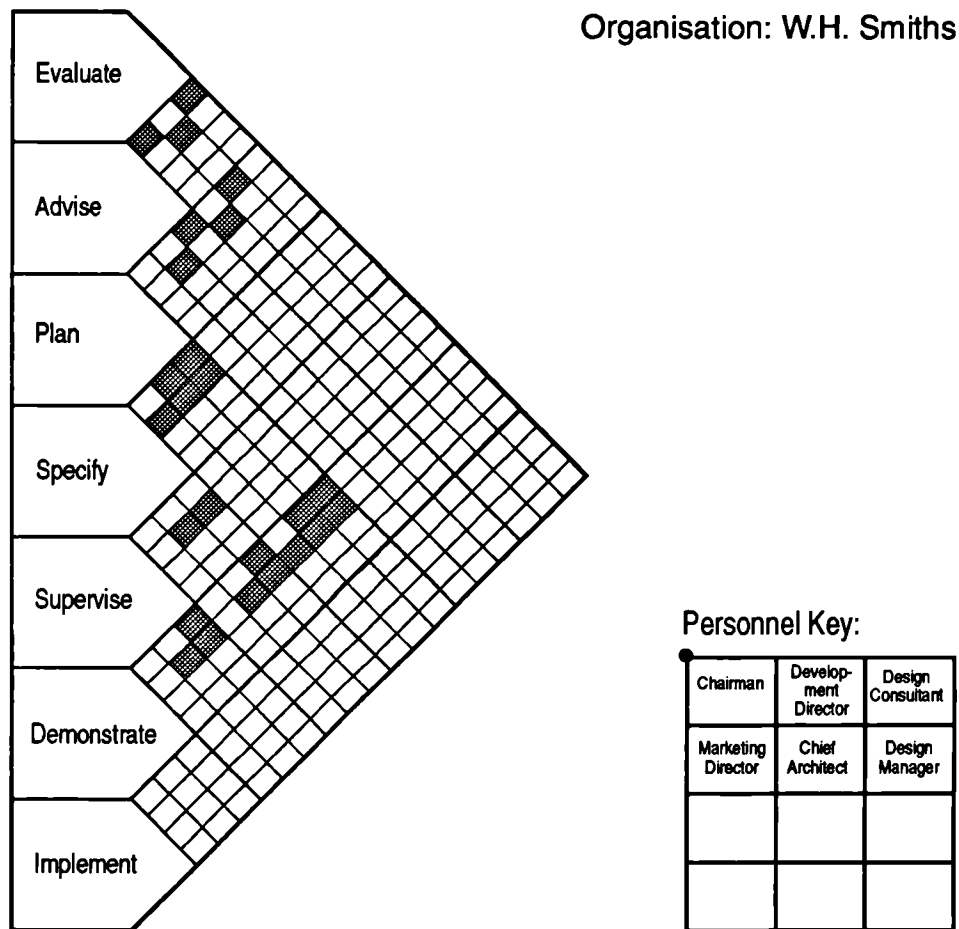


figure 16: Matrix 3 for W.H. Smiths

From the Interview Data

By turning to the interview notes and observations, we can learn something of the type of transactions in these three steps.

At Sealink, the operations director described how ships were being re-styled to provide a more pleasing atmosphere, a more functional use of space and a better trading environment. He also said that it was important that each ship be harmonious whole. On-board crew (other than ship's crew, Captain, engineers etc.) reported up to the operations director. (This was a recent introduction made as an acknowledgement that on-board staff were a passenger services resource.) The Operations director regretted, however, that short timescales had prevented consultation with on-board staff. Decisions on final choice of the re-styling design for a ship interior were taken by the managing director. This example suggests that on-board staff and their operating environment were considered separately.

A senior manager at Courtaulds, responsible for three factories in South Wales, commented that the relationship between the design studio and the sales teams (who shared a building in west London) and the three factory managers (based in South Wales) was

problematic because they only met when there were manufacturing problems. This senior manager was attempting to set up visits of a more general nature to improve communication.

A marketing and buying director within the W.H. Smiths group felt that overall the Smiths design policy was laudable, if a little bureaucratic. In his own business, however, he felt that the design manager and the external design consultants had gone too far down the “design” road and had incurred cost problems for him. On individual stores, although he conformed in principle to the external design consultant’s design concepts, in practice for implementation he used his own system. The product and merchandising controller, with the assistance of three draughtsmen, planned store layouts, positioned all merchandise, and determined displays and packaging size. They also had a construction section that put together new displays. This team was described to me as a vital internal planning resource and not in any way a design department. Operationally, this team appeared to be necessary though it did not fit into company policy on design.

There was a similar issue at BHS. In the re-organisation referred to earlier packaging had in theory become a part of marketing, however, for political reasons certain aspects had remained under the Director of Merchandise. Their one graphic designer, who had been in packaging, had moved to marketing, and all graphics, photography and design consultancy was now handled by marketing. There were eleven people left in packaging reporting to the Director of Merchandise. Eight had come originally from the paper industry and considered themselves to work on the functional side of packaging.

Traditionally packaging had been decided upon between this department and individual buyers (whose budget the packaging came out of). Discussions were held with buyers on the type of pack (bad customer handling was a major problem) and the relationship of the merchandise display to store fitments, that is, whether merchandise was boxed, sitting on a shelf, or on a hanger on a racking system. For example, in lighting, changing over to skin packaging had cut down the time at point of sale, because the sales assistant spent less time checking that fittings were undamaged. The packaging function handled the relationship with the manufacturers of the merchandise. Normally BHS sent packs to manufacturers but sometimes could persuade a manufacturer to install his own new packaging equipment. Audits on packaging were carried out by the Buying department. Functional packaging thought that was right, since packaging came out of the buying departments’ budgets, and therefore had to come within buyer’s margins. Amazingly the individual in packaging who described this process did not consider that anyone in his department was involved in solving design problems.

At British Rail, the Engineering Project Director talked of his experience with the HST (High Speed Train) project at Derby (British Rail’s engineering and R&D centre) where he had seen innovation fail due, in his estimation, to the fact that there was so much new technology which was untested that it was hard to pinpoint the cause or causes of the total failure of the project. In his current projects, the Class 91 Engine and the Mark 4 coach for

Intercity, he was determined to commission innovative work but only where it made sense and only where a good fit could be achieved with existing and reliable technology.

The Design Officer for industrial design who was based at Derby and involved in this project, in the design of the interiors, described how they had produced a mock-up of the Mark 4 coach in the workshop at Derby. For the Pullman he said he had produced two mock-ups, one to the brief they had been asked to work to by the sector, which was a logical extension of some present refurbishment work, and a second, which was a version that design consultants had considered to be more appropriate. When senior managers saw both mock-ups they walked straight past the mock-up they had commissioned, to the designer's alternative, declaring that this was just what they had meant! In conclusion, the design officer said, the formal policies were there, but most people knew how to operate outside them when appropriate.

Involvement of Design Managers and Design Consultants

It is clear that design managers and design consultants significantly enter into the frame in the Specify, Supervise and Demonstrate steps in interactions with senior and middle managers. The examples suggest that many formal and informal forms of control are employed by managers to regulate designers' activities. For example, specification would be an explicit form of control, whereas the use of short time scales (Sealink), distance (Courtaulds), and technicians (W.H. Smiths) are implicit forms, which perhaps could be referred to as tactical controls. The British Rail example demonstrates how design consultants and design managers become adept at using stealth to achieve favourable results for themselves and their teams. In BHS dividing the design tasks between two functions provides an implicit, politicised form of control.

The Final Step, Implement

From Matrix 2 and 3

Of all of the six companies, this step is only significant in the two manufacturing companies, Courtaulds and Clarks. Courtaulds Contract Clothing is vertically integrated: the chief executive of the Leisurewear division had all aspects of the business reporting up to him. At the implement step, the chief executive was involved in assessment and evaluation activities; no sales or design individuals were involved. During an interview with the chief executive, a request to visit some factories was met with great surprise: he was of the opinion that manufacturing bore no relationship to the design process. He did, however, agree to the visit.

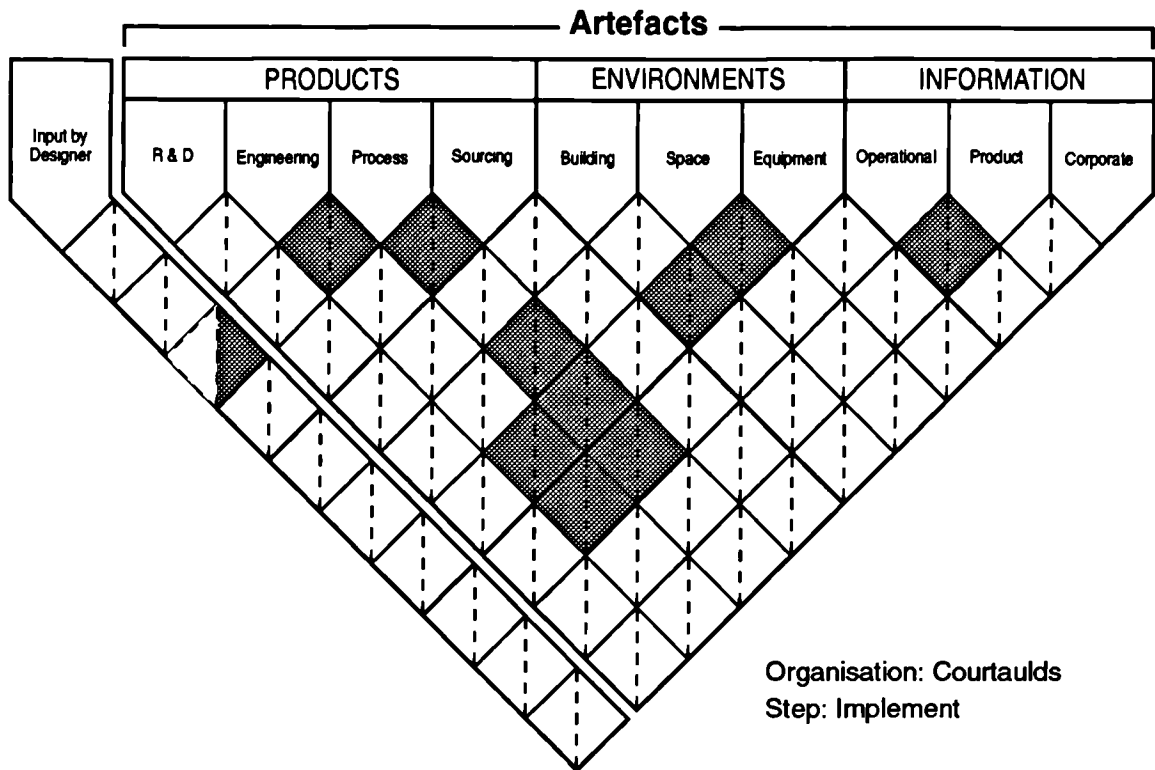


figure 17: Matrix 2 for Courtaulds, Implement step

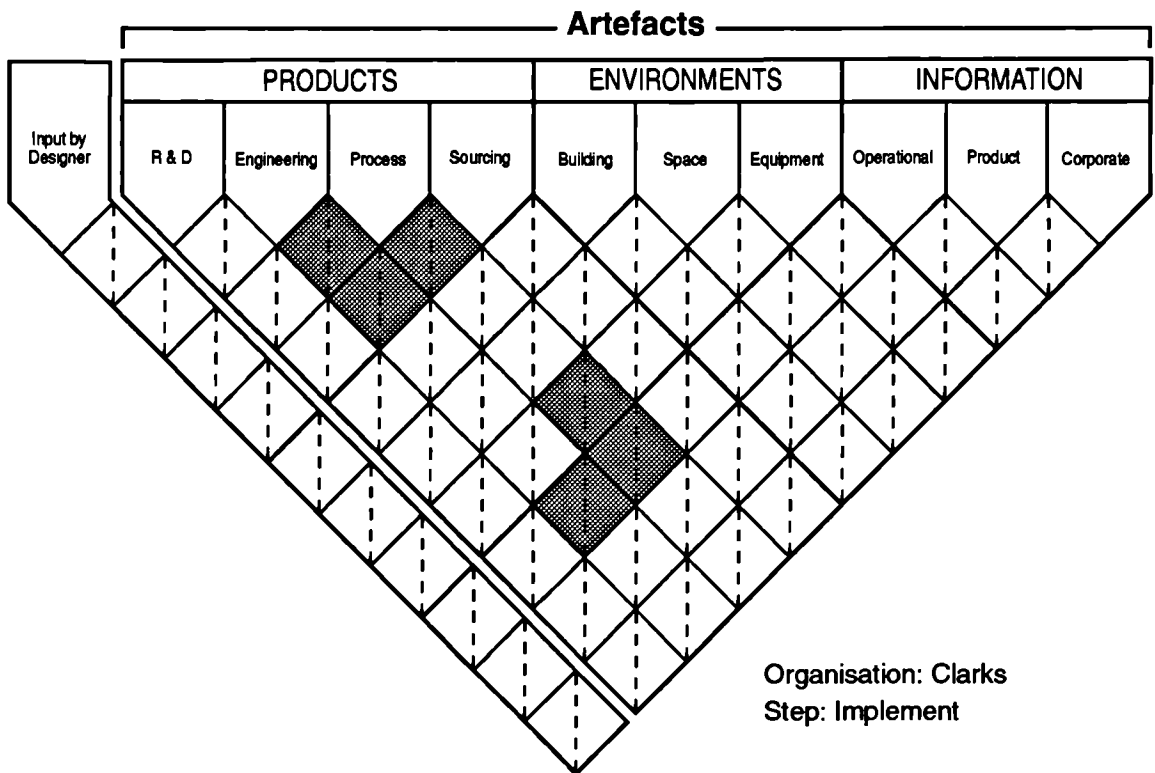


figure 18: Matrix 2 for Clarks, Implement step

Clarks was in three divisions, Marketing, Retail and Manufacturing. In the six steps already considered, the majority of entries into matrix charts have been individuals from the

marketing divisions. One exception was the project engineer who was based in manufacturing and reported to a factory manager.

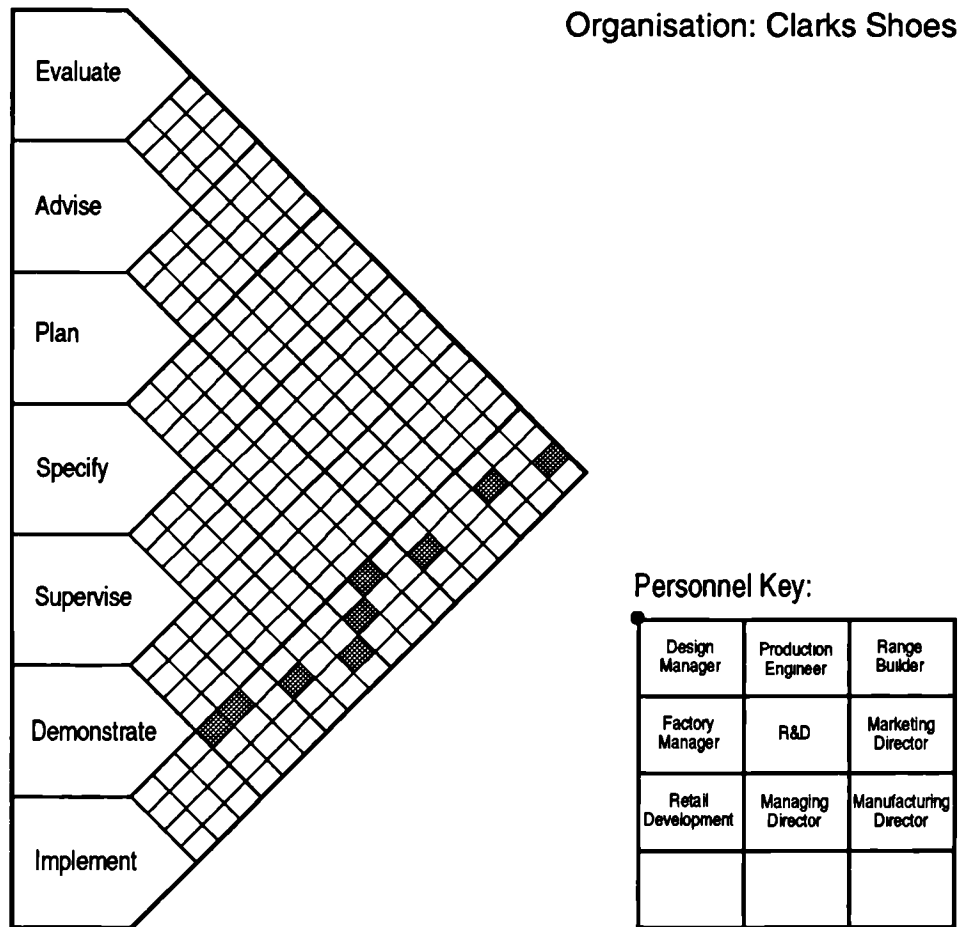


figure 19: Matrix 3 for Clarks, Implement step only

The product engineer sat at the point where the manufacturing and marketing divisions met. His task was crucial to product line success, as he took prototype shoes, known as pullovers, from the design studio or from research and development and interpreted these into shoes that could be produced on the line. This role could be seen as having great strategic importance, requiring an individual with understanding of product development as it is defined by both marketing and manufacturing. However, at Clarks strategic importance was not attributed to this role – product engineers had low esteem, low status and little influence. They found themselves in alliance with factory managers because of their reporting position and frequently in difficult relationships with designers and range builders. They made an interpretation of a prototype shoe that was appropriate to criteria defined by the factory manager. This situation suggests that although design development had officially ceased after the demonstration step, issues that arose from the needs of manufacturability affected the implementation step and the nature of the product that reached the customer.

MATRIX 2A: THE SUMMARY CHART FOR ALL SEVEN STEPS

A summary of these complex sets of decisions and actions is essential if we are to perceive any significance in the patterns of action.

The Matrix 2a chart is a summary chart. By adding up the number of entries on all seven of the Matrix 2 charts a range was arrived at which shows where activities are chiefly collected. It should be remembered that all entries are activities which affect the design development process, even though they may be in Research and Development, for example. The range was as follows:

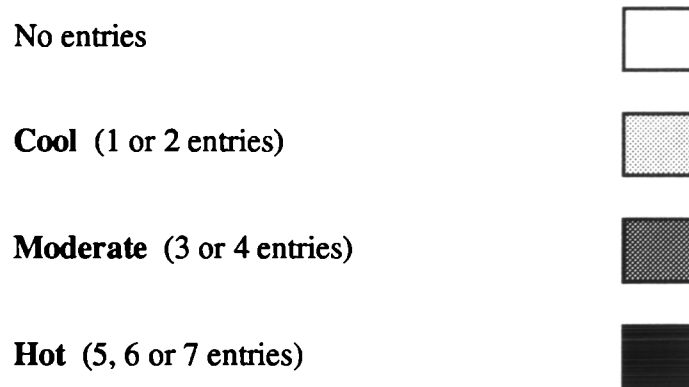


figure 20: key to Matrices 2a

Hot Spots/Cool Spots

We can consider Chart 2a as a representation of concentrations of activity and imagine this as a lattice of hot and cool spots, hot spots denoting greater instances of interactions within the seven steps of the design development process, and cool spots fewer instances of interaction. Represented visually, the summaries for the companies can be seen at a glance and compared against one another rapidly. The three levels are shown in shades of grey to allow the graduation of hot to cool spots to be seen at a glance. What are the implications of hot and cool spots? We will first identify the locations of hot spots, then consider hot and cool spots in the “input by design”, column and finally look at comparisons between companies with similar spreads of hot and cool spots.

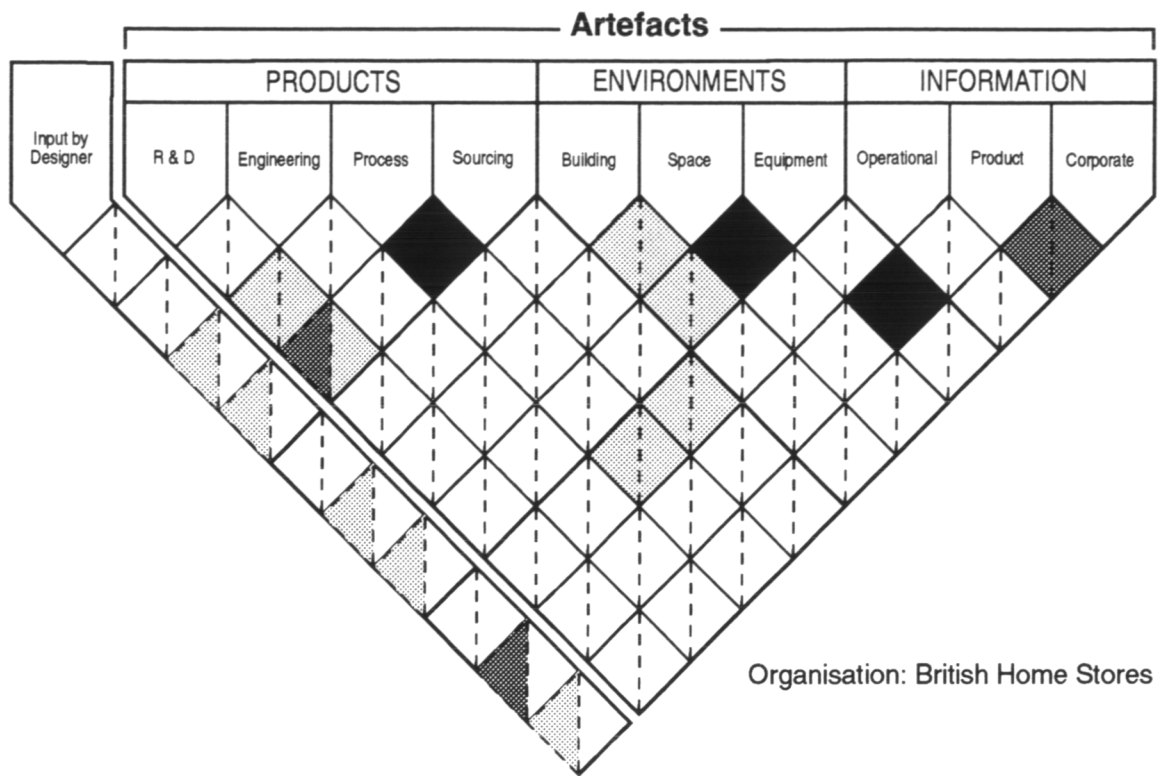


figure 21: Matrix 2a for British Home Stores

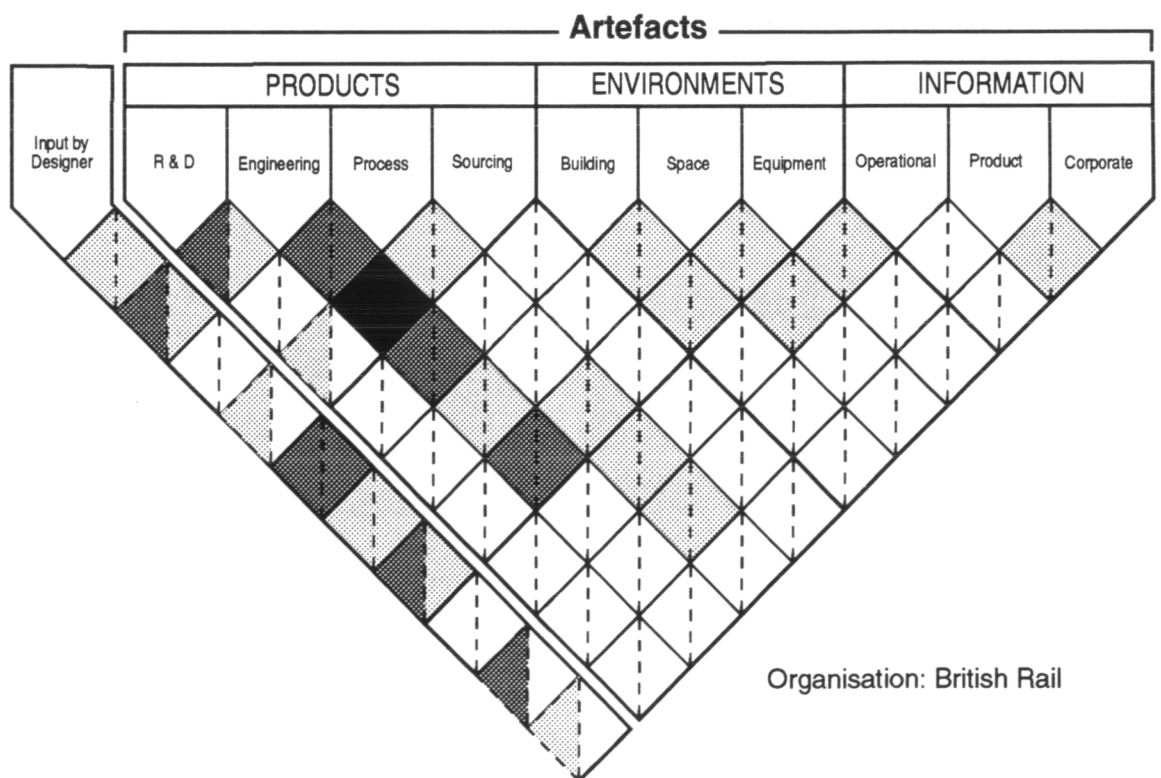


figure 22: Matrix 2a for British Rail

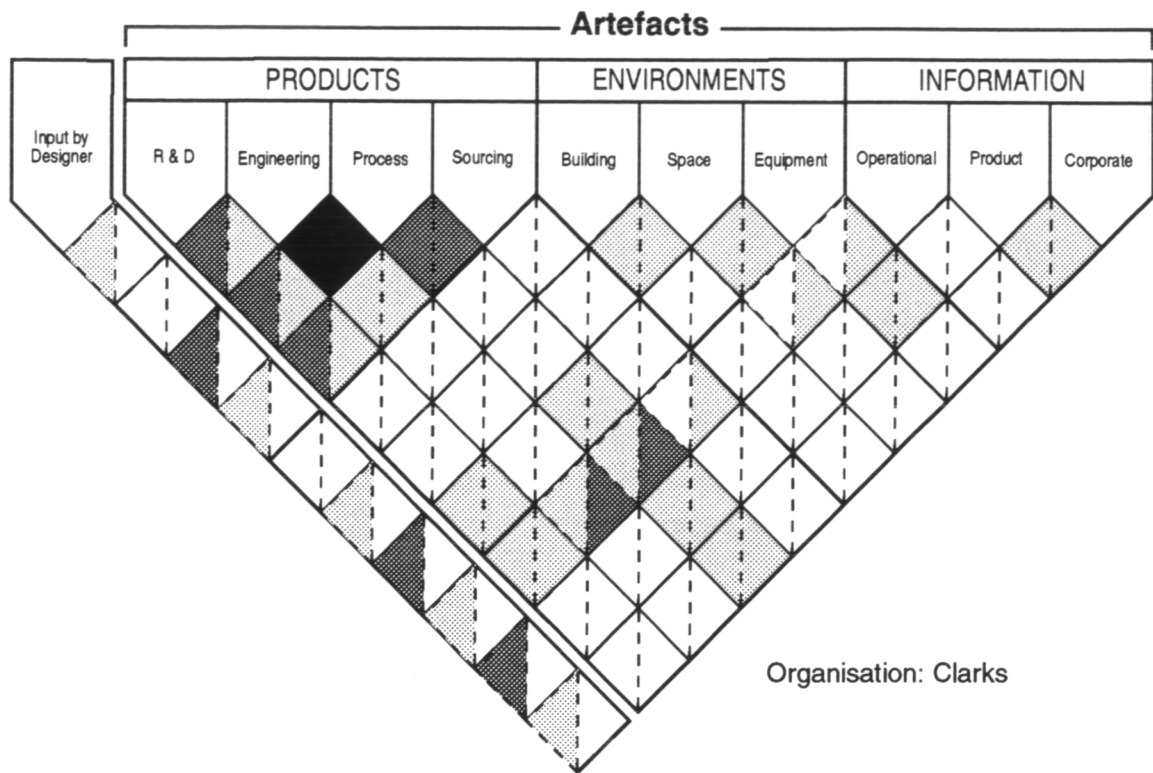


figure 23: Matrix 2a for Clarks

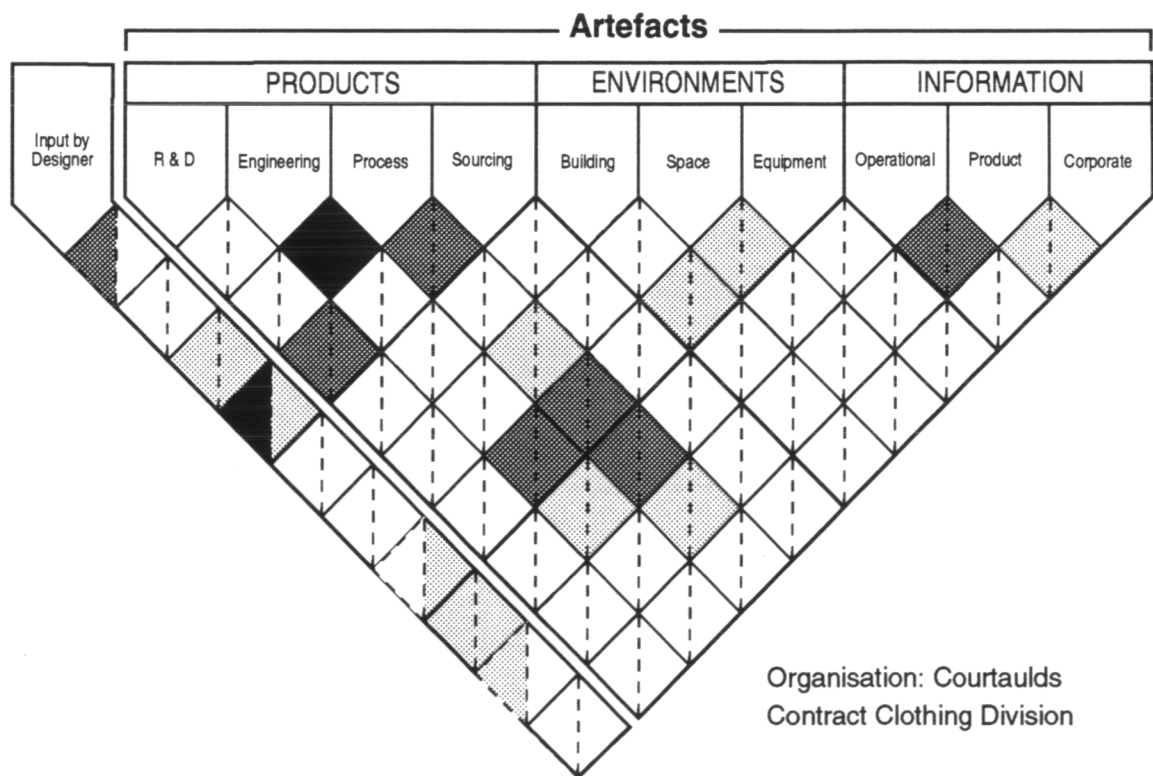


figure 24: Matrix 2a for Courtaulds

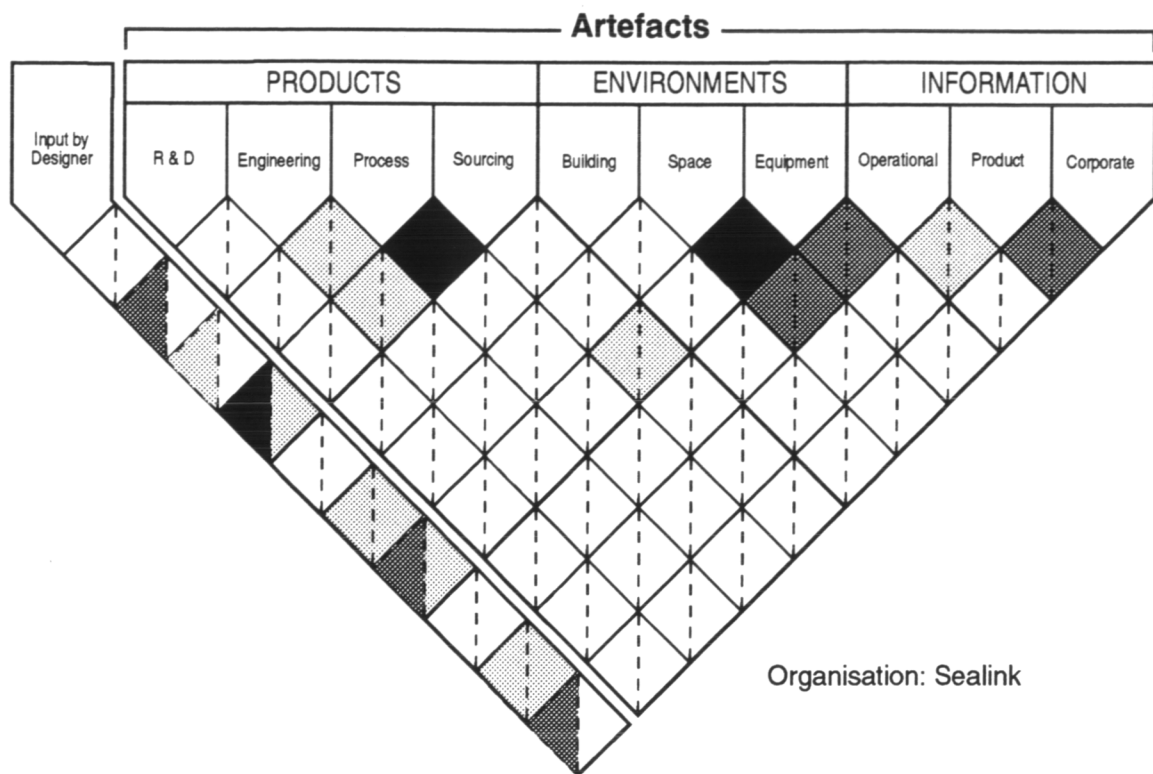


figure 25: Matrix 2a for Sealink

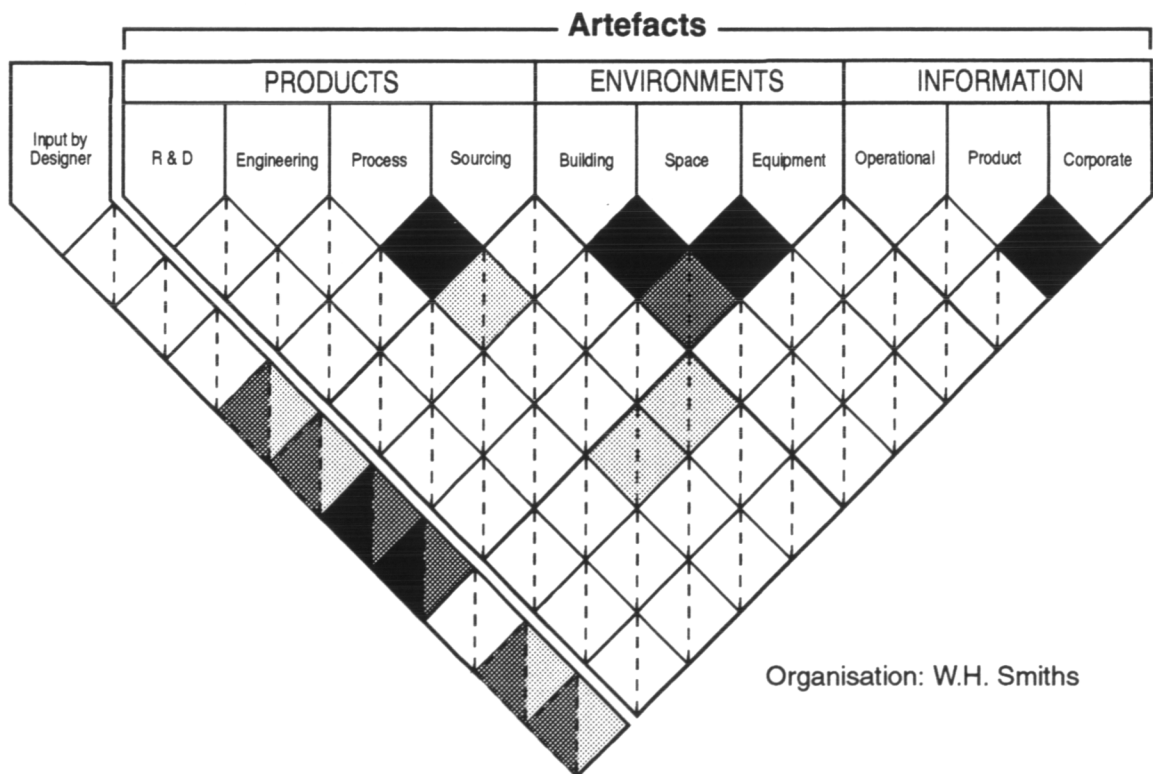


figure 26: Matrix 2a for W.H. Smiths

Hot Spots

The companies with the least hot spots are Courtaulds and Clarks, the two manufacturing companies, and a service company, British Rail.

The hot spots in all these three are interactions between Product, Engineering, Process and Sourcing. At Clarks and Courtaulds there is interaction between product engineering and product process, and at British Rail between product engineering and product sourcing. At Courtaulds, there is hot spot interaction on product sourcing from designers. The one-sided entry reflects the input designers made to sourcing fabrics and fashion ideas.

The remaining three companies, W.H. Smiths, British Home Stores and Sealink, all have more than one hot spot.

Sealink has two hot spots in interactions between product process and product sourcing and between space and equipment for environments. There is also a one-sided hot spot in the designer column, which records the activities of the naval architect in finding and evaluating ship yards to undertake ship refits.

British Home Stores displays one hot spot in interactions between product process and product sourcing and two in interactions between space and equipment in environment, and product information and equipment in environment.

W.H. Smiths displays the highest number of hot spots, two in interactions between building and space in the environment category and between space and equipment also in the environment category. There are two hot spots in interactions between product process and product sourcing and between product and corporate information. There are two one-sided spots displayed in the designer input column – one in space and one in equipment.

For all companies the interactions between product process and product sourcing, between product process and product engineering, and between space and equipment appear to be the hottest spots of management activity in the design development process.

Designer Hot Spots/Cool Spots

It should be noted that in displays of hot spots, no company has an equal interaction between design input and any other category. Three companies display designer hot spots, and there are only a total of four hot spots between them. Of these four hot spots two are in product sourcing, one is in space in environment, and one is in equipment in environment. This seems to suggest that although designers make important contributions to the design development process, since their interactions in hot spots are one-sided they are not exactly the key players in the process overall.

As we move down toward cool spots, more entries and interactions are displayed. There are four moderate one-sided entries: British Rail has two of these, the other two being in Sealink and W.H. Smiths. There are in total only seven one-sided entries above the mid-point whereas there are 29 one sided entries below it. It is also important to look for equal interactions between designer input and managerial input: we see only five equal interactions. They occur in British Rail, Courtaulds and Sealink. All are cool spots.

Predominantly “one-sided” entries are displayed in the design column which charts the activities of designers making input into the design development process. Typically this situation is one of the designer responding to a brief. In this situation, many decisions will have been taken prior to writing the brief and it is apparent that designers will not have been included in this pre-brief decision making process. From the entries displayed it is clear that designers make a number of inputs, spread in a broad, thin layer. In summary the number of hot spots is small with one-sided interactions, and there are many cool spots. It would seem clear that the designer sees far less of the entire design development process than do certain managers.

Clarks and British Home Stores display inputs by designers of the “responding to a brief” type. Courtaulds, British Railways and Sealink display a majority of inputs made by designers where there is no equal corresponding interaction. At Courtaulds, for example, there is a high input made by a designer in product sourcing. The chief executive of Leisurewear explained that designers were increasingly being used in sourcing for fabric handling and feel.

The inequality in entries with a hot spot on one side and a cool spot on the other needs further consideration. Designers appear to be both involved but also removed, to sit, as it were, on an island within the business.

Perceptions about design development can be seen to be significantly different between designers and managers. The Design Manager at Courtaulds described himself and his designers as “gleaners”, firstly collecting information on style, material and general feel and then formulating mood sketches and finally garment presentations. Contrast this with an aspect of design as described by the chief executive:

Fabric is another area where things can go wrong; even with computer pattern grading 75%–80% fabric usage is normal. There is the width that fabric manufacturers can make to. In T-shirts, for example, with horizontal stripes, a few inches width in the material can make the difference between three garment fronts or two. Things like bat wing sleeves [a large baggy cut around the shoulder], two pockets, not one, six pin tucks, where four would have done – all these issues become critical.

The designers in the studio do not appear to consider these sort of practical concerns worthy of mention; they are not in their perceptual field. It is as if, as designers, they are not part of the business in the same way as others, but a resource which the business can make use of. One consequence of this is that the designer cannot integrate with other functions. The designer sees only the same isolated portion of the process time after time and this portion, which is largely self-contained within design, becomes for the designer *the entire process*. Designer and manager cannot therefore share the same perspective and the situation of unequal interactions becomes self-perpetuating.

The Spread of Hot to Cool Spots in the Six Companies

A consideration of all six summary charts finds two clear categories:

- 1). Activity spread broad and thin; one hot spot and many cool spots.
- 2). Activity clustered; more than one hot spot and few cool spots.

1). One hot spot, many cool spots

Into this category fall both manufacturing companies, Courtaulds and Clarks. Both had design functions so they produced a high proportion of their design work in-house. It is clear from the broad and thin spread of entries that activity in design development was to be found in almost every facet of product development, and also that it would be very difficult to extract the discreet elements within managerial decision-making that contributed to the design development part of product development. A significant difference is evident between the manufacturing and service examples, which reinforces the notion that design decision-making is embedded in managerial tasks. British Rail provides an interesting example because the summary matrix looks similar to the two manufacturers and quite dissimilar from the service companies. British Rail did not at first sight fall into the category of a manufacturer since they had stopped manufacturing locomotives within the previous five years. But those same engineers still produced detailed specifications for other manufacturers. Senior managers and sector directors were moving towards a service perspective, with greater concerns for the customer, but the culture was a powerful one, slow to change, and still that of the engineer and the railway man. Design decision-making, therefore, was still conducted from the perspective of a manufacturer.

2). More than one Hot Spot and Few Cool Spots

Into this category fall both the retail businesses, W.H. Smiths and BHS, and Sealink, all three of which are service businesses. None of them had a design function that produced significant quantities of design, although all of them had some in-house design expertise. In British Home Stores there was one graphic designer in marketing who described herself as a “design administrator”. At Sealink there was the Naval Architecture Practice, a wholly owned subsidiary, which made most of the arrangements for the refurbishment to take place in selected ship yards. At W.H. Smiths there was a design manager with a small team of two or three people, and architects in the property division. Here it was possible to discern the effect of a design policy. It is clear, when comparing the summary matrix from W.H. Smiths with those of Sealink and British Home Stores, that the formal design policy structure did have an effect both on management activity and designer activity. In the W.H. Smiths matrix, in the “input by designers” column, there are no one-sided entries and no extremes of unequal interactions. Across the matrix in general, activity is more narrowly clustered and more concentrated. It should be noted that this is the only example where the existence of strong formal mechanisms was seen to have an effect.

MANAGEMENT ACTIVITY; DESIGN ACTIVITY

What can be learnt about contributions to the design development process from the summary hot spot/cool spot matrix?

In the first category (one hot spot, many cool spots) management activity is dispersed across many interactions and is in the cool range. So too are the designers' inputs in the cool range. In the second category (more than one hot spot and few cool spots) management activity is clustered and varied with both hot and cool spots. Designers' inputs are also varied, both hot and cool. Management activity is distributed differently in the two categories, but designers' activities are not, although it can be seen that the number of hot and cool spots tends to match or mirror that of the management activity.

Patterns of management activity in design development seem therefore to be affected by the type of business – manufacturing or service. Patterns of designer activity in design development are apparently less affected by the type of the business. There is a degree of consistency in the patterns of designers' activity across different types of businesses, which is not seen in the activity of managers.

The lack of consistency in the patterns of managers' activity across different types of businesses suggests that managers' activities in design development are undertaken within the stream of other activities, making it hard to recognise them as design activities. To illustrate this let us return to the description made by the chief executive of Courtaulds Leisurewear quoted earlier:

Fabric is another area where things can go wrong; even with computer pattern grading 75%–80% fabric usage is normal. There is the width that fabric manufacturers can make to. In T-shirts, for example, with horizontal stripes, a few inches width in the material can make the difference between three garment fronts or two; two pockets, not one, six pin tucks, where four would have done – all these issues become critical.

Earlier I presented this as a description of an aspect of design and used it in contrast to the description of design activities made by the design manager.

The chief executive of Leisurewear, in his description, was not explaining his activity as design decision-making, but explaining some of the critical variables in the garment industry. The description he gave me was preceded by his explanation of 'contribution to poor lines; a practice where customers negotiate their way out of taking all the stock they ordered if it is not selling.'

Fabric sourcing is not only about style and quality of fabric. In horizontal striped T-shirt fabric, if the fabric won't make three garment fronts, but only two and a half (which means two) he has to either waste fabric, the cost per garment going up, or change the style. The examples he gives are of changes of details in the overall design. But in these detail design decisions he has to take account of the predominant style and what he believes he can sell – a narrower T-shirt might make better use of fabric but if loose and baggy T-shirts are the

predominant style, he will not be able to sell the narrow ones. He then has to look for an alternative fabric manufacturer, or decide to accept high fabric wastage. He has to weigh up the variables and decide what action to take.

A decision like this would probably be described as having been taken on the basis of experience, that is, knowledge of the implications behind each of the variables, which we could call tacit knowledge. In considering whether, say, the reduction from six to four pin tucks is a good decision, an understanding of what is important in the overall sense or design of the garment would be vital. The pin tucks may be there to give a fullness to the garment, so making it loose without it being perceived as “baggy”. Or the pin tucks might be there to give tailored detail and a more traditional quality perception. In the first instance reducing the number of pin tucks would physically affect the looseness of the garment, though probably not critically, but it would not critically affect the perception of it. In the second instance, the reduction in pin tucks would not physically affect the shape of the garment but might well be critical in its affect on the perception of traditional quality. So reducing the number of pin tucks is a good decision in the first case and a bad decision in the second. Tacit knowledge has to be employed in weighing up the variables of change of style, change of fabric manufacturer, higher wastage, and so on. If the physical characteristics of the garment (the design) are changed, a decision in design is taken – but it is just one of the variables. Tacit knowledge will be employed in taking this decision and it is unlikely that this decision will be acknowledged as a design decision, but rather as a business decision. What we see recurring in these summary matrix charts are many activities that contribute directly to design development but which rely upon tacit knowledge of the business. These activities are wide-ranging, grounded deep within managers’ tasks. So we are seeing two different senses of design, an acknowledged sense of design in the activity of the designers, and an unacknowledged sense of design in the activity of the managers.

TWO SENSES OF DESIGN

Can the idea of two differing senses of design provide a framework for understanding these complexities and confusions? Can we apply the idea of two senses of design to explain the descriptions given above? When, for example, in BHS the functional packaging department was in discussion with buyers on the type of pack in relationship to customer handling and merchandise display, and did not consider that they were considering problems of design; when the Marketing and Buying Director at W.H. Smiths Do It All had his own internal planning resource which he did not consider in any way a design department; when the Sector Director at British Rail suggested that ‘there could be a period of hands-off during design development, but senior managers must be back at the critical point’; and when the Managing Director at Sealink, newly arrived from the brewery business, hired design consultants with expertise in pub design in preference to those with expertise in ship design; were these people making design decisions, or not?

Can the idea of two senses of design be applied to the apparent unequal interactions between designers and managers? The acknowledged design of the designers is a stereotypical understanding of design which we all recognise, one emphasising creativity, ideas, newness, and style. Design does not extend beyond this stereotype in any description of design given in the six companies. The stereotype is useful in understanding the design manager at Courtaulds when he described his team with such an abstract term as “gleaners”, collecting information about style, material and general “feel”, particularly in contrast to the Chief Executive who was worrying about the numbers of pin tucks and fabric usage.

We could describe the acknowledged designer as one who is legitimised to continually produce “design”, this design being tacitly understood by managers and used as a resource – rather like a raw material – in the process of developing an artefact. Therefore in the Courtaulds example we see the designers producing “style”, shape and feel and the manager optimising, making decisions on the variables of style and fabric use. The metaphor of an electricity generating station is useful in thinking about the shortcomings in this approach to design. Power production in an electricity generating station varies over a twenty four hour period because the consumption is not constant, and excess power can be stored until there is increased demand. Demand is measured by sophisticated devices developed to provide feedback on power use and future power requirements. In the case of design, no devices exist to provide feedback on its current or future use. In the “design station” supply continues regardless of demand, the user, in this instance the manager, being oblivious to the notions of inefficiency or storage. Greater knowledge of how this design resource is used, and of the relationships between supplier and user would be needed to change the present situation. The “two senses of design” provide a framework from which to begin.

Chapter 6: Questionnaire Study – The Organisation of Design in British Industry

INTRODUCTION

The previous chapter concluded with a description of design as a situation of acknowledged and unacknowledged design decisions – the “seen” and “silent” senses of design. The matrix charts provided an analytical framework from which both the acknowledged and unacknowledged contributions to the design development process become apparent. The summary matrix charts also point to the existence of different patterns in managerial contributions between the manufacturing and service industries, with some hybrid companies (such as British Rail, a service company displaying many of the patterns of manufacturing industry).

The key question this chapter addresses is what characterises situations in which there are acknowledged and unacknowledged design decisions, where the two kinds of design co-exist?

By this stage of the research work there was a good understanding or “feel” for a manager’s experience in relationship to design decisions. In the continuation of the study data suitable for statistical analysis was gathered. Methods were selected which were suited to analyses of individuals’ attitudes as well as of the general arrangements made by companies for managing design decision making.

SELECTION OF COMPANIES IN THE SAMPLE

The decision to look across both manufacturing and service industry sectors, rather than within one sector, was consistent with the early empirical studies. The focus could not have been narrowed to one industry sector, because there was no existing consistent research data on either the contributions of managers and designers in the design decision making process, or on the different requirements or practices of manufacturing and service industries. Because of these factors the decision was taken to maintain a broad focus, enabling the study to consider for example whether the contributions made by managers in design decision making were affected by industry sector.

Chapter four, the first chapter in this section, described the methods of managing design adopted by companies to maintain a formal commitment to design. All the companies had a declared commitment to design and an obvious question which arises is what differences, if any, occur in the procedures for design decision making and the management of new product/service development in companies which do not have a declared and formal

commitment to design. Clearly this could be answered if in this study commitment to design was not a criterion of selection.

The selection of companies was undertaken by a research assistant to eliminate any bias, and particularly to avoid either the inclusion or exclusion of companies known to have a commitment to design. His brief was to select companies from five industry groupings: Apparel & Textiles, Small Domestic Products, Engineering, Retail and Transport. One of the few constraints in the selection was that a company should be in a business where its products or services were visibly experienced by its customers. A manufacturer of micro-chips would therefore be excluded. From the initial selection, a short-list of companies was drawn up and fifty companies were approached. The approach was made by letter from the Chairman of the Design Management Committee at London Business School, Sir Peter Parker, to the chairman or chief executive of each company. Following this letter, the companies were contacted directly and the needs of the study discussed.

The needs of the study were quite particular as information was required on the individual attitudes of managers towards design as well as the company's management arrangements for design.

A one day visit would be made to each company, and during this visit each of four managers would be asked to complete a questionnaire during an interview lasting approximately one hour. The four managers were to be at senior or high/middle management level and represent marketing, finance, production or operations and general line management. Consistency of the position and function of managers across the entire sample of companies was important. In addition to the four managers, in those companies where a design manager or design director was employed, he or she would also complete a questionnaire in the same manner.

During the one day visit there was to be opportunity for general discussion, site visits to factories, shops etc. Relevant company literature would be used for background information.

SAMPLE SIZE

The sample size was dictated by the decision to conduct the questionnaire survey by interview. A questionnaire distributed by post would have accommodated a larger number of sample companies. However, since the earlier studies indicated a fair degree of organisational complication around the subject of design it was considered that data gathered this way would be unreliable and questionnaires would not necessarily be completed by the four targeted managers from the four functional groupings referred to above.

Another factor that affected how the study was conducted was that since the area of design decision making was organisationally complicated it would be likely that respondents would have questions that required answering before they completed a questionnaire. This

could entail interpretation on the part of the interviewer. It seemed the best way to eliminate the possibility of a range of interpretations was for one person to conduct all the interviews.

The target was set at one hundred completed questionnaires from twenty five companies within a time scale of six months.

Companies that participated in sample

As can be seen from the list twenty three companies finally participated, giving a total of seventy six completed questionnaires.

Manufacturing	Service
<i>Small Domestic Product</i>	<i>Non-retail</i>
Kutrite	Barclays Bank
Fisco Products	Hogg Robinson
Wedgwood	Watney Mann & Trumann
Royal Doulton	ODE
Pifco	United Transport
<i>Electronic/Mechanical</i>	<i>Retail</i>
Bomford & Evershed	W.H. Smiths Ltd
Smiths Industries	Boots plc
Adapt Vending Services	Waterstones
Initial Service	Pentos
<i>Textile/Apparel</i>	
Dorma CV Home Furnishings	
Charnos plc	
Warners UK	
Spencers Ltd	
Jaeger Holdings	

table 4: participating companies

QUESTIONNAIRE DESIGN

It should be remembered that the questionnaire constituted the third study in the research programme, and although broad for the reasons already referred to, its purpose was well

defined. The three principle areas of interest identified for the questionnaire were:

- 1). The structure and organisation of design
- 2). The financial and project control of design
- 3). The roles and characteristics of managers of design.

By asking direct questions under these three categories it was expected that data would be forthcoming which would give a far clearer picture of (a). design decision making processes, (b). the two senses of design, (c). the effect of formal design management arrangements, and (d). the extent of industry differences.

A consideration of how to ask these questions followed. If questions were open-ended, then apart from the need to code them by content analysis and the likelihood of losing in the process some of the richness, the outcomes might not be so very different from the three earlier studies in that they would further reflect the degree of organisational ambivalence established in the previous two studies. If pre-coded questions were used this would provide an opportunity to ask questions within the framework or set of assumptions already made and so would in effect test these assumptions. The questionnaire was therefore predominantly made up of pre-coded questions, checklist questions, some yes/no questions and some using an attitude scale.

Questions were designed to be clear, to be as short as possible, to be precise and not to lead the respondent in any one direction. The questionnaire was divided into six sections to lead the respondent gradually into the core issues and generally allow the completion of the questionnaire to occur comfortably during the interview. There is much in the literature of questionnaire design on the importance of the start of the questionnaire. One view is that it should begin on interesting but non-sensitive issues so in this questionnaire the first section covers company information which is non-sensitive and which allowed for a general discussion of the company and its business. The layout of the questionnaire was considered carefully and designed with the assistance of a graphic designer and was spiral bound into a booklet.

Choice of Attitude Scale

The attitude scale that was chosen requires discussion. Attitude scales can be either uni- or bi-polar: a choice of opposites is referred to as bi-polar. However, in the literature on questionnaire design it is pointed out that it is hard to be sure if a question truly represents opposites (Sudman and Bradburn, 1982); uni-polar scales are therefore to be preferred. Opinion is also divided over a mid-point in an attitude scale. Some argue in favour of a mid-point (Sudman and Bradburn, 1982) believing that respondents should not be forced into a choice. However, Sudman and Bradburn also argue the reverse, that response could inevitably be more superficial if a mid-point is retained. Another expert argues that the use

of a mid-point changes the measuring scale, by providing two response items; response to the scale itself and a “know/don’t know” response. He advocates the use of a six point scale.

The issue of using a mid-point scale or not in this particular questionnaire study was quite important. The argument can be made as follows. The inclusion of a mid-point in a scale allows managers to adopt a “don’t know” position, which might accord with an initial response to design decision making. However, the assumption made in the two senses of design is that managers frequently use tacit knowledge, and in this sense managers do “know” if they are given the opportunity for reflection. Not providing a mid-point therefore forces the managers to reflect before making a judgement, so allowing them to display their tacit knowledge.

Since the questionnaire would be completed by interview and the interviewer would be the same in every case, the decision was taken not to include a mid-point and to allow time in the interview for reflection. A six point scale was adopted, which allows the scale to be broken down easily into two or three categories in statistical analysis.

Testing the Questionnaire

The questionnaire went through a number of drafts and was pre-tested twice. The first pre-test was to fifteen individuals who completed the questionnaire and also gave their opinions on which questions were unclear, confusing or irrelevant. The second pre-test was run at Clarks. Twenty five managers attended a seminar discussing the content of the questionnaire, followed by completion of the questionnaire by each manager alone in his or her office, and not by interview. Feedback came either via notes made in the questionnaire booklet or by letters from individual managers. Some comments from managers reinforced the decision to conduct the questionnaire via interview, for example, “It seems to me there is a terrible problem of the definition of design! It means so many different things to different people and I found I was confused in parts of the questionnaire. I’m not sure what can be done about this.” Other comments were that it was over lengthy and too wordy, and asked for more yes/no type questions.

Following this pre-test, questions were reduced in number and simplified. The following is an example of a discarded question:

If your company employs engineers, could you say approximately what percentage of the total engineering work-force are called designers?

0%	5% or less	10%	25%	50%	75%	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 27: a discarded question

This question was typical of the kind of information that managers did not carry in their heads, and caused them discomfort. The question on this issue that was included in the final questionnaire was more general and much simpler.

C1) If you have designers working in your company, does the definition of designer relate to the following backgrounds?

Engineering	Design college	Apprenticeship	Other	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 28: question C1

Content of the Six Sections

As mentioned earlier the first two sections of the questionnaire were to lead gradually into the core content. They established the status of the company and the status of the individual respondent.

Section A: Company Information

Questions establish the industry sector, how many individuals are within the same function as the respondent, the structure of the organisation, and whether there is a documented corporate plan.

Section B: Personal Information

This section establishes the age and education of the respondent, his or her job title, the major tasks and activities associated with the job, and how long the individual has held this particular job.

Sections C, D and E: Design In Your Company; Finance and Design and Management of Design

These three sections represent the core content of the questionnaire and were arranged so as to allow a comfortable progression of conversation and the completion of the questionnaire during the interview, starting with a consideration of how design projects are understood and accommodated, and continuing through to how design projects are financially managed and whether the management of design is acknowledged in any form. In each section questions probe the organisation structure used for design, the responsibilities given to individuals for design and the beliefs of the respondents about design.

Section C: Design In Your Company

This section concentrates on the organisation and structure used for design projects, and establishes whether there are any formally qualified designers fully employed by the company and if so what qualifications or background these individuals have, and also establishes which managers play a central role in design decision making.

The matrix studies suggest that senior managers are actively involved in the early stages of design and new product development, for example in the Evaluate and Plan steps they were more active than were the designers. Questions such as the two given below were included to establish who is acknowledged as carrying accountability for design.

C3) In your company are there people whose job carries accountability for design, but who are not called designers?

Yes No N/A

C4) If your answer was Yes to the question above, where does their expertise lie?

Engineering	Marketing	R&D
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales	Publication	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 29: questions C3 and C4

The Use of Design Policies and Guidelines

The review of the design management literature, the preliminary study on the forms of managing design and the matrix charts all reveal a belief in the importance of the use of documentation as a control mechanism. Most usually associated with design are product specifications, design policies and design guidelines. The extent to which documentation was present in each participant company was considered in a series of questions.

C6) Is design considered in a section of your company's corporate documents?

Yes No

C7) Is there any form of design manual in your company?

Yes No

C11) Is there a separate document (from those mentioned above) for specifications?

Yes No N/A

If No, proceed to question C14

C12) If your answer to the above question was Yes, do the specifications cover any of the following?

Product	Supplies	Room sizes	Equipment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature	Light	Working environment	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 30: questions C6, C7, C11 and C12

C14) If you do have access to formal design documents (manuals, specifications, etc.), how often do you refer to them?

	Daily	Weekly	Monthly	6-monthly	Annually
Corporate identity manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procedures for design projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 31: question C14

These questions ascertain how much documentation exists, but the more interesting issue is how much the existence of documented formal methods affects individual opinions about design. For example, do greater amounts of documentation lead to a perceived increase or decrease in the importance of using design in new projects? Does an abundance of documentation affect individual perceptions about the complexity or interactive nature of design in new projects? The following set of questions was included to answer these questions.

C16) When your company launches a project involving design, is it structured in the same way as any other project?

Yes No

C17) Would you please rate a project involving design in terms of its complexity and its interactive qualities

Complexity					
Low					High
1	2	3	4	5	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Interactiveness					
Low					High
1	2	3	4	5	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 32: questions C16 and C17

In the interviews conducted in companies with a commitment to design, three statements were often repeated. A question concerning these was included.

C18) To what extent do you agree with the following statements?

	Disagree					Agree
	1	2	3	4	5	6
Design must be tightly controlled from the top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The design process can act as a catalyst in many projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design should be a central function in any organisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 33: question C18

Section D: Finance and Design

The matrix study indicated that senior managers were involved at all stages of decision making. We may assume that they take key financial decisions in new projects including financial decisions affecting the design content of new projects. However, this form of financial control is only one issue; another financial issue arises over the design studio in those companies with in-house design. How much financial control is given to the design function? Can they influence overall financial planning to any degree?

D3) In your opinion, is it preferable for the design function to be centrally controlled?

Yes No Uncertain

D9) If your company has a design function, how much influence do you consider it has when it comes to allocation of resources (people, money, materials, etc.). We ask you to answer the question at two levels: specific and general.

Specifically concerned with design	Influence					
	Low 1	2	3	4	5	High 6
Financial expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staffing expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Within the company generally	Influence					
	Low 1	2	3	4	5	High 6
Financial expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staffing expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 34: questions D3 and D9

The matrix study indicates that senior and middle managers, whether formally or informally, are active in the monitoring and maintaining tasks surrounding design. Financial monitoring and maintaining is a powerful tool. Who wields this power?

D5) In your company, whose budget finances a design project?

	Entirely	Partially	Not at all
Your own budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your job budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D6) If you are discussing a design project, do you believe it is important to exercise greater budgetary control than you would with non-design projects?

Yes No

D7) In your organisation who approves decisions on project expenditure?

	Individually	As part of a team
Design studio manager	<input type="checkbox"/>	<input type="checkbox"/>
New product development manager	<input type="checkbox"/>	<input type="checkbox"/>
Production manager	<input type="checkbox"/>	<input type="checkbox"/>
Project manager	<input type="checkbox"/>	<input type="checkbox"/>
Marketing manager	<input type="checkbox"/>	<input type="checkbox"/>
Sales manager	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

figure 35: questions D5, D6 and D7

It was important to know whether the practices on design decision making within the company reflected the opinions of the individual managers. Given the opportunity to change current practice would they be likely to do things differently?

D10) In your opinion should the following people have any influence on the allocation of resources to design or to projects involving design?

	Influence					
	Low 1	2	3	4	5	High 6
Design studio manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New product development manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Production manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marketing manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 36: question 10

The questions in this section were aimed at locating the individuals who controlled the budgets in new projects, and who are therefore powerful in the shaping of new projects and, within that process, design.

Section E: Management of Design

This section addresses the roles for and responsibilities of design managers or design directors. Since it was unlikely that all participant companies would have such individuals, many questions in this section were designed to enable respondents to give their opinions about aspects of the management of design.

E8) If you were to be involved in selecting a design manager or director, would you consider design expertise or managerial expertise to be the more important?

Design expertise more important

Managerial expertise more important

Both equally important

figure 37: question E8

E9) To what extent do you disagree or agree with the following?

The Design MANAGER should:

	Disagree					Agree
	1	2	3	4	5	6
Develop design awareness within the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Develop and encourage new products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Act as a catalyst for others as they make decisions about design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oversee design in the company "hands-on"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Re-style existing products in order to add value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Design DIRECTOR should:

	Disagree					Agree
	1	2	3	4	5	6
Develop design awareness within the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Develop and encourage new products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Act as a catalyst for others as they make decisions about design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oversee design in the company "hands-on"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Re-style existing products in order to add value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 38: question E9

Also included in this section was a question concerning the seven steps of design development that formed the basis for the matrix charts. The question asked for a rating of importance for each step. Since the majority of managers who had participated in the matrix study were more active in the first few steps and less active in later steps, it was useful to ascertain whether questionnaire respondents would rank these early steps as more important.

E10) How important do you think the following activities are in achieving good design management?

	Importance					
	Low 1	2	3	4	5	High 6
The evaluation of artefacts or products in relation to objectives set out by the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Providing professional advice or seeking professional help after an evaluation process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Planning the strategies for artefact or product development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drawing up specifications as part of the development process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supervising, monitoring and evaluating day to day decisions in the design process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensuring that artefacts or products are fully tested during the development process by models or samples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If the organisation is a manufacturer, involvement in the full or part production of the artefact or product in relation to quality control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

figure 39: question E10

The last question in this section was open-ended and asked managers to give an opinion on what they believed would generally improve the use of design in industry. This question was included principally to see whether the use of the formal methods, advocated in the literature and by the “design committed” companies, would be frequently cited.

Section F: The Future

There were just five questions in this section which served to bring the interview to a close. Many of these questions were open-ended and all focused on the future roles and responsibilities of a design manager or director. An example was: “If you were to be involved in the choice of a design manager or director, what would you consider to be the main focus of the job over the next five to ten year period?”

THE USE OF STATISTICAL ANALYTIC METHODS

Two methods were adopted. The initial analysis of the questionnaire used the Statistical Package for the Social Sciences (SPSS), which is a well known set of pre-packaged data processing techniques and statistical operations. The other method was multi-dimensional scaling (MDS), using the Guttman-Lingoes series of multivariate statistics, MSA 1. This method of analysis was adopted because it is appropriate in the analysis of the attitudes of

individuals (Elizur and Guttman, 1976; Canter and Rees, 1982). A description by Brown and Sime provides a simple and concise summary of MDS techniques.

In summary, MDS techniques represent the degree of similarity amongst items in terms of Euclidean geometry, the association between items, say responses to questions, are plotted as points in an array such that the greater the similarity, the shorter the distance between any two points. The great advantage of these procedures is that they facilitate the discovery of patterns in data that may not be of the more traditional dimensional kind... Another advantage lies in the visual representation of data. Typically, MDS procedures have output plots as part of their library of routines and... such maps display data in a visually communicable way that is easily comprehensible... MSA 1 provides a plot of subjects or types as points in a multi-dimensional space, such that those having the most similar profiles are closest together. The programme also gives separate plots for each variable or facet in terms of which the individuals have been coded. At present there is a programme size limitation to MSA 1 i.e., matrices are confined to 99 individuals, 50 variables, and 20 categories. (Brown and Sime)

ANALYSIS

This section of the chapter will concentrate upon the results of the two analyses, SPSS and MSA 1. The SPSS analysis will be discussed first, with a summary of the results and a closer look at some of the more interesting of these results. Details of MSA 1 analysis follow, which was used to explore aspects of the data in relationship to differences between manufacturing and services industries. Finally there will be a summary of the results and the conclusions drawn from them in relationship to the previous studies.

Statistical Significance

Many of the tables included in this section do not represent statistically significant factors. Here statistics are frequently used to describe situations and to note variations and differences between groups. For example, in the utilisation of in-house or consultant designers (table 5) the table demonstrates that product design is more likely to be conducted in-house, whereas in the design and refurbishment of buildings the project is more likely to be given to a consultant. Using statistics in this way as a descriptive tool is essential in understanding more about why, for example, a manager in a service company, who is most frequently involved in projects where design decisions are focused around building stock and refurbishment issues, would have a very different set of criteria about design than would a manager in a manufacturing company. Factors of statistical significance arise in obvious areas in the issues of the level of accountability of designers and in the importance of design to companies, where there is a statistical significance between those companies which have a design manager and those which do not. Those with a design manager believe that designers are more accountable and that design is more important.

Sections A and B

Results

The discussion of results proceeds sequentially, beginning with sections A and B and then moving on through sections C, D, E and F.

Industry Sector

Respondents were asked to indicate whether the company was in one of the following five sectors. The response was as follows:

Apparel	11.6%
Retail	19.7%
Transport	2.6%
Electronic	13.2%
Other	50.6%

The original intention was to compare various sectors within manufacturing and service industries against one another. However, the sample spread rendered this unrealistic so the sample was regrouped first as follows:

Service	19.7%
Retail	17.1%
Manufacturing – Apparel/Textile	21.1%
Manufacturing – Domestic Products	22.4%
Manufacturing – Electrical/Mechanical	19.7%

Subsequently service and retail were grouped together as were the three manufacturing sectors to give:

Service	38.2%
Manufacturing	61.8%

This classification was used in later stages of the data analysis.

Respondent Profiles

The study had set out to gather data from a number of functions so as to make comparisons between functions on attitudes towards design. The function profile was:

Marketing	26.3%
Operations	26.3%

Production	18.4%
Finance	17.1%
Design	11.8%

The status of respondents was split almost equally between the titles of manager and director. Just under half (47.4%) held the title of director while the rest (52.6%) held the title of manager. 88% of the respondents were male. 80% of respondents held a first degree or HND (Higher National Diploma) but only a few (18.4%) held postgraduate qualifications. 14% held accountancy qualifications. 50% of respondents had been on short courses during the time that they had been employed by their companies.

Section C

This section, Design In Your Company, concentrated on the use of designers and the general arrangements for managing design.

The Existence and Use of documentation.

A question was asked on the existence of an annual corporate plan so that a comparison could be made between the general existence of documentation and the existence of documentation concerning design. 68% of the companies produced an annual corporate plan. 61% of respondents said that design was referred to somewhere in the company's corporate documents. In the interviews where this issue was discussed, design was referred to either in the annual corporate plan, the annual report or in mission statements and publicity material. In almost half of these instances (38%) a dedicated design manual existed. Once again, during interviews where this issue was discussed, the design manual was frequently the corporate identity manual, consisting of logos, typefaces, page layouts and colour ranges.

The design management literature emphasises the desirability of formal procedures, for instance documented guidelines, as an aid to the management of design in new projects. However, only 17% of respondents could say they had such documents. 79% of individuals said they had no access to any form of documentation, whether design manual or design procedures. Did all these companies, therefore, consider design unimportant? Not at all – most respondents believed that design was important in their companies.

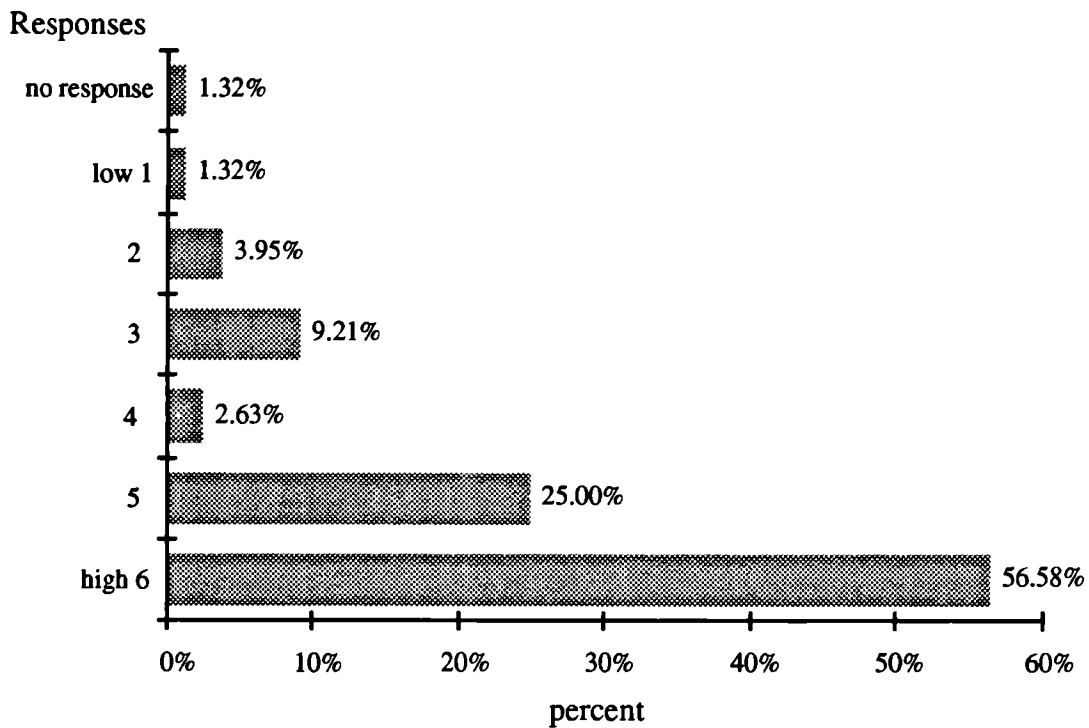


figure 40: responses to question C15

It would seem that the implication made in the design management literature that formal procedures for the management of design are an essential factor in the commitment to design, is not borne out in practice. However, as further analysis reveals, which will be discussed later in the chapter, the mention of design commitment in the company's corporate documents does appear to affect managers beliefs about how important design is to their company.

Specifications

The existence of specification documentation was significant. 65% of respondents claimed that specifications for products existed and 38% claimed that there were specifications that were used in interactions with suppliers. Specifications were also more frequently referred to, by those that had access to them, than were design manuals or guidelines. In interviews where these issues were discussed, clearly managers considered specifications a form of design documentation, it was also clear that respondents did feel comfortable with formal specification documents, whereas respondents did not feel comfortable with the idea of documents about formal procedures for the management of design.

Designers in the company

Designers employed by companies were almost equally divided between those with an engineering background and those with a design college background (34% engineering, 35.5% design college); few companies appeared to employ both (11%). This might be accounted for simply by the size of the companies in the sample, particularly in the manufacturing sector, where medium-sized companies predominated. However, that so

few companies employed both types of professional designer reinforces the notion of different understandings of design discussed in chapters one and two. Boundaries around the two professions of design are closely guarded by their professionals, to the extent that they are mutually exclusive, and it appears as if this has an effect upon arrangements for design and design capacity within companies.

Accountability for Design

In considering how to frame questions on the extent of the role of managers in the design decision making process, the word “accountability” was selected in preference to “responsibility”; this was particularly important when asking in whose realm design decision making was located. The Oxford English Dictionary definition of accountable is ‘liable to be called to account; a form of responsibility where the individual will be judged on the rationale of an action or series of actions and the outcomes of these actions.’ Responsibility is defined in the dictionary as ‘a charge, trust, or duty for which one is responsible’, which is more direct, specific and pre-determined than “accountable”.

A high number of respondents (93%) said that there were non-designers in the company whose job carried accountability for design, with the marketing function topping the list.

Functions Accountable for Design:

Marketing	63.2%
Engineering	42.1%
R&D	34.2%
Sales	23.7%
Publication	21.1%
Other	36.8%

The level of accountability believed to be carried by designers in the company is shown in the bar chart below.

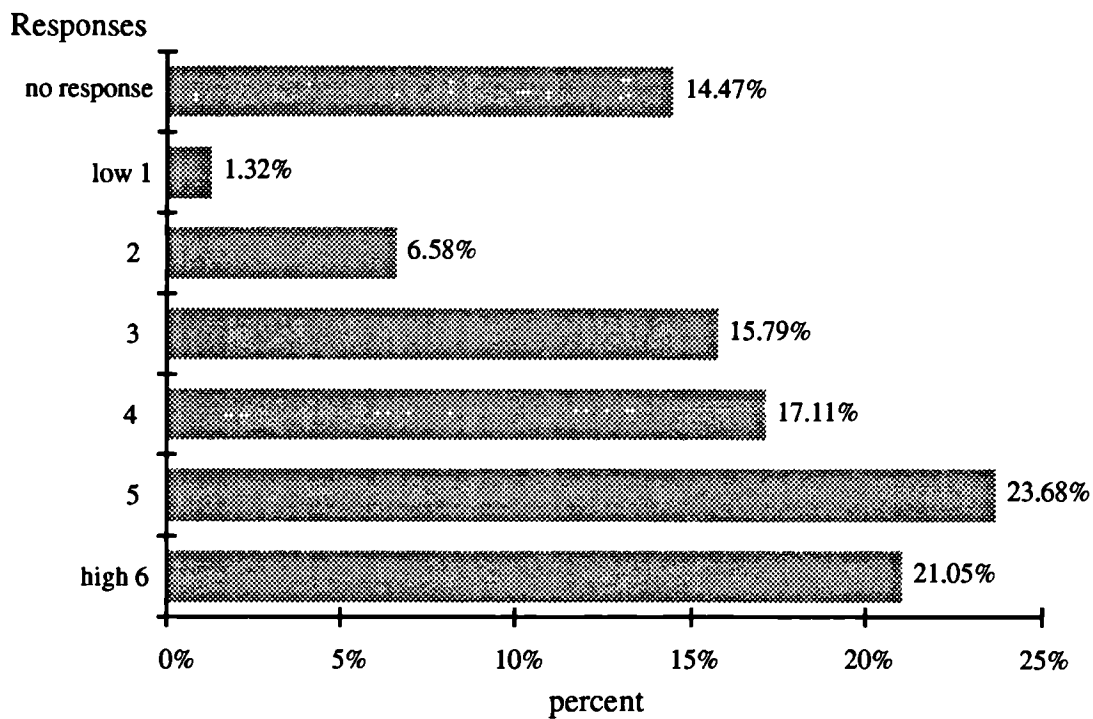


figure 41: responses to question C2

It is clear from this that opinion is varied, but overall designers are considered to have some accountability.

The issue of accountability was explored further in attitudes toward projects involving design. Design projects are not considered to be structured differently from other types of project, though they are considered to be quite complex and interactive. In interviews where these issues were discussed, complexity seemed to arise from the number of iterations required within the overall project and the resulting number of detailed changes. This also affected interactivity as so many people needed to be involved in the detailed changes.

Complexity and Control

Respondents generally believed that design activity should be centrally located, either as a function held at the centre, equally available to all, or in cases where a central function was inappropriate, within the decision making reach of senior management.

This would seem to be in accord with the recommendations made in the design management literature. From the accompanying interviews it does appear that respondents' opinions reflect the arrangements within each company, but tempered by acknowledgement that projects involving design can be or even need to be complex and messy. Certainly in those companies where design was part of a single function, for example production, then the projects involving design appeared not to be given an opportunity to become complex or interactive. Design was understood in these companies as a single focus, most usually surface styling, decoration or colour range.

In Chapter 3 we saw that managers who championed design frequently referred to design activity as a catalyst in decision making. When asked about this, respondents were in

general agreement that design could as a catalyst in decision making. It is hard to give a precise definition of what a “catalyst in decision making” is understood to mean, but most managers in interviews recalled situations where designers had presented a set of models or solutions to a problem or brief and that this had generated an increase in activity levels on the project and an increase in focused discussion which ultimately led to a resolution, an agreement either to proceed or to terminate a project.

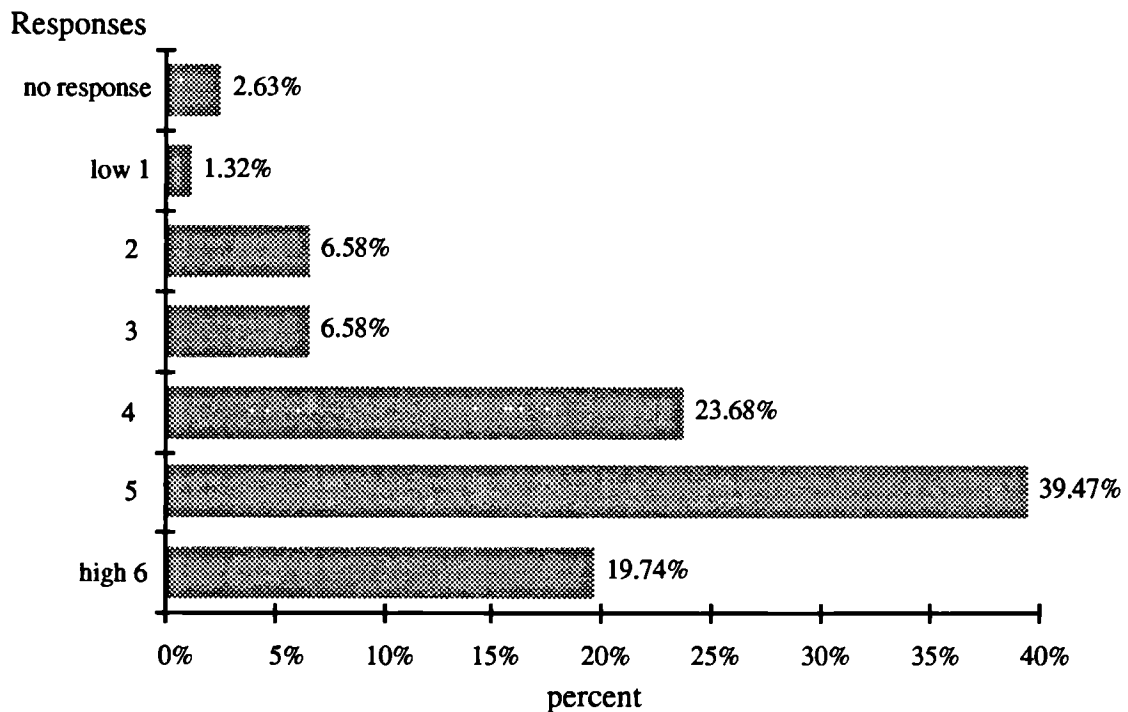


figure 42: responses to question C182

Using Consultant or In-House Designers

Is it more likely that consultant or in-house designers will be used in projects? Respondents were asked for their opinions on the use of in-house designers or consultants in three different project types: the design of products (function and styling); the design of environments (offices and shops); the design of information (product information and promotional, advertising and corporate material). The tables below show that for product projects, all four project aspects are more likely to be carried out by an in-house resource, although in R&D the use of consultants is fairly frequent. In environment projects the responsibilities are more likely to be split, with building stock and refurbishment aspects of a project going to consultants and planning and equipment aspects being undertaken by an in-house resource. Whereas there are many differing requirements and specialised contributions needed in product and environment projects, in information projects there are fewer specialised contributions required. The audience for the information project becomes a determining factor, that is to say, whether it is a TV or national advertising campaign, a local or store-based campaign, or an annual report or literature for shareholders. It is more likely, though hardly significantly so, that promotional and corporate information needs are

handled by consultants. Operational information is most likely to be managed by in-house resources, and to a lesser degree so too is product information, which includes the literature accompanying a product (instruction manuals and leaflets on product ranges).

Project Type	In-house		Consultant		Project Aspect
	Mean	Median	Mean	Median	
Product	4.5	5.5	3.5	4	R&D
	4.0	5	2.3	2	Engineering
	3.9	4	2.3	2	Production
	3.7	4	2.3	1.5	Sourcing
Environment	2.3	1	4.1	5	Building Stock
	2.6	2	3.9	4	Refurbishment
	3.0	3	2.7	2	Planning
	3.4	4	2.5	2	Equipment
Information	3.6	4	2.5	2	Operational
	3.9	4	3.1	3	Product
	3.5	4	4.1	5	Promotional
	3.0	3	3.6	4	Corporate

table 5: use of design: in-house or consultant

In the product category, projects included almost all the activities of design engineers, but it was most unlikely that they would be involved in the design of environments or information. Traditionally, design engineers have always been an integral part of a manufacturing work force. However, most apparel manufacturers also rely on in-house teams of fashion and textile designers, because of the frequency of new product lines serving seasonal changes in the market.

Environment projects regularly required the expertise of the interior designer and the professional architect. Traditionally many service industries had very large architecture departments, but in two of the companies in the sample, the job of chief architect had been metamorphosed into that of design manager. The new job consisted of wider general responsibilities, but a much smaller department – in one instance the down-sizing was from approximately 300 to 45 personnel, significantly changing its role¹. The new role was less

¹ These two instances reflect a general trend towards the closing of in-house architecture departments in favour of using both consultant architects and interior designers. Interior design consultants have experienced approximately five years (1984-89) of very rapid growth, as many service industries simultaneously cut their in-house facilities and embarked upon major facelift projects.

one of line management of an architectural facility and more one of an advisory role within the company and a negotiating role to set up contracts with architectural and design consultancies.

The use of both in-house and consultant designers in the information category suggests that the in-house designers are understood to be less prestigious than the consultant. It would appear that there is a high probability of prestigious work going out to the consultant. The link here between the company, its information needs and advertising agencies should be taken into consideration. Generally reference is made to two types of graphic work, "above the line" and "below the line". "Above the line" work is prestigious and frequently a company will use consultant advertising agencies for this work, who in turn will commission graphic and media consultants to work with them.

Summary

Managers' perceptions about the general structural arrangements made for design projects and the role of designers is summarised in the following key points.

- 1). Design is important to companies.
- 2). Design is frequently made reference to in a section of the company's corporate documents.
- 3). Design manuals setting out standards for design or documents outlining formal procedures for managing design are not usual, and where they exist, few managers have or want to have access to them.
- 4). It is perceived to be preferable for design activities to be controlled from the centre of the organisation.
- 5). Non-designers are accountable for design, and these individuals are most likely to be from marketing or production.
- 6). Projects involving design are believed to be complex and interactive.
- 7). Design is believed to act as a catalyst in the project decision making process.
- 8). Preferences for in-house or consultant designer are dependent upon project type.

In this section the conclusions reached are that managers are both aware of, and in control of, design. Structural arrangements for the management of design are none too clear. Though control is considered to be best held centrally, day to day accountability is actually carried within the appropriate functions. The arrangements made for the use of designers seem to be simply assessed on a project by project basis.

Section D

Finance and Design

This section of the questionnaire was directed toward establishing how finance was designated for design projects, the origin of budgets, and which individual or group of individuals gave financial approval.

Questioning the origins of budgets perplexed managers, many of whom decided they could not answer because they were unsure about how finance was assigned to design projects. However, the table suggests that while a department budget or a special project budget might be used, it was more likely to be centrally-funded budget.

Deployment	Function or Departmental	Special Project	Central Dedicated
Entirely	17.1%	22.4%	28.9%
Partially	21.1%	15.8%	27.6%
Not at all	15.8%	14.5%	10.5%
No response	46.1%	47.4%	32.9%

table 6: origin and deployment of budgets

Although some respondents were unsure about arrangements in their own company, when asked for their own opinion on financial control of design projects 67% of respondents believed that financial control of design should be the responsibility of those at the centre of the organisation, which suggests that this is considered a senior management responsibility.

Financial Approval and Influence

Financial approval is as likely to be made by one senior individual as by a team of senior managers. In interviews respondents cited the managing director or the CEO as the most likely senior individual. As part of a team, the most often cited person to be involved in decision making was the marketing manager.

Respondents described some of the arrangements for financial approval during interviews. In one electronics company, any project where the projected budget might exceed £50,000 had to be sanctioned by the CEO. In another manufacturing company finance for new projects was committed by a Group Marketing Committee. This company had a design studio which reported to production. The design studio had an annually allocated budget for day to day costs, with no provision for new project start-up costs. In one mechanical engineering company, the chairman and managing director chaired the Product Policy Group. This chairman had very strong beliefs that a budget restricted development and consequently there was no fixed budget. However it is interesting to note that the marketing

director in this company expressed concern over their ability to innovate: he said he believed that everyone in the company thought it vital to innovate but that their design flair was slipping and that they were concentrating too much on quality control. Perhaps too much influence from the top can act as an inhibitor and *no fixed budget* can be as easily equated with *no budget* at all as with no restrictions on budget.

Function	Decision Making		No Response
	As Part of a Team	Individually	
Design Studio	15.8%	11.8%	72.4%
New Product Development	36.8%	9.2%	53.9%
Production	27.6%	3.9%	68.4%
Project Managing	13.2%	5.3%	81.6%
Marketing	46.1%	11.8%	46.1%
Sales	23.7%	3.9%	72.4%
Other/Senior Management	–	43.4%	56.6%

table 7: actual decision making for financial approval

In those companies where there was a design function, questioning respondents about the financial influence of the design function drew an uncertain response. A few respondents believed the design function had quite high influence over their immediate staff, day to day finance and some design projects. However, the financial influence of the design function beyond the design studio was low. Respondents felt the design function had little influence over financing projects generally, and a question on the design studio making any contribution to general matters of finance struck respondents as faintly ridiculous. Another question, included to make comparison with actual practice, asked respondents for their opinions on who should have control of financial approval. Opinions reinforced the authority of marketing, while recognising the importance of the new product development manager (though many companies did not have such an individual or function).

Opinions on Decision making for Financial Approval		
	Median	Mean
Marketing Manager	5	4.7
New Product Development Manager	5	4.2
Design Studio Manager	4	3.7
Project Manager	4	3.6
Production Manager	4	3.1
Sales Manager	3	2.8

table 8

Budget Problems on Projects

In the two earlier studies, individual managers had expressed opinions about the issues that caused projects to run over budget, including:

- unpredictable production costs due to the length of the development period
- a lack of common goals between managers and designers
- a lack of research and development investment
- insufficient information from the designer

Nine of these kinds of opinions were set out as statements and respondents were asked to agree or disagree with them. Responses varied and no one particular issue attracted more attention than any other, although a number of respondents queried one statement which read, “budget problems are caused by insufficient information *from* the designer”. Respondents suggested that it would be far more likely for budget problems to be caused by insufficient information *for* the designer. Had these respondents been designers this would not have been unexpected, but they were not and interestingly they were split between manufacturing and service companies.

Summary

Managers’ perceptions about arrangements for financial control are summarised in the key points listed below. There is a lack of clarity over the origins and deployment of budgets but it is marginally more likely for design to be funded by a centrally resourced budget.

- 1). Financial control of design is believed to be the responsibility of those individuals at the centre of an organisation.
- 2). It is common for financial control to be the responsibility of one senior individual, frequently a managing director or CEO.
- 3). In the situation where a team of senior managers takes financial control a key player will be from the marketing function.

- 4). A design function is unlikely to have much financial control over itself and even less financial influence within the company.
- 5). In an ideal situation, managers believe those who should have most financial influence in projects involving design would be from marketing and new product development.

The structural arrangements made for managing design seen in section C and those for financial control seen in section D are consistent. Structural arrangements in the previous section appeared none too clear and that lack of clarity is reinforced in this section for example in the uncertainty of budget origins and budget deployment. Furthermore the belief in the extent of the role of the centre is maintained as is the limited role of design.

Section E

Management of Design

This section concentrates on the design function itself and the roles of design managers and design directors.

The Design Function

The first requirement was to establish how many companies had an individual with the title design manager. Half the respondents said there was a design manager in their company. Another requirement was to ascertain where the representation for Design at Board level lay:

Design Personnel	Non-design Personnel	No one
19.7%	22.4%	57.9%

table 9

Because of the existence in some companies in the two previous studies of both a design director and a design manager, a question was included to establish differences between the two jobs as understood by managers. Only one of the companies had both a design manager and a design director and the question on the difference between a design manager or design director caused most respondents bewilderment. However, most used their general knowledge of the different roles between a manager and a director in giving their answers and most completed the question.

Roles	Design Manager		Design Director
	Mean		
Develop design awareness within the company	Mean	4.6	5.6
Develop and encourage new products	Mean	4.5	4.6
Act as a catalyst for others as they make decisions about design	Mean	4.7	5.0
Oversee design in the company 'hands-on'	Mean	5.1	3.5
Re-style existing products in order to add value	Mean	4.6	3.8

table 10: important roles for design managers and directors

Consistent with the general difference between a director and a manager, the design director is expected to play a lesser role in overseeing the day to day management of design than the design manager. In the case of the design manager, beyond the role of day to day management of a design studio, there is little variance in the importance of the other roles. For the design director, the most important role is to develop design awareness within the company and, beyond this, to act as a catalyst for others as they make decisions about design.

In the development of new products there is effectively no perceived difference between the manager and the director. On this basis, it is perhaps clear why few companies finance design directors and are instead content with a design manager.

The role of design manager was considered by those respondents whose companies had design managers to be not particularly frustrating and to carry a medium amount of power and reward. The general sense from respondents in interviews was that the job of design manager fell somewhat outside the cut and thrust of the business. Nevertheless they believed that in selecting a design manager, getting a balance between design and management expertise was important.

On the question of whether to work with in-house designers or consultant designers, respondents would rather work with in-house designers than consultants. If they were given the responsibility for the creation of a design development team they would choose predominantly in-house designers.

Design Teams			
In-house	Consultants	Equal Mix	No Response
51.3%	22.4%	13.2%	13.1%

table 11

In one of the few open questions respondents were asked to comment upon what they felt would improve design management in industry. Opinion was fairly evenly split between those who considered that designers' knowledge of management and particularly finance and production techniques should be improved, and those who considered that it was managers who should be educated to know more about design. It is fair to generalise that respondents believed that there was a need for greater cross-functional understanding.

The Seven Step Framework

The questionnaire provided an opportunity to test the seven step framework used in the matrix chart study. A question was included in this section that asked respondents for their opinions on how important the seven steps were to good design management. The table demonstrates that all seven were considered to be important, but two were considered to be more important than the rest, steps 1 and 6.

	Seven Steps	Importance (mean)
Step 1	The evaluation of artefacts or products in relation to objectives set out by the company	5.4
Step 2	Providing professional advice or seeking professional help after an evaluation process	4.8
Step 3	Planning the strategies for artefacts or product development	5.2
Step 4	Drawing up specifications as part of the development process	5.1
Step 5	Supervising, monitoring and evaluating day to day decisions in the design process	4.9
Step 6	Ensuring that artefacts or products are fully tested during the development process by models or samples	5.3
Step 7	If the organisation is a manufacturer, involvement in the full or part production of the artefact or product in relation to quality control	4.7

table 12: seven steps in managing the design development process

Step One

The evaluation of artefacts or products in relation to objectives set out by the company.

Step Six

Ensuring that artefacts or products are fully tested during the development process by models or samples.

Completed matrix sets show that in all six companies, senior managers are involved in step one, and again in step six, though in the latter step their role is often an evaluative one. The least important steps were considered to be steps 2, 5 and 7.

Step Two

Providing professional advice or seeking professional help after an evaluation process.

Step Five

Supervising, monitoring and evaluating day to day decisions in the design process

Step Seven

If the organisation is a manufacturer, involvement in the full or part production of the artefact or product in relation to quality control.

The matrix charts demonstrate that steps 2 and 5 are principally the preserve of designers, whether in-house or consultant. Completed Matrix 2 and 3 sets show that there is less interaction in these steps between designers and managers. Step 7 is rated as the least important step in managing the design development process. For most companies, production is not included when considering design development and is consequently considered as an implementation facility. This fracture can also occur between other aspects of the product development cycle, for example, capital investment decisions and design development. The issue is discussed in *Dynamic Manufacturing* (Hayes, Wheelwright, Clark, 1988) where the evolution of management thought stands accused of embracing the scientific and analytical to a degree that has excluded the values of the integrity of the artisan. With these values now lost as a resource, management teams are reduced to managing quality with a series of “band-aids”. They write on quality as follows:

Bad quality no longer was regarded as an embarrassing indictment of one’s skill and integrity, to be attacked and eliminated whatever the cost, but simply as another problem to be dealt with through quick fixes: re-work stations, “acceptable quality level” agreements. (Hayes, *et al*, p.57)

The sentiments expressed in *Dynamic Manufacturing* bear comparison with the idea of seen versus silent design. The fracturing of the design development process in effect denies a management team access to the tacit knowledge it possesses.

Summary

Managers’ perceptions about design management, the design function, and the roles of design personnel are summarised in the key points listed below:

- 1). The roles of developing design awareness and acting as a catalyst for others as they make decisions about design are considered to be the most important roles for a design director.

- 2). Developing and encouraging new products is not considered to be a high priority for either a design manager or a design director.
- 3). There is a preference for in-house designers in managerial-led team projects.
- 4). In the seven step framework, step 1 (the evaluation of artefacts or products in relationship to set objectives) and step 5 (good testing during development of artefacts or products by models or samples) are considered to be the most important steps.

FURTHER ANALYSIS

The need to analyse the data by functional groups and industry sector was discussed earlier in this chapter.

It will be recalled that the matrix charts plotted significantly more contributions made by managers to the design development process than managers appeared to acknowledge and significantly fewer contributions from designers than they themselves perceived. Charts also indicated differing patterns between managerial contributions in manufacturing and service industries.

Analysing the statistical data by functional group and industry sector allows us to establish, for example, whether the function in which a manager is located affects his attitudes toward design. Perhaps a degree of difference is to be expected, say, between production and marketing. In interviews, a degree of rivalry and on one occasion open hostility was expressed between production and marketing managers. One particular production manager considered insufficient time was allowed to iron out production problems on new designs as a direct result of the marketing function's inability to carry risk. The production manager described how the individuals in marketing would sit on a new product range, not giving the go-ahead for production development to begin until the very last minute. He considered that marketing were completely unaware of the increased potential of product failure that this waiting caused, so concerned were they about the assessments they had made about markets that they were blind to every other consideration. Another question to be answered is whether differences in utilisation of design are only a result of industry sector.

As has been mentioned earlier, it is usual in further analysis of subsets of data to look only for significant differences. In this study the existence of non-significant differences is also informative. An absence of differences suggests that, though managers have different tasks, different perspectives, positions and even industries, they share the same attitudes about, or understanding of, design development.

Three themes were identified and are discussed below: (1) differences between functions, (2) differences between manufacturing and service industries, and (3) the effect of a design manager.

Differences between Functions

The differences between functions are primarily considered using selected data from sections C, D and E of the questionnaire (see tables 2.1, 2.2, 2.3 and 2.4).

From the tables it is clear that there are few significant differences between functions, with the exception of the design function. The design function is likely to hold different opinions on matters of design, and is more likely to believe that design is important than other functions. Design is more often at variance with other functions, and believes design is more complex and more interactive than do other functions. This is a significant factor, and will be returned to later.

Apart from the beliefs of the design function, surprisingly few differences exist between functions. Over the four topics of accountability of design, the importance of design to the company, and the complexity and interactive nature of design projects managers tend to agree, and managers in the marketing and production functions are in close agreement on the importance of design. Production are less inclined to consider design projects to be particularly complex or interactive. In fact on complexity, their opinions and that of finance are closer than others. The design function believes that designers are more accountable, that design is more important, that design projects are more complex and more interactive.

Topic	Entire Population	Marketing	Operations	Finance	Production	Design
The extent of accountability of design	4.4	4.3	4.1	4.3	4.3	5.1
Importance of design to the company	5.2	4.9	5.4	5.2	4.9	5.8
Complexity of design products	4.6	4.7	4.8	4.3	4.4	5.0
Interactive nature of design projects	4.9	5.0	4.8	4.8	4.6	5.6

table 13

Production is at variance with other functions over the control and location of design, and is less inclined to agree that design should be controlled from the top or that design should be a central function. Here, I am reminded by the argument made by Hayes *et al* that the strategic potential in production is not sufficiently considered by today's senior managers – therefore if design is controlled from the top or centrally located, then the design issues in relationship to production are forgotten in favour of a strong relationship to marketing. The design function is convinced that the design process does act as a catalyst in decision

making, even if others are less sure, and they are very much in favour of being a central function.

Topic	Entire Population	Marketing	Operations	Finance	Production	Design
Design should be controlled from the top	4.4	4.1	4.8	4.7	3.9	4.8
Design process does act as a catalyst in decision making	4.6	4.2	4.9	4.2	4.4	5.6
Design should be a central function	4.4	4.4	4.4	4.3	3.5	5.7

table 14

Decision making on the assignment of resources to design development falls more frequently within the realm of one senior manager, usually the managing director or CEO. Traditional sensitivities show up in managers' opinions on who should be given resource decision making powers (table 15), as for example, the low response of marketing toward the involvement of sales managers. Not many companies had managers dedicated to new product development, but generally all functions were keen to place a manager with this title in a key role. Finance are less inclined to put influence into the hands of a new product development manager and it is unfortunate that their opinions on the influence they, as a group, should have are not available. There is considerable agreement as to the influence of the marketing manager, who is placed second. The marketing function considers its own input to be important, but not as important as the new product development manager. However, production believes that marketing should have greater influence than new product development.

Job Title	Entire Population	Marketing	Operations	Finance	Production	Design
Design Studio Manager	4.5	4.5	4.2	4.3	4.3	5.6
New Product Development Manager	4.9	5.2	4.9	4.5	4.7	5.3
Production Manager	3.8	3.6	3.6	3.9	4.0	3.8
Project Manager	4.3	4.7	4.2	4.5	4.0	4.2
Marketing Manager	4.8	5.0	4.8	4.5	4.9	4.8
Sales Manager	3.6	3.1	3.6	3.7	3.7	4.0

table 15: who should have influence on the allocation of resources to design or projects involving design?

To return to the design function, it believes that it should have the most influence, closely followed by the new product development manager, and it also seems to consider the role of sales manager more important than do other functions. Functions are likely to consider themselves to be more important than others do, but if we compare the opinions of the marketing and the production functions about their own roles with that of design then we see that marketing thinks it is slightly more important than others do, production thinks it is definitely more important than the others do (interestingly finance is closer to production in its opinions about production) but design considers that it is hugely more important than others do. Were this to be converted into a rating scale for how marginal a function feels, then one could say that marketing feels fairly comfortable, production feels marginalised and design definitely feels like an outsider.

The significant differences that the design function exhibits are also in evidence in its opinions on what issues cause problems on budgets allocated to design development. In four of the five statements it is at variance with other functions.

The design function is more likely to consider that budget problems are caused by:

	Other Functions	Design
1). Insufficient understanding on the part of the designer of the organisation objectives	3.6	4.1
2). Unpredictable production costs due to the nature of the design	3.7	4.0
3). Too little power invested in the design manager	2.7	3.3

They are less likely to consider that budget problems are caused by:

	Other Functions	Design
4). A lack of common goals between managers and designers	3.4	2.9

There is a degree of contradiction, in that the design function considers it has more common goals with managers (point 4) but believes it is more likely to insufficiently understand the organisation's objectives (point 1), and on the subject of power, it would seem it believes it shouldn't have that much more power. This indicates that the design function believes that designers either don't understand, or are not told, what the organisation wants, nor does it necessarily feel that it knows what production needs, and it is this lack of understanding which becomes translated by others into a lack of common goals. Does it, then, feel misunderstood and powerless?

Although the Seven Step framework has already been discussed, we return to it in order to consider the relative importance of each step from the different functional perspectives. Many functions believe that the first step, the evaluation of artefacts or products in relationship to a company's objectives, is the most important step. Completed matrix charts which plot the involvement of personnel demonstrate that this is the step where the most senior managers are involved. The exceptions are production and finance. Neither of these functions are shown on the matrix plots as being involved in the evaluation step, which is perhaps why they consider it somewhat less important (though having said this, production does not consider it *less* important than others, but rather considers the other steps more important). Only the finance function regards evaluation as less important than the other functions do. For production, the two most important steps are the last two, which is hardly surprising since this is where it has the opportunity to enter the frame.

Importance of Seven Steps	Entire Population	Marketing	Operations	Finance	Production	Design
Step 1: Evaluation against Operations	5.4	5.4	5.5	4.9	5.4	5.8
Step 2: Advice after Evaluation	4.8	4.8	5.2	3.6	5.1	5.8
Step 3: Planning Product Development	5.2	5.1	5.2	5.0	5.1	5.8
Step 4: Develop Specifications	5.1	4.9	5.2	4.9	5.0	5.8
Step 5: Supervisory	4.9	4.8	5.0	4.8	5.0	5.2
Step 6: Models and Testing	5.3	5.1	5.3	5.2	5.6	5.7
Step 7: Quality control in Production	5.0	4.5	5.2	5.4	5.5	4.6

table 16

So far the marketing function appears to carry the major slice of accountability, both financial and otherwise, and opinion seems to be that this arrangement is correct. Consequently it is the marketing opinion which is likely to reflect practice. In the Seven Steps framework, marketing believes evaluation to be the most important step, while achieving quality control in full or part production to be the least important. Planning for production development is considered quite important, but the step on the testing of artefacts or products during development using samples or models is one that marketing apparently think less important than do any of the other functions, including the finance function. Like production, marketing is actually rating its own activities as being the most important. But since it apparently carries more power and accountability than production, a more universal position might be expected. The steps of evaluation and planning are also some of the most cerebral and lend themselves best to quantitative controls. Again the design function is not in line with other functions. The design function considers everything more important, except involvement in full or part production in relationship to quality control. It is likely that finance gains a very different perspective of projects; it may be less involved and is the one function to make regular retrospective analyses of financial data. In interviews this group was often surprisingly well informed, insightful and less prejudiced than might have been expected. Finance considers that involvement in full or part production in relation to quality control is the most important step, followed by the testing of artefacts or products by development of models or samples, followed by planning product development. This

seems to reflect a very different mind set from that of the marketing function or the design function, and to be closer to that of production. The position of the Operations function has not yet been mentioned: whereas marketing and production are frequently seen to hold differing opinions, the marketing and operating functions rarely demonstrate differences. Managers who make up the respondents in the operations function are more likely, though not entirely, to be those from service sector industries, and to be involved with managing geographic areas in terms of distribution, retail outlets or particular business sectors. The next section will bring this into sharper focus.

Differences between Service and Manufacturing Industries

Differences in the service and manufacturing sectors can be quite well explored by a consideration of how service and manufacturing use different project types.

For example, typically the manufacturing sector will commission more product projects and the service sector more environmental projects, with both commissioning equal numbers of information projects. Whether in-house or consultant designers are more likely to be commissioned in the three project types will have a significant effect upon managers' experiences of design development. As can be seen from table 17 the differences vary depending upon the project aspect.

Project Aspect	Service		Manufacturing		Entire Population	
	In-house	Consultant	In-house	Consultant	In-house	Consultant
R&D	3.7	3.9	5.2	3.5	4.7	3.7
Engineering	3.5	3.2	4.9	2.3	4.4	2.6
Production	3.2	2.6	4.7	2.4	4.2	2.4
Sourcing	3.4	3.0	4.2	2.0	3.9	2.4

table 17: product development in service and manufacturing

Product Development

For product development, the manufacturing sector is more likely to use an in-house design team, while the service sector might use in-house or consultant designers. The difference in importance of product development in manufacturing and service industries is significant and it should be remembered that in manufacturing the term "design team" might include engineering design and aesthetic design. The broad base of the questionnaire meant that these variables could not be explored statistically. However, by including the knowledge gained from the process of completing questionnaires from interviews a good picture was arrived at. It would be fair to say that for the companies in the electronic or mechanical sectors, the in-house design teams were design engineers. If these companies felt the need

for aesthetic design (industrial designers) they employed consultants. In interviews, discomfort about the idea of aesthetic designers was evident. One head of an engineering design studio said he used industrial designers occasionally to give a concept idea. This man had no idea of industrial designers' background or training, but he felt he was increasingly under pressure from others in the organisation to use designers from industrial design consultancies. He maintained that he had to resist, since he considered the fees of such consultancies were too high "for a couple of new product ideas" and that the technical design would not be as good as his own people could produce. Another head of an engineering design studio talked enthusiastically and in detail about new product development in engineering terms but referred to the aesthetic design as simply a need for "better colours". In the same company the director of marketing referred to the company's need for "a chappie with a long scarf". He described how the company was losing market share because competitor's products were more attractive and offered more features. He described his own company's products as long-lasting with an excellent record for quality. He felt this was not enough any more, but along with the rest of the management team he considered that an industrial designer would not fit into their culture, so as a management team they had decided to renew their quality programme. From the above it is reasonable to assume that in the electronic and manufacturing sectors, engineering design forms the dominant focus. Industrial design will be most frequently used peripherally, and most usually in a consultancy role.

In textile and apparel companies, there was also a distinct preference for in-house design teams. But in every case the in-house design team consisted of aesthetic designers, usually fashion or textile designers. There appeared to be no need for engineering design. Those involved in the research and development of new fabrics were known as fabric technologists and did not appear to be included in design development. The pressures on the textile and apparel industries are all about the speed with which ranges have to be produced. In household textiles this might be two to three times a year, but in apparel it can be as many as four times a year. Some lines are merely updated but many have to be completely new. Logistically it is just more practical to use in-house design teams, and continuity is also an important factor. Their design teams are more likely to interact with customers (chain stores such as Marks and Spencer), and will also be closer to the sales team.

An aspect of commissioning product which is very different from either of the above is the commissioning of product in the service sector. The service sector is less committed to the use of in-house design teams. The context for this can be understood from the nature of product development in the service sector. In the retail sector, for example, a retail chain may sell products which carry its own brand; some products may be developed within the company, while many will be manufactured under licence or sourced from a regular supplier. Therefore the nature of product development is that it has a high perceived "package of product content". These products can include anything from a carton to dispense aspirin through to a branded hairdryer or a bottled beer.

Environment Development

The word “environment” is used principally to describe the interiors of buildings, and service and manufacturing companies demand very different things from their environments. For the service sector, environments are frequently a part of the product in that they provide the surroundings in which products or services are offered. For the manufacturing sector, an environment development project is most frequently the building or refurbishment of a new factory or office facility. It is a much more rare occurrence and likely to be a long term, capital intensive investment.

Project Aspect	Service		Manufacturing		Entire Population	
	In-house	Consultant	In-house	Consultant	In-house	Consultant
Building Stock	3.9	4.5	1.7	4.7	2.5	4.6
Refurbishment	4.0	4.6	2.0	4.0	2.8	4.2
Planning	4.0	3.1	2.8	2.9	3.3	3.0
Equipment	4.1	3.2	3.3	2.4	3.6	2.7

table 18: environment in service and manufacturing

Long term investments are less common for the service sector where, in recent years, companies have undertaken extremely regularly changes in the environments in which they offer their services or products. The environment has become as important as the service itself, a potential differentiator in the minds of the consumer. Increasingly then a standardised interior for a chain of retail outlets which will be completely re-configured at regular intervals has become another aspect of design development that has to be managed by the organisation. In chapter 4 these issues were discussed in some detail. What was clear from the studies in that chapter was that interior design consultancies were frequently employed either in preference to an in-house team, or in addition to an in-house design team, in which case the interior design consultancy would be commissioned to produce an overall design concept for the shops which would then be interpreted for individual stores by an in-house design team².

Since major environmental changes are substantial in terms of capital investment, the re-

² In the sample, one retail chain in the midst of this type of environmental change had adopted a slightly different approach. The new-look for the stores was being handled by the in-house design team. This had been a conscious decision because they had hired an American merchandising consultant and they wanted his expertise to dominate. The Director of Business Development said, “we almost wanted a non-design solution, something timeless because of the high cost of store refurbishment.” In this company the in-house design teams were split into Design and Construction, headed up by a man with the title of Chief Architect who reported to the Director of Store Planning and Packaging, and Communication Design which was a part of the marketing function.

positioning of a retail environment is similar to launching a new product: decisions are usually taken by senior management. Environmental design projects therefore are likely to significantly involve and pre-occupy managers for a period of a year or so, and then to retreat for two or three years. If a manager's experience of design development is of this type, then the functions of marketing and operations will have been similarly engaged in the new environment development, and both functions will have been concerned with the effect on customers and aspects of service and market position. Because the level of activity is not continuous, and because the organisation is more likely to have used a consultant interior design team for the concept design and one or two flagship stores before handing over to an in-house team for nation-wide implementation, it is likely that the whole process will have appeared to managers to have been quite complex (see table 20).

Information Development

This general heading needed discussion with respondents. Information was taken to encompass all the graphic design needs of the company, ranging from packaging, swing tickets on garments and instructions for using products through to corporate information, annual reports and general advertising of products and services. It also included the design of forms and other documents used by the company for internal communication and monitoring purposes.

These types of design development project are common to both manufacturing and service sectors and many companies in the sample had an in-house design facility of some kind, associated either with the marketing or publicity function. From the interviews it was clear that decisions on using a consultant or an in-house design team were dependent upon the size of the in-house facility and the status of the project. High status projects had bigger budgets and normally were given to consultants. Of all three project types, this was the most unambiguous.

Project Aspect	Service		Manufacturing		Entire Population	
	In-house	Consultant	In-house	Consultant	In-house	Consultant
Operational	3.8	2.9	3.7	2.6	3.7	2.7
Product	3.9	3.9	4.2	3.0	4.1	3.3
Promotional	3.8	4.5	3.5	4.1	3.6	4.2
Corporate	3.6	4.7	3.0	3.6	3.3	4.0

table 19: information in service and manufacturing

In both service and manufacturing, in-house teams were considered to be a lower risk, perhaps more thorough but probably less innovative. Differences in attitudes to the use of

consultants or in-house design teams was apparently based less upon differing perceptions than on differing experiences of projects and their relevant criteria.

How Accountable are Designers?

It makes sense to follow the above discussions on the use of different types of design with a consideration of how accountable the manufacturing and service sectors consider design to be. The opinions of managers in service and manufacturing industries towards issues such as the accountability of designers, the importance and complexity of design, and central control, are of course affected by their project experience (see table 20). Manufacturing believes designers to be more accountable than the service sector does, and manufacturing is less sure that design should be a central function. The service sector believes design to be more complex, and has a preference for using consultant designers in a design development team. Service also believes that problems on budgets are more likely to be caused by poor information from designers³.

Topic	Service	Manufacturing	Mean
Extent of Accountability of Designer	3.8	4.6	4.4
Importance of Design to the Company	5.1	5.2	5.2
Complexity of Design Projects	4.9	4.5	4.6
Interactive nature of Design Projects	5.0	4.9	4.9
Design should be controlled from the top	4.9	4.1	4.4
Design process does act as a catalyst in Decision making	4.6	4.5	4.6
Design should be a central function	4.7	4.2	4.4

table 20

We can see from table 20 that the opinions of managers on these issues reinforce and are consistent with the findings on the use of different design project types and the use of in-house and consultant designers. In manufacturing, which typically uses a greater amount

³In one of the companies in the retail sector, a manager described how they had been overwhelmed by the success of one of their newly refurbished and re-positioned stores, which he attributed almost entirely to the impressive design of the interior. However, he also said that it had significantly run over budget and time scale and that he could not contemplate using the same consultancy again because of the budget problems, even though he had a project which he would very much like them to do.

of in-house designer time, designers are held more accountable and design is less likely to be a central function.

The Effect of a Design Manager

It seems clear that there are differences between functions and also between industry sectors. Indications are that individuals in the design function appear to hold significantly different opinions from others. In the analysis of industry sectors, differing requirements of design development play a significant part in affecting differences between the two sectors. Not all companies employed a design manager but it seems essential to consider what differences were caused by the presence of a design manager.

The analysis divided the data into those companies with a design manager and those without. There are differences, but in the main these are of the kind one might expect to find (for example, the control and influence in the design function). Design is considered more important in those companies with a design manager, and there is greater use of in-house design teams on research and development, in sourcing and in product development, and also a greater use of in-house design teams in operational and product information projects. There is less concern over the need to maintain tight control on budgets⁴.

The accountability of designers is higher in those companies that employ a design manager. However, there are no significant differences in the complexity or interactive nature of design, the belief in the need for control from the top or that design should be a central function. Not even in the issue of the design process acting as a catalyst are there any significant differences. Results are consistently a little over the mean if there is a design manager and a little under the mean if there is no design manager.

Although there are some differences in those companies with a design manager, these seem to be related to greater operational activities emanating from the design function, which naturally creates a situation of higher accountability. Because there is greater design activity, there is a belief that design is more important to the company. However, it seems hard to find any indications of the sort of shifts in opinion which would better represent or be closer to those of the design functions which were seen in the first analyses (for example in Philips). The only conclusion possible is that the attitudes and beliefs of the design function really are at variance with everyone else. Their opinions are barely reflected in their day to day responsibilities which are those of running a design studio. Rarely are the responsibilities of the design manager or design director of strategic importance to the company.

⁴We also compared this with whether design was within a section of the company's corporate documents. If design is in the corporate documents, then opinion shifts in the same direction as it does if there is a design manager.

FURTHER ANALYSIS USING MSA 1

Although the interviews and the analysis using SPSS had illuminated several issues such as the extent of managerial control, differences in design project utilisation and consensus over the general importance of design, few broad conclusions can be drawn. One statement that can be made is that managers share an understanding of certain key features in design development but what is actually done all depends upon circumstances. Although this is not an insignificant conclusion, it is not unequivocal. Multidimensional scaling techniques were applied to reveal patterns to help understand what these circumstances might be. Data was input into the MSA program which had proved to be statistically significant in the SPSS results, together with data which had emerged as important from the three separate analyses (Differences between Functions, Differences between Service and Manufacturing, and The Effects of a Design Manager).

The MSA plot positions each respondent as a point in space which represents an aggregate of all answers in the data set, relative to all other respondents. One effectively runs through each question looking for those responses which have had an effect on the clustering or otherwise of the individuals (see figure overleaf).

From the plot of the functions that each respondent belongs to (figure 44) it is clear that functions in and of themselves do not significantly affect opinion. Interestingly even those from the design functions are scattered throughout the plot. This reinforces the findings from the SPSS, particularly in the area of project experience.

Differences between Service and Manufacturing Sectors

Typology of Attitudes and Practices

The first analysis of the data revealed two broad divisions, one between manufacturing and service industries, and one between companies with a design manager and companies without. These findings were summarised as four major types in a paper which was published in the *European Management Journal* (Dumas and Whitfield, 'Why Design is Difficult to Manage: A Survey of Attitudes and Practices in British Industry', 1989).

- A Manufacturing industry with design manager
- B Service industry with design manager
- C Manufacturing industry with no design manager
- D Service industry with no design manager

The plot (see figure 45) divides left and right. On the right is the service sector, which can be seen to straddle the plot in a soft arc (the reason for this become clearer later in the analysis). On the left side of the plot is the manufacturing sector which is more tightly clustered. Centred at the top of plot is a small group of manufacturers who apparently think

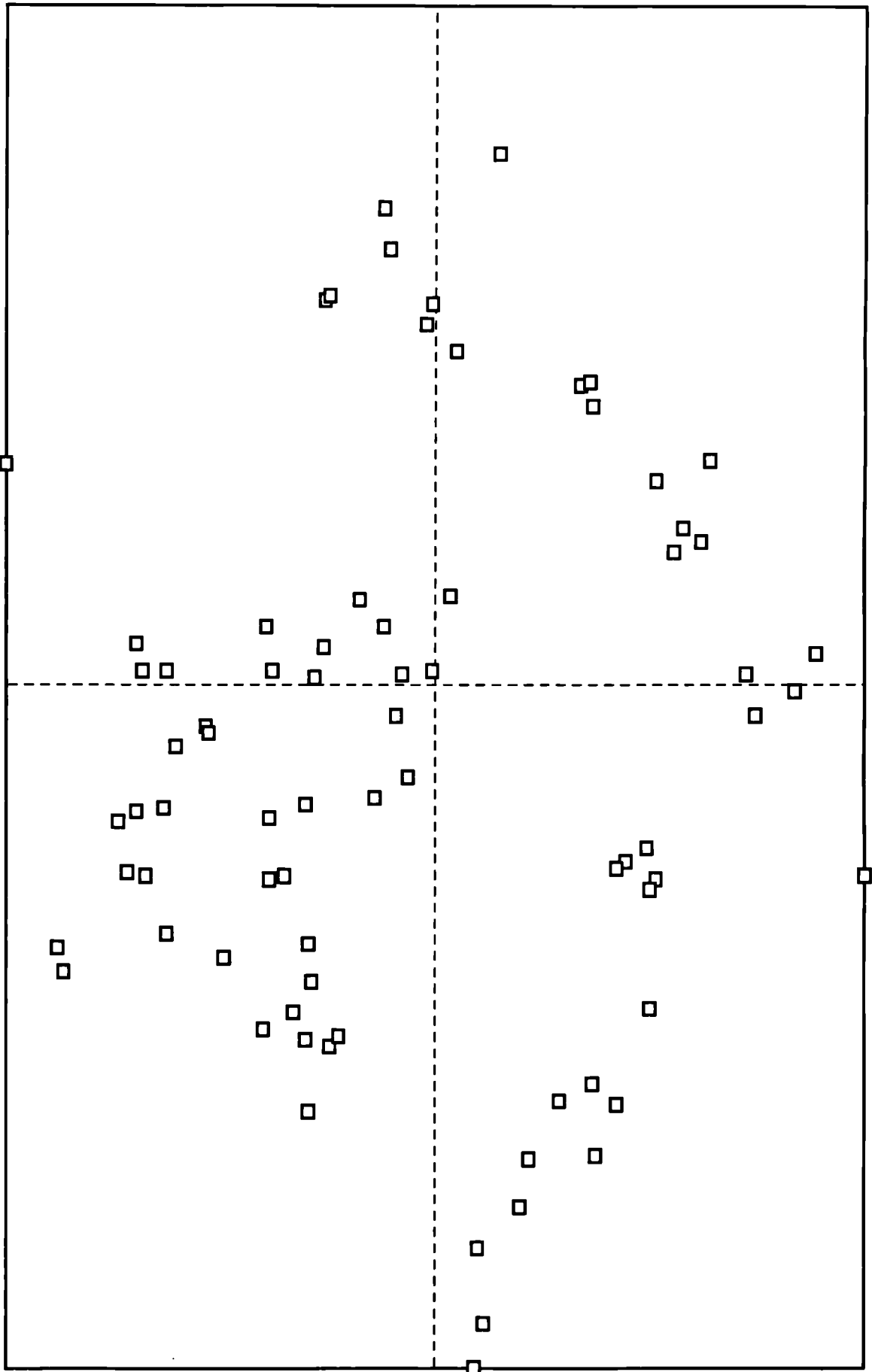


figure 43: basic MSA plot

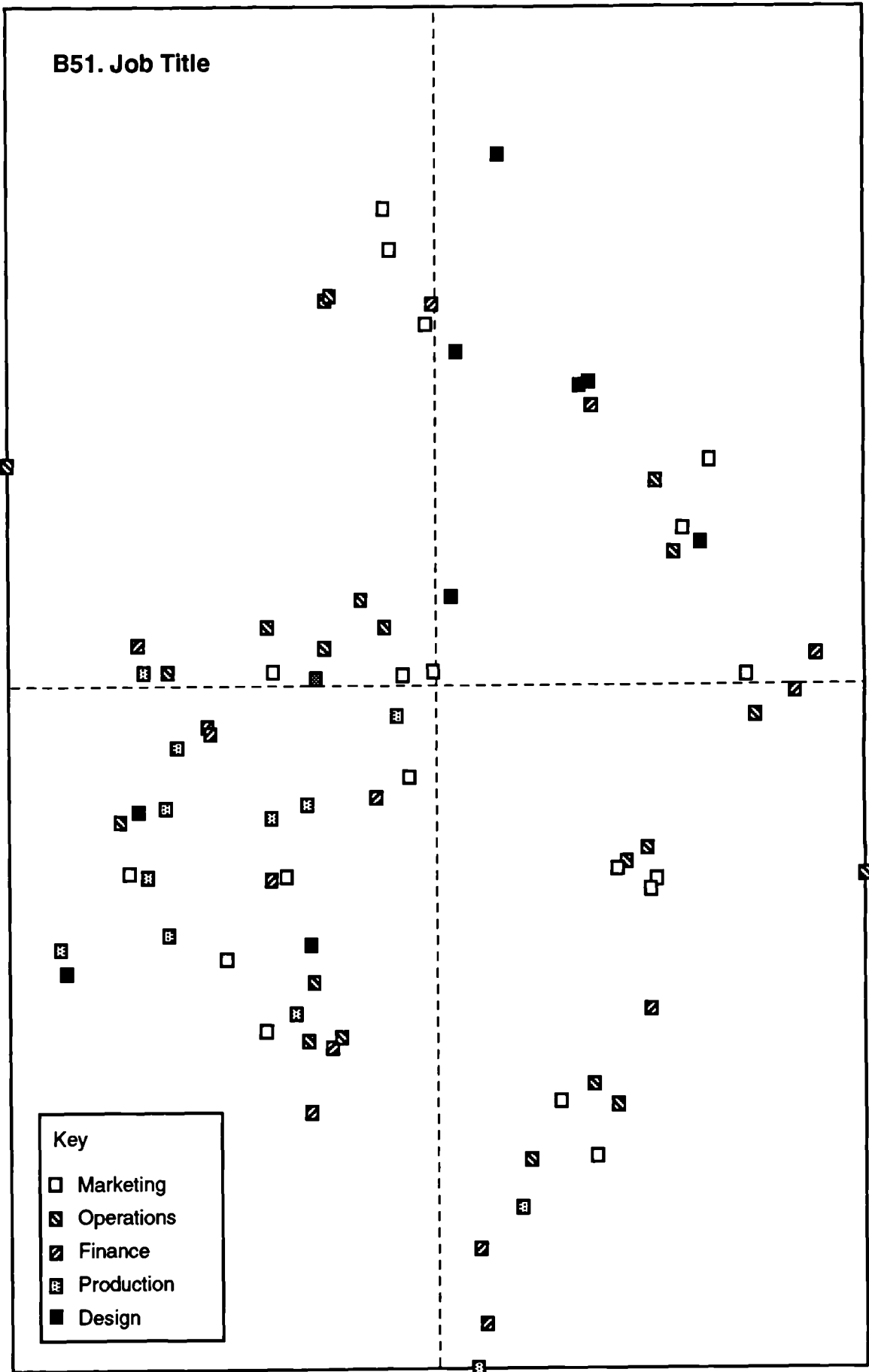


figure 44: MSA plot showing respondents by function (question B51)

similarly to the respondents from the service sector (this will be discussed later). Answers which were significant in producing the split can be listed as follows:

Manufacturing	Service
No Documented Corporate Plan	Documented Corporate Plan
Predominance of Engineering Degrees	Mix of Degree Disciplines
Sales not accountable for design, but others variously accountable	Marketing predominantly accountable for design
Do not use external design consultants	Do use external design consultants
Design function could become a profit centre	Design should be a central function
Design is not in a section of the corporate documents	Design is in a section of the corporate documents

table 21

Most of this has been discussed quite adequately in previous sections, but it is interesting to see that managers in manufacturing see a potential for the design function to be a profit centre, which is perhaps recognition of the value added to a product by the effects of the in-house design team.

In companies with a design manager, design projects are more likely to be structured similarly to other projects and are considered to require less central control. These companies favour design operating as a profit centre, and also believe design has greater importance and that the design function exerts an influence on the company.

An interesting feature of the divisions is that the presence of the design manager exerts a powerful attitudinal difference, while the sector location of the company, in either manufacturing or service, is influential in a practical manner, for example in the use of design consultants and design documentation.

Further Differences found by MSA Analysis

A further analysis carried out after the article was published revealed relationships between the age of the respondents, the length of time in their jobs and the amount of documentation on design.

In service companies with a design manager, respondents are in the upper age range of forty years and over, and have all been in their jobs for a number of years, suggesting that tradition or culture is a factor with certain companies always having had a design manager. It also suggests that these respondents are in companies that are relatively stable. Other features of these companies include high design accountability; engineers and managers in production predominantly accountable for design; and design projects are structured like

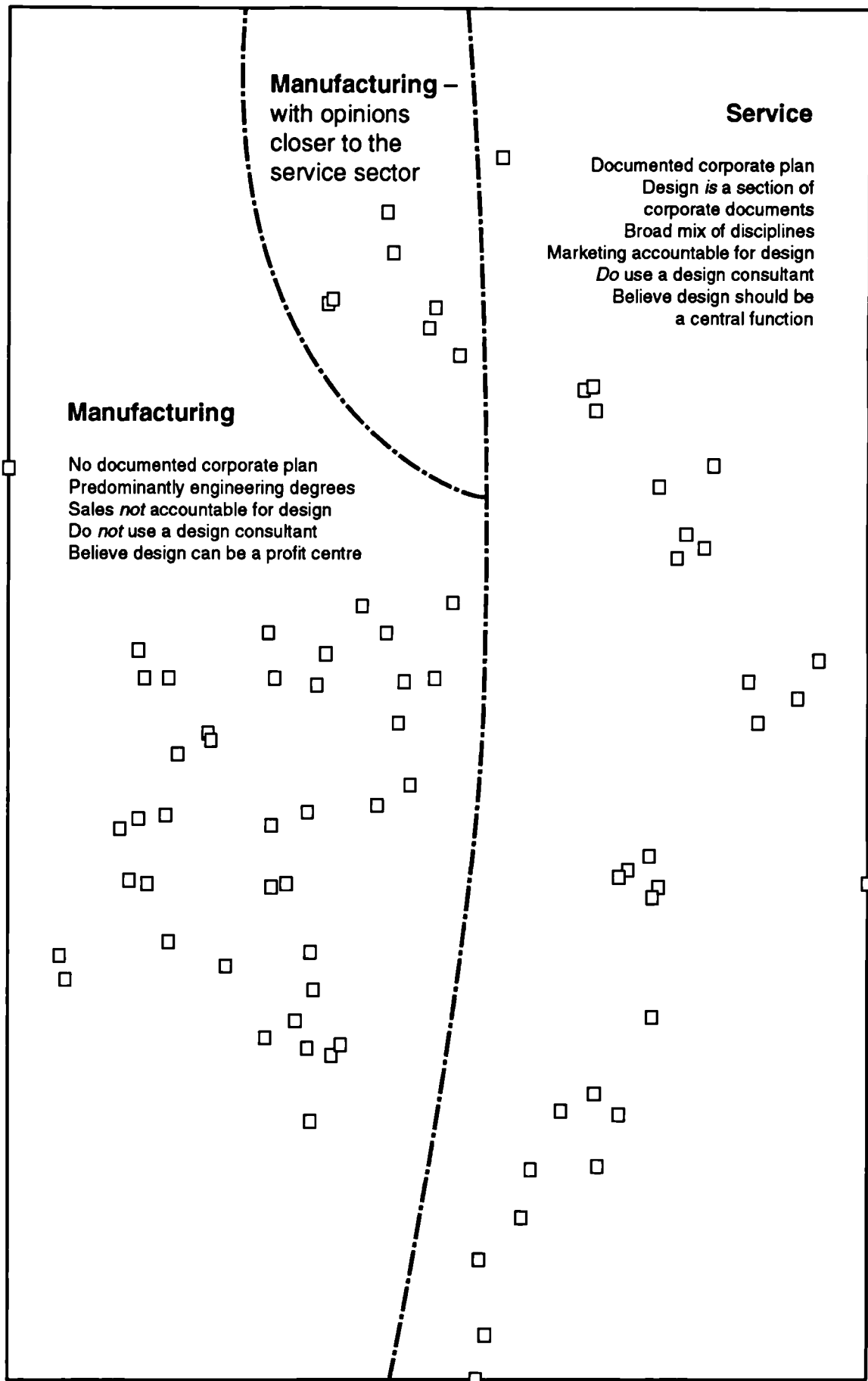


figure 45: MSA plot showing service/manufacturing division

all other projects. In the service companies with no design manager the distinguishing features are that respondents are generally under forty and have been in their jobs a relatively short time. There is low design accountability with design projects not being structured like other projects, and a belief that design should be centrally controlled. Two of the service companies in the sample, both from the same retail sector, could be usefully compared here. One was an established company with a tradition of having a design manager and very stable operating circumstances, dedicated to maintaining its market position. The other, owned by an entrepreneur, was a young and fast growing company dedicated to increasing market share, with no design manager and a big expansion programme.

Though it was not appropriate for SPSS, it was possible that the original company groupings, three types of manufacturer and two types of service (see table below) might provide insights if applied to an MSA plot. Project type has emerged as one significant factor affected by the type of industry, i.e. service or manufacturing. For example, would the differences between apparel/textile manufacturers and manufacturers of domestic products cause each to display an array of distinguishing features?

Manufacturing	Service
Domestic Product Apparel/Textile Electrical/Mechanical	Retail Non-Retail

table 22

Each respondent was identified as belonging to one of five industries. What emerged from a close look at the plot with a repertoire of a twenty three items was seven discreet groupings, four belonging to the service sector and three to the manufacturing sector. These can be seen below.

Group 1: Service, Predominantly Non-Retail

This group is characterised by the following:

- 1). The company has a documented corporate plan.
- 2). The managers are relatively young and new to the job.
- 3). There is no design manager.
- 4). Design is a section of company corporate documents.
- 5). The company uses design consultants.
- 6). Design projects are not structured like other projects.
- 7). Designers have low accountability for design.
- 8). Marketing carries major accountability for design.

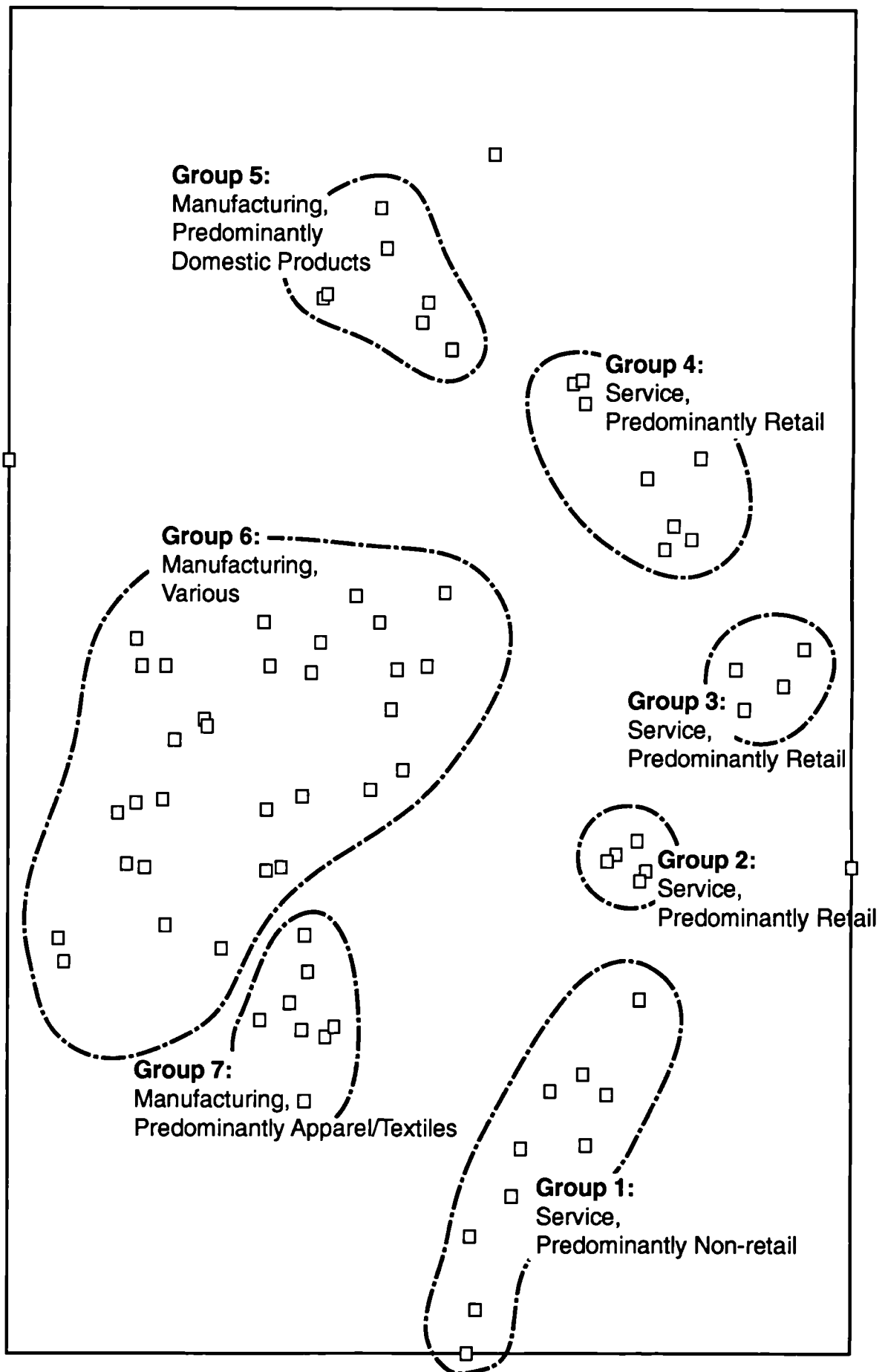


figure 46: MSA plot showing seven discreet groupings

Group 2: Service, Predominantly Retail

This group is characterised by the following:

- 1). The company has a documented corporate plan.
- 9). The managers are over forty, yet relatively new to their jobs.
- 3). There is no design manager.
- 10). Design is considered very important.
- 11). Design projects are structured like other projects.
- 5). Designers have low accountability for design.
- 12). Managers believe that design must be tightly controlled from the top.
- 13). Managers believe design should be a central function.

Group 3: Service, Predominantly Retail

This group is characterised by the following:

- 1). The company has a documented corporate plan.
- 2). The managers are relatively young and new to their jobs.
- 3). There is no design manager.
- 4). Design is a section of company corporate documents.
- 5). The company uses design consultants.
- 7). Designers have low accountability for design.
- 11). Design projects are structured like other projects.
- 12). Managers believe design must be tightly controlled from the top.
- 14). Marketing and Publication carry major accountability for design.

Group 4: Service, Predominantly Retail

This group is characterised by the following:

- 1). The company has a documented corporate plan.
- 9). The managers are over forty, yet relatively new to their jobs.
- 15). There is a design manager.
- 4). Design is a section of the company corporate documents.
- 5). The company uses design consultants.

- 11). Design projects are structured like other projects.
- 16). There is a design manual.
- 13). Managers believe that design should be a central function.
- 17). Managers believe that design could be a profit centre.
- 14). Marketing and Publication carry major accountability for design.

Group 5: Manufacturing, Predominantly Domestic Products

This group is characterised by the following:

- 1). The company has a documented corporate plan.
- 9). The managers are over forty and have been in their jobs a relatively long time.
- 15). There is a design manager.
- 4). Design is a section of the company corporate documents.
- 11). Design projects are structured like other projects.
- 13). Managers believe that design should be a central function.
- 18). Designers have high accountability for design.
- 19). Engineering, Marketing and Publication carry major accountability for design.

Group 6: Manufacturing, Various

This group is characterised by the following:

- 9). The managers are over forty and have been in their jobs a relatively long time.
- 11). Design projects are structured like other projects.
- 20). Managers believe a design manager should have power.
- 21). Managers believe that design could be a profit centre.
- 22). Engineering carries major accountability for design.

Group 7: Manufacturing, Predominantly Apparel/Textile

This group is characterised by the following:

- 2). The managers are relatively young and new to their jobs.
- 20). Managers believe a design manager should have power.
- 21). Managers believe design could be a profit centre.
- 23). There is no clear opinion on who should be accountable for design.

Bearing in mind the small number of respondents represented in some of the seven groups, this information must be treated with caution, and taken as providing insights rather than hard facts. But accepting that the information is more “soft” than “hard”, we can proceed to draw a map-like layout which may be used to illustrate many issues.

Consistency of Attitudes

As well as re-grouping by the five company types it was also possible to identify individuals by company. This was useful because it allowed for the identification of company attitudes. There are only two companies where all the individuals reside in one group. One company is in group 1, and the other is in group 4. In group 4 the company is known to manage the design process with a high number of formal devices, and formal documentation is effective in ensuring that all managers maintain consistent attitudes and practices. That there are only two companies who so obviously share the same attitudes and practices suggests that managers within the same company not only hold differing attitudes towards design but are likely to understand the use of design in their company differently. We cannot tell from this study how significant a difference that makes but it is certainly a question for further study⁵. It does, however, reinforce the notion that there are many realities of design in existence at any one time. A prime example of this is the answers to the question on the existence of the design manager. In some companies, some respondents said there was a design manager, while others said there was not (this occurs in group 6 which is the mixed manufacturing group). Many of the engineers described themselves as design managers, though individuals in a function like marketing did not describe these engineers as design managers at all. Group 6 provides an image of traditional manufacturing engineering bias. Group 5, which is a manufacturing group, shares certain attitudes and practices with the service sector, perhaps reflecting the need for domestic product manufacturers to be much closer to their customer than is traditional in manufacturing. Group 7 is largely made up of textile and apparel manufacturers, which traditionally are not engineering-led. As an industry sector they have employed in-house fashion and textile designers for many years, and in certain senses design is an integral part of their business. They operate with a high base of tacit knowledge and their position diagonally opposite to the company that manages design in a formal and documented way is clearly telling.

Service and Manufacturing Split

A key difference between the four groups on the right of the map and the three on the left is the conscious management of design. On the right hand side, in all the service groupings, we see evidence of the acknowledgement of design as an issue that must be consciously managed. The different groups on the right hand side represent how important each

⁵ A further study relating consistency of attitudes and practices to effective product development measured by product time to market and market success would be appropriate.

company chooses to make design and, as importantly, how individuals perceive that importance. There is little evidence on the left hand side of much conscious thought given to the management of design, yet issues such as power for design managers and profit centres still arise, which suggests that issues surrounding design do exist. However, the complex nature of product development suggest the existence of much higher levels of tacit knowledge residing in many more realities of design than could exist in the service companies.

Age and time in the same job appear to have been a determinant in the clustering of attitudes. It is outside the scope of this study to consider explanations in any detail, but as a speculation, it might be that there is an effect of entrepreneurship in design development generated by relative youth or, in the case of the individuals over forty, the challenge of a new job which may place a greater emphasis on an individual's responsibility for design whether acknowledged or not. In the company represented in Group 4, with formal design approaches, and a consistency in managers' attitudes, managers are over forty and have been in their jobs for some time. Stability and a knowledge of how things are done perhaps decreases entrepreneurial activity.

It is somewhat frustrating that the limits of this study are such that it is impossible to explore such issues as the effect upon design development of individual entrepreneurial activity, but the stress on design needing tight control from the top, evident in groups 1, 2 and 3, coupled with low accountability for designers might suggest that there is an aspect of entrepreneurial activity in design development.

In Summary

Both SPSS and MSA analyses suggest that both acknowledged and unacknowledged design activity exists.

This chapter began by describing the need to explore further the possible existence of two senses of design, seen and silent. The statistical study shows that managerial activity in design is abundant. There is a high degree of consistency concerning the preferred roles for the design function, which appear to limit the design function often to advisory roles leaving the final decisions to managers. The importance of project type in the differentiation of attitudes and practices also reinforces the likelihood of a management team not only being, but needing to be, in the driving seat of a design project. There are questions which cannot be answered by this set of statistics, for example, whether the preferred role for the design function of influencer or catalyst is such because of a management team's need to defend the boundaries of a design development process, which they can manage with tacit knowledge but cannot articulate. If the tacit design knowledge of a management team is vital to the success of a design development process then disruption of their unacknowledged processes could result in a design failure. In the following chapter we follow just such an event in the case study of a season's design development at Courtaulds Home Furnishings.

Chapter 7: Courtaulds Textiles: Home Furnishings Study

This chapter describes observations made of design and new product development between autumn 1986 and summer 1987 in the Home Furnishing business which is part of the Courtaulds Textile Group.

The Courtaulds Textile Group was formed in April 1985 by re-structuring a number of Courtaulds businesses, causing changes in both the strategies and the structures of these businesses. These changes affected the way that the businesses were expected to manage design. Previously the majority of the design work had been undertaken individually by each business, but the new structure expected much of the design work to be undertaken centrally.

There will be increasing benefit from the closer association of these businesses [Courtaulds Textile Group] in strategic planning, design and marketing, the use of production and management resources and responding to fashion and the needs of the ultimate consumer... The Textile Group now forms what is in effect a very large consumer goods business, serving retailers and their customers and being driven principally by fashion and by consumer needs. (Courtaulds Annual Report, 1985.)

Before describing the events in Home Furnishings, it seems necessary to consider by way of context, how the restructuring of the businesses into Courtaulds Textile Group, known as CTG, was made and why design was drawn into the re-structuring exercise. Two reports are referred to, one a report from the analysts De Zoete Bevan in 1985 on the formation of CTG, and the other a report produced by the National Economic Development Office in 1984 on 'Managing Design in the Textile Industries'.

The De Zoete Bevan report states that the strengths of Courtaulds Textile Group were spread across seven business sectors. They held 25% of the market in intimate apparel; they were Marks and Spencer's leading supplier of clothing and textiles; they had a very profitable spinning and weaving business in France; and they had control of 25% of the UK cotton-type spinning industry, with approximately a 10% share in man-made fibres, a 10% share in home furnishings, and control of the linen market in the USA.

In their conclusion the analysts stress the importance of a fashion orientation to consumer tastes on a commercial basis, and the need for the fabric suppliers to meet high standards of colour, design and quality. Equally important, the report points out that the Group had generated positive cash flow and was 'free to spend around £40 million per annum over the next 5 years'.

In Home Furnishings the larger proportion of the business was contract business,

principally to Marks & Spencer, but the report also draws out the strengths and potential in their key brand of Christy.

“Christy” is now exploiting its good name in bedding, avoiding the mainstream area of prints and concentrating on specialised skills, particularly using embroidered designs. However this is somewhat “late in the day”. During the 1970s, and typical of the Kearton “production philosophy” Courtaulds Textiles’ attention was diverted away from market changes, to establishing a major UK vertical operation at Campsie in Northern Ireland to service Europe with Household Textiles. Meanwhile Dorma and Vantona were enjoying the growth in the UK bedroom which has led to Vantona Viyella’s current market leadership and 8.5% margins which CTG has yet to match across the board. Strategically CTG has much to gain and little to loose in Home Furnishings. It will certainly contribute to growth in the 5 year plan at improving margins. The broad strategy can be described as seeking the currants in the cake rather than trying to consume the cake itself. (De Zoete Bevan.)

In stressing the need for improvements in fashion and colour awareness the report clearly leads to the consideration of improvements in design. In the previous year the NEDO report on managing design in the textile industries produced a series of recommendations.

THE NEDO REPORT: DESIGN FOR SUCCESS, APPROACHES TO MANAGING TEXTILE DESIGN

The report produced by NEDO is a comparative study of firms in the UK and firms in Continental Europe. It was commissioned apparently because earlier reports had suggested that UK firms had lost ground to continental competitors as far as design and the links between the design function, sales and marketing were concerned. Aspects of the report are summarised below.

The report found the similarities between continental and British firms more marked than the differences. Apparently the research team had expected, for example, to find in most continental firms that the heads of design departments would have a seat on the board, but in fact design was clearly located in the marketing function. In addition there seemed little difference in the degree of importance given to design, with no continental firm being actually “design led”.

There are similarities between this report and the results of the questionnaire survey discussed in the previous chapter, for example the power of marketing, the recognition that design is managed relative to project type, and the lack of easily accessible information on finance for design.

The findings of the report are similar in many respects to the studies in this thesis. Different structures for design are described in the report. For example, where design is in the marketing function, a product manager with a technical or commercial background has responsibility for design. Or in those companies where the internal designers are more

technically able, for example in weaving, there is less likelihood of a product manager. Here the head of design will report to the marketing director.

In three of the British firms there was a design director; the report describes the role as 'a director of the company who takes most of the responsibility for the organisation and selection of designs, while the final decision on which designers should be used and on co-ordination between design, marketing and sales is taken by the managing director.'

The research team were surprised by the apparent lack of information on the cost of the design functions, given the importance most companies attributed to them. Most companies believed that the new product development cycle was speeding up because of the rapid changes in fashion, and even within home furnishings and household textiles there was often pressure to produce more than one range per year or at least to top up a range, although one company apparently considered the life of a design in home furnishings to be approximately five years.

The recommendations of the report which seem to have a relevance to CTG are:

- As each company continually re-examines its marketing strategy, it should at the same time re-examine its total design strategy, relate it to any changes made in the marketing strategy, and consider whether the structural and organisational responsibilities of management need to be redefined in the context of design.
- Above all else, there must be commitment from the board and the managing director to the importance of design and its successful integration within management structures.
- Particular individuals in each company (whether design directors, marketing directors or product managers) should be given a key role in collecting, co-ordinating and assessing all information and ideas from internal and external sources relevant to the design decision making process.
- In both apparel and domestic textiles, a close understanding of fashion and styling trends as far as the finished products are concerned is as essential prerequisite for the effective and profitable marketing of designed textile fabrics.
- Companies need continually to review the way in which they present their products to customers. The design team should be closely involved in such presentations.

One of the conclusions in the report, that a change in market strategy should generate at least a review of design strategy seems particularly apposite to Courtaulds in late 1984 and early 1985.

In an interview the chairman of CTG, talking about the changes in design, is quoted as saying 'We're trying to make the CTG whole greater than the sum of its parts' (*Management Today*, May 1986). New design centres were established in lingerie, children's wear and outerwear. The Fabric Marketing Centre at Margaret Street also became a place where design was given greater prominence. For apparel and home furnishings the design studio at Margaret Street was enlarged, and a separate entity was created from the archives of the designs of nineteenth century prints. In early 1986 the Chairman appointed a Design

Director, a textile designer who had been running a fashion and textile design degree course at an art school.

HOME FURNISHINGS

The Home Furnishings business was based at Wigan. The major part of the business was sales to Marks and Spencer, but in addition there was the Christy Brand and other own label accounts for John Lewis, House of Fraser, AIS, Habitat and Next. The Chief Executive summarised the business as

what remains of Courtaulds Sheeting Division, which was created in the early 1970s when the group had a vision of developing a large scale operation and invested heavily in vertical plant in Northern Ireland related to a making-up plant at Wigan. This division was closed in 1982 and a restructuring took place resulting in the currently constituted business at Wigan. At the closure the “good” pieces of business were centred at Wigan; these were M&S and Christy Brand, but both were small, under £1 million turnover each. Since then M&S has grown to nearly £6 million and Christy Brand to just under £2 million, and we have also developed other own label contract accounts which are currently nearly £1 million.

Since this restructuring design had been managed by a product development manager based at Wigan and his one assistant. The product development manager, originally a technologist from the spinning and weaving business, had come to Christy’s to be on the commercial side and he had built up the M&S business. He had been responsible for much of the successful technical development on the embellished products mentioned by De Zoete Bevan as critical to the success of Home Furnishings and he had trained his assistant up from the shop floor. This was the situation at Home Furnishings when the Design Director took up his appointment.

The Design Director reported directly to the Chairman of CTG. From the organisation chart it can be seen that there were four Chief Executives of businesses and two individuals, design and marketing, reporting directly to the Chairman.

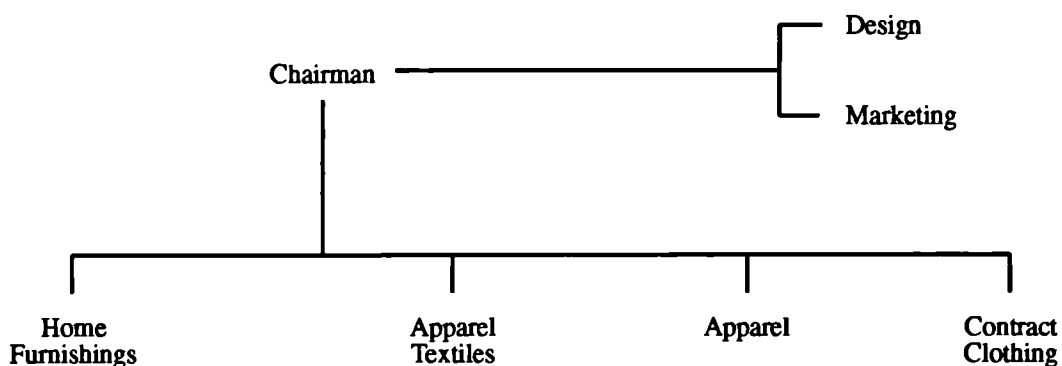


figure 47

Central Design, Marketing and the Chairman were all located at Margaret Street. This building was also at the disposal of all four Chief Executives, who were provided with small offices and used the showroom facilities for presentations and meetings with customers, although Contract Clothing had its own large design studio elsewhere in central London and rarely used the facility.

The Chairman expected that the Design Director would have influence with all four businesses; his brief had been simply 'to improve design at CTG'. Apparel Textiles had always maintained a small studio at Margaret Street. Jo Bowing, its Design Manager, had worked with Courtaulds from this studio for many years. The Design Director expanded this studio and also appointed a Design Manager for Home Furnishings. The Chief Executive of Home Furnishings was enthusiastic about the appointment as was the managing director based at Wigan. The new Design Manager for Home Furnishings design manager had been the Design Director's second in command on the fashion and textile degree course.

To undertake a field study of design development I arrived at the following agreement with the Home Furnishings team. I would follow the course of the Autumn 1987 product development from the point at which they had a range of designs to show to customers up until the point at which they began full scale production. It was agreed that I would interview the key members of their team, observe at presentation meetings between themselves and their customers and be present at meetings at the Wigan factory between the development team and the production people. In addition I would receive minutes of any meetings with customers where design development was the key issue. I agreed not to directly interview their customers. From January to May 1986 I made two extended visits to Wigan and many visits to the Margaret Street studios. The meetings were recorded with notes.

Design in Home Furnishings Autumn '86 – Summer '87

Given the recent structural changes at Courtaulds, the growth in the central design facilities, the additions of Design Director and Design Manager, and the personal commitment toward the new design initiative of the Chairman and the Chief Executive, I expected the study would be a good opportunity to observe the effects of a new design initiative.

The initiative did not have a happy outcome and I have therefore given very careful consideration to the description that follows. As I re-read all the interviews and meeting notes prior to beginning this chapter, much of the decision making seems frankly perplexing given the stature of the company and the experience of the individuals involved¹. In order to try to understand or at least ask the question as to why the management team used design in the way it did, I am beginning at the end, and will then briefly outline some questions before discussing particular events through which to explore what happened to design at Home Furnishings.

¹ This leads to the consideration of whether design for the management team, became imbued with some form of "mythic quality" which affected their business judgements.

At the beginning of July 1987, the end of my period of observation, I received a letter from the Chief Executive of Home Furnishings which summarised the position of Home Furnishings as he saw it at the time. Extracts are given below.

The growth through to '85 was largely on narrow product lines. We developed skills in bulk production of embellished products. The market was under developed in these at that time. We moved M&S into this area and we had simple design production requirements. From '85 product proliferation took place. We embarked upon Brand and other own label business, and the resultant complexity gave us problems of control in the factory.

In the past year we also experienced exchange losses as we had centred our business on embellished products, largely out of Austria. In consequence, from the good profit position of '85 we have been operating at roughly break-even for the past two years. We have taken decisions to eliminate some of the complexity, and are getting to grips with tighter planning and better factory operation.

The main sales problems to have affected us in the past two years have been largely in the Brand side, and more recently in the own label side other than M&S. In Brands, we set ourselves the task of gaining market share in a created scene. We did things with embellishments primarily, but two years ago thought we had to broaden our design range. We have not kept pace with the need to sell discontinued lines, and also seconds.

We have now taken the decision to cull more fiercely the Brand range and have embarked on much tighter control of quality to alleviate the commercial pressure on seconds sales – the market for the latter has become very difficult due to over-production by the larger producers. The sales problem in own label has been the failure of some of our chosen accounts to be successful in the products they are doing with us. We are dropping some accounts and concentrating on certain product style, and expect to have a small business of between £0.5–£0.75 million.

All this before we come to the design problems of today which face our business of tomorrow, namely design focus for M&S and design handwriting for a narrower Brand range.

Throughout this period we have tried, on cost grounds, to run a central design studio, which would have the advantage of personal designs originally conceived for one customer for use elsewhere, if need be, thus minimising the costs of design origination, sampling, etc. This has not proved an easy task, and design costs have got out of line with the margins available in the business.

I am still not certain that we should not, as a business, reduce our complexity even more, simply down to M&S and Brand.

From the letter we can see that various issues frequently at the interface of design and business decisions adversely affected the health and confidence of Home Furnishings. What went wrong? Four key business decisions are set out below.

Increase in Product Lines

Home furnishings increased product lines in a way which meant that they could not adequately control the output of product. Design was employed to achieve increase in product lines, but thinking about design did not extend into thinking about the effect on production.

Sourcing from Austria

Embellishments sourced from Austria were incurring losses due to exchange rate changes. Design was regarded as able to generate new design ideas, but was not regarded as able to work towards solutions for the Austrian problem.

Broadening the Range

The design range was to be broadened, but there was no indication of an envisaged direction. Design was understood to be about the generation of new designs, but not about *focus*.

Re-cycling Designs

The existence of the central design studio was to enable designs to be re-cycled if they were rejected by one customer. This attitude to design includes a form of pragmatism after the event, but accepts serendipity.

The reality of design at Home Furnishings was very narrowly centred around the creation of designs by acknowledged designers. Excluded are the issues of new lines for the integration of design into production, the integration of design to plan market focus, and the integration of design to address business problems caused by external pressures. The strength of the narrow reality of design acted as an immense perceptual boundary fracturing thoughtful decision making and replacing it with a form of blind faith in designers' creativity.

In the Chapter 5, the separation of acknowledged designers' activities from the activities of managers is quite clear. The questionnaire study demonstrates that managers believe that the important tasks for design directors or design managers are those of acting as design influencers and as catalysts for others as they take decisions. Arrangements at Home Furnishings fit consistently into the patterns described in these earlier studies. The roles of the acknowledged and unacknowledged design decisions are squarely within the framework of the two senses of design, Seen Design and Silent Design.

The Role of the Design Manager

The new design manager in Home Furnishings had in fact just four months to acclimatise to his new job and to produce a new range of designs. Four months *is* sufficient time to physically produce designs and samples and to mount a presentation of a new range, but to do this the design manager would have had to keep consultation to a minimum. This would not have been difficult to do. As we have seen from the matrix study, interactions between

designers and managers at the design origination stage are minimal. Managers return when it is time to make decisions about the designers' output. At Home Furnishings this was in January when a new range of 23 designs, a selection of printed and embellished products, was ready to be shown to their potential customers.

The presentation was held in the Margaret Street showroom. There were twenty three proposed textiles, with the majority of these displayed in room sets, on beds, as duvet covers or pillows or cushions. All the fabrics had been made with sample screens, which entailed making up the bed linens from many small pieces. Apparently, this was not common practice in the business (but it did remind me of the display practices of design schools at end of year degree shows, even down to the size of each of the display stands).

Attending the presentation, from Home Furnishings was the Chief Executive, the Managing Director, the M&S Sales Account Manager, the Product Development Manager, his assistant and the Design Manager. From Marks and Spencer there were two bed linen selectors, one wall coverings selector and a trainee selector. The three Marks & Spencer selectors were women, and they were more relaxed and more casually dressed than those from Home Furnishings.

The presentation meeting lasted three and a half hours. The first part of the meeting was spent looking at the displays. Everyone walked round the exhibits with a list of their "price points" (the likely selling prices). Each textile was described by the Design Manager. He talked of "stories", which is the phrase used to describe the design styling, and of "patterns carrying colour". The selectors commented on which designs they liked and whether a particular textile might make an extension to their ranges, and on how appropriate the suggested price points were.

For the second part of the meeting everyone convened around a table. The senior selector began the discussion. On pricing, M&S was looking for a 31% margin. M&S was tight for time because they had brought the launch date forward from September to August. Finally they said that they would have liked to have seen design presentations in December, because it was now quite hard to make decisions, particularly since they had not been expecting such a new range.

The Home Furnishings Managing Director said quite directly that he wanted to push the selectors to identify one or two textiles that they would definitely accept. After much discussion they did accept two. On one of the textiles, "Lace Toile", they asked for certain changes to the colour ranges and a change of name to Dresden, and on the other textile, "Silver Feather", they wanted the embroidery removed, the pillowcases changed and a change of name to Gatsby. This second textile used a special metallic finish which could only be printed in Italy.

The selectors appeared very concerned over detail, for example, the detailing of lace inserts and the finishings of the topside and underside of the duvet covers were issues they wanted reassurance on. The samples were mock-ups and therefore detailing in these samples was only approximate.

The meeting turned to timescales. The selectors wanted deliveries at the end of July, and production would therefore have to begin on the 1st of June. A further meeting, in three weeks time, was set to finalise the designs. The Home Furnishings team attempted to bring other designs, which had not been part of the display, into the conversation. Many of these designs came from the Courtaulds Archive Collection. It will be remembered that the Courtaulds Archives had been mentioned during re-structuring as a good business opportunity. Though the selectors recognised the quality of these textiles and commented upon their high standards, they made it clear that the meeting was at an end. They had had enough for one day.

The presentation had focused upon the new design work of the Design Manager. A high proportion of these designs were not simple embellishments but were prints, directly in competition with Dorma and Vantona Viyella, who also supplied Marks & Spencer. The Courtaulds Archive material was also print designs. The existence of the archives and the suggestion that it was a good business opportunity had opened up the possibility of selling prints. Yet the business opportunity in archive prints lay in nostalgia and tradition, whereas the new designs undoubtedly challenged Dorma's and Vantona's markets in a much more direct way than the archives would have done.

The Consequences of the New Designs

De Zoete Bevan's report suggested that Home Furnishings would not compete successfully against Dorma and Vantona in printed bed linens. CTG had built a successful niche market in embellished products. While the use of the central studio and the addition of a new design manager, would seem on the face of it a sound decision, there was apparently no discussion of the direction of new niche markets. It would appear that the Design Manager had no awareness of a business-led design strategy.

The Courtaulds Archives which the Chairman had specifically mentioned as important in his press release and which might have had the potential to become a niche product were more or less overlooked by the new design manager for reasons that are not clear. With the M&S presentation over, the new range of designs was shown to other customers during late January and February. Regularly sales managers were in situations with customers where they had to attempt to rationalise the new design range, which represented a clear and unexpected change in direction. The sales managers were making design changes on an *ad hoc* basis as customers requested, mixing aspects of one design with aspects of another. Often the Design Manager would be present at these meetings and would be left protesting vainly, as his designs were changed in the process of attempting to make a sale. These meetings were effective in increasing conflict in Home Furnishings and signalled to customers a loss of overall direction, which had the effect of weakening Home Furnishings' advantage in embellished products, since customers began to buy from other suppliers. Even if they liked the new prints, by February most customers were committed to prints from other suppliers.

The Sales Manager who managed the Marks and Spencer account had strong opinions. His job had been made more difficult by the advent of the new design range. His perception of the situation indicates that design development could have been approached differently at Home Furnishings. Consistent with the opinions of managers from the questionnaire study, he believed design was important. He also believed design had to be accountable for providing designs that would sell and were what the customers were looking for. He considered that the Managing Director had taken too many of the final decisions on design, preventing accountability resting broadly upon the shoulders of either a sales manager or the design manager. 'As it is, if it goes wrong then so many people have had their say, it is no one's fault,' he said. Where production control was concerned, he said, design development had never been considered, no one had ever discussed the 'new designs in relationship to factory capacity', and the design work had never been targeted at particular customers. In effect he felt that all the design studio at Margaret Street and the Design Manager represented was an extremely expensive way of hiring a designer. The Design Manager did not do the job of managing design, nor had he ever been presented with the opportunity to do so. Though this was a valuable insight which could only have emanated from middle management experiences, the senior management team were never able to make any use of it – as the letter from the Chief Executive referred to earlier demonstrates.

Almost more frustrating however, is that although the Sales Manager and Design Director ended up at personal odds with each other, their opinions were remarkably similar. In an interview at about the same time the Design Director said, 'Designers are falsely tried and tested. They [the senior management] pay lip service to design. There is a lack of skill in putting people together and letting them get on with their jobs. It is counter-productive. Designers are constantly adapting to everyone's wishes. Contacts with management are superficial; they operate a closed door policy to designers, which leaves designers to manage the design studio, which is a very introverted job. They [the senior managers] don't work out their target customer. Designers need to be part of a team, design cannot be done on its own.'

The Sales Manager's and the Design Director's analyses of the situation were not in conflict. However, there was no forum where these two individuals could have expressed their opinions, and they never knew that they shared such a similar point of view. They were both caught in the intractability of their circumstances, and this continued in meetings where they were both expected to maintain a point of view suitable to their function, and this led to a downward spiral of crisis and confrontation.

The Effect of New Designs on the Factory

The problems were no less felt in the factory where the proliferation of designs, which were all selling but in small quantities, was causing headaches for the production team.

There was an increase in the total number of designs and many of these were for small quantities. Since production of bed linen revolves around girls on sewing machines, a

proliferation of small quantities is easier than in some production situations where equipment, dye stuffs etc. would have to be considered. However, managing Finished Product, Work in Progress and Uncommitted Stock was a juggling act which took three individuals from the Production management team a day and a half every fortnight. There were approximately 930 different lines and the computer print-out could not cope with the juggling which was now essential. Logistics in the cutting room were becoming critical because of the increase in small quantities. They had recently hired a highly qualified woman with previous experience in another Courtaulds plant to try to rationalise as far as was possible. There was a quality problem from the Courtaulds mill that supplied cloth and they were trying to work out a penalty payment, which they were hopeful the mill might accept. But the quality problem also affected the cutting room since it was in the cutting room that faults in the cloth were found. Up until the hiring of the new woman faults had not been found until later in the making-up stages.

The production team was working hard to improve efficiency. But the hard facts were that the factory was not meeting all its delivery dates. Discussion over factory capacity in relation to the introduction of the new designs had never taken place. The reasons for this are locked into the arrangements that were made for design development at Margaret Street and were further exacerbated by the showing of designs to customers in late January and February. No one could be sure what designs would enter production from the potential range of 32 which was on offer to the customers, and therefore no one could know what the issues on factory capacity were going to be. The factory claimed that pre-production time had to be a minimum of twenty weeks. If full production for Marks & Spencer was to begin in June, the factory needed firm decisions by February. Of course some very limited pre-production had already taken place for the twenty three new designs, but by the beginning of February M&S had not made a final decision. When M&S finally did make a decision, it was to trial two of the new designs but to also maintain many of the previous season's designs, which of course affected production planning. In late May and June, the factory was meeting 95% of its deliveries, and all in all they felt that they were doing better than they had expected. However, M&S was experiencing things differently, experiencing shortages and even being out of stock on some items. M&S found it was unable to sell sets of bed linen because of the missing items. Coupled with the confusion over the new design direction, M&S began to consider Home Furnishings as out of control, and so too did other customers. For a business so reliant upon M&S, this sent shock waves throughout the company.

New Design versus Product Development

The Chief Executive described the role of the Design Manager as 'to input design origination from wherever, and to progress design through the printers in particular.' Prior to hiring a design manager the development of designs and in particular the embellished bed linens which Home Furnishings relied upon so heavily, had been done by the Product Development Manager. The Chief Executive's description of his role is as follows: '[he]

handles cloth sourcing for style origination, embellishment sourcing and embellished product control (and design along with design manager), in relation to manufacturing the created styles; he is also responsible for keeping product development within known price points.'

In terms of managing the process it would appear that the Product Development Manager carried more responsibility for the tasks that might be associated with a design manager than did the Design Manager himself. Many of these tasks were critical to achieving good products. He was responsible for where the cloth came from and for all the embellishments, for any interpretation of styling prior to manufacture and for the costs. He was based in Wigan and had one assistant. Though it was apparently this man who had been largely responsible for the embellished bed linen niche market, he had in effect been passed over by the new design initiative that had been established in Margaret Street. As mentioned earlier the Product Development Manager had been a fabric technologist in the spinning and weaving business who had come to Home Furnishings to develop business with M&S. When he arrived he felt that insufficient importance had been given to design development and he had persuaded the Chief Executive to let him have an assistant. The M&S Sales Manager described him as 'a man with a chip on his shoulder'. In the circumstances, who could have blamed him? The situation in product development was tense and getting worse. All technical development that the Design Manager needed went to the Product Development Manager, and in effect this man could make or break a design by the moves he made and the rapidity with which he did so. Even if he had been enthused with the task of turning the Design Manager's designs into products, he was used to sourcing for a very limited range on embellished products. The sudden influx of a plethora of designs was overwhelming. In this "over the wall" design exchange it was prudent for the Product Development Manager to play safe and to maintain that certain things could not be achieved. The Design Manager had neither the experience, nor the technical background, nor the time to challenge decisions made by product development. The Design Manager gradually lost his grip, becoming so isolated that, for example, on my last visit to the factory, he refused to join the group for lunch even though the meeting was to continue on into the afternoon. Communications between these two aspects of design ground to a halt. Again the M&S Sales Manager's comment is apposite: 'the Design Manager should never have accepted the current product development manager as his technical development person.' He said further that if the Design Manager had had more experience of business he would have known that he needed a strong ally in production.

The Role of the Design Director at CTG

The strategic intention that created the Courtaulds Textile Group and the central design studio was undertaken to make CTG 'greater than the sum of its parts'. How was this expected to occur and what actions were taken to ensure that it did occur? Towards the end of my period of study at Home Furnishings I had an opportunity to discuss these two

questions with the Chairman. His answers are along the lines of the conclusions of the questionnaire where the roles of the design director and design managers are concerned. The Chairman described how his brief to the Design Director had been a simple one: to improve design at Courtaulds Textiles. The Chairman believed that the existence of a design director would signal to others, chief executives and managers alike, the new importance of design and that the design director would act in the role of a design influencer and as a catalyst for change. The design studio was provided with a certain amount of finance, centrally funded, to pay for day to day running costs and to finance the director. Arrangements for each of the businesses were that each would finance its own design manager and his or her direct design development costs. Home Furnishings was not the only business to be affected by the new initiative. Businesses in the Courtaulds Textile Group had always had a high degree of autonomy, and the re-structuring did little to change this. While Home Furnishings became caught up in a new design direction, Apparel Fabrics were able to continue almost unaffected by any influence from the Design Director. A brief description of the approach to the new design initiative adopted by Apparel Fabrics is given below.

Contrast Between Home Furnishings and Apparel Fabrics

De Zoete Bevan's report said of Apparel Fabrics:

Apparel Fabrics are the fabrics used for clothing, known in Courtaulds as Outerwear. CTG has been relatively more successful in its Yarn and Fabric divisions on outerwear... A major contribution to the successful changes in CTG's spinning businesses which control about 50% of UK capacity has been its reorientation away from commodity yarns for woven fabrics, towards the new leisure wear markets being satisfied by knitted fabrics... The potential is as great as the double figure margins already being achieved by Tricot France [owned by CTG].

Design capability in Apparel Fabrics principally lies in fabric technology. The competitive advantage lay in new fabric types and new technology to achieve this, and not new designs on fabrics. The new design initiative didn't add much, but importantly neither did it take anything away.

The Design Director had little effect as a design influencer or as a catalyst for change in apparel fabrics. In interviews with the Design Manager and Chief Executive of Apparel Fabrics the reasons for this became clear. The design studio for apparel fabrics had always been in Margaret Street. The Design Manager had been with the business for ten years and knew a great deal about fabric technology, and she considered that she had a good but pragmatic working relationship with the Chief Executive and other managers. The Chief Executive considered that for his markets he had all the design he needed. He valued his design manager, and said that she could probably produce excellent design, but her fabric technology understanding was of greater value to his business. He believed he could not tackle new markets on 'design alone'. He had nothing personal against the Design Director

and he had collaborated with him on new stands for trade fairs. He thought the Design Director had provided him with better and more consistent publicity on 'colour stories', but he said that the Design Director's lack of detailed technical knowledge of the apparel fabric business prevented anything more from occurring. It would appear that in this business the design activity was better grounded and relatively well integrated as a business consideration. But it is also probably true that it had a lucky escape, since the Design Director did not have much technical knowledge.

DESIGN AT HOME FURNISHINGS: WHAT WAS LEARNED

Although the reasoning used to arrive at the use of design to generate a new niche had a certain logic, the perspective adopted in the new design initiative prevented the communication that would have been required to develop such a niche. The new design manager in Home Furnishings, hired in September '86 and given the task to produce a new design range by January, could not have had been grounded in the business. There is no need to conduct a study to understand that an individual from academia, working in London, who sets about producing a range of twenty three textile designs, printed on screens (that had to be fabricated in Italy) and made-up into sample ranges by mid January would have had few occasions to adequately interact with the business people based in Wigan and would therefore have only scant knowledge of the issues the business needed to address.

For Home Furnishings, once it had commissioned the new design manager to produce a range of new designs from a London studio it had triggered a corrupted design and new product development information chain. So for example, there was little that production could have done to prevent the confusion experienced in May and June, since in effect it had already started the previous September.

Itami refers to information-based resources as "invisible assets", maintaining that these are just as essential for effective operation as the more visible corporate resources. He goes on to explain that

It is of course impossible to separate people from the invisible assets they carry. Engineers store technical knowledge in their brains, workers acquire skills and savvy on the job. These are examples of embodied information. People are important resources, not just as participants in the labour force, but as accumulators and producers of invisible assets. (Itami, p.14.)

The Sales Manager responsible for the M&S account who was severely affected by the whole initiative described what he would have done if he had been given direct responsibility for design, and two issues stand out as representative of something closer to a responsible strategy for design. His suggestions were that he would have developed a collection of designs which he would have been written off over a period of five years, rather than the one year period usual for Home Furnishings. He would have skipped a season with M&S in terms of new designs, in order to develop a new strategy *with* M&S. The reasons

he gave were that this would have increased the respect that M&S held for Home Furnishings, and in fact some individuals at M&S could not understand why they had not done this anyway.²

Had the Sales Manager's design strategy been adopted, it is probable that production would have also had an opportunity to participate. With the M&S team closely involved in design development, for its markets and with a more considered approach to other markets, which would have been generated by the decision to write off costs over a five year period, it is conceivable that Home Furnishings would have found itself a new niche. Another factor relevant to the Sales Manager's design strategy was that M&S was not that sure of the new designs and so decided to play safe and maintain many of the previous season's designs.

Home furnishings failed to recognise the design knowledge it already had in the development of the embellished niche. Instead Home Furnishings took a leap into the dark, believing that the presence of two designers could re-position their products and in the space of four months provide a new design direction more effectively than could their own people.

The first casualty was the Managing Director of Home Furnishings, who resigned as the confusion at Wigan increased in late May. He was closely followed by the Design Director, who went in June – he believed his job had become untenable. Two months later the Design Manager, for whom there was effectively no job left, also resigned.

As far as the designs were concerned, Marks & Spencer trialed two of the new designs but eventually took neither one into bulk production. The design studio for Home Furnishings at Margaret Street was wound up and the development of new designs reverted to the Product Development Manager at Wigan. The year of the new design initiative at Home Furnishings had been a costly exercise, not only in terms of financial loss but also in terms of Home Furnishings' standing with key customers and its confidence to move away from the M&S umbilical and consolidate the Christy Brand.

It is possible to see this business failure as a failure on many fronts, from poor strategic decision making through to poor operational planning. Normally design would only be sighted as a factor in business failure in terms of "poor design" and a failed artefact. But here we must recognise not just the failure of *a design*, but the failure of *the process* of design, and furthermore we must recognise the power that the process can wield – at Home Furnishings the failure the extent to which design decisions affect the business corrupted the decision making process. Prior to the advent of the new design initiative the form of design practised was silent design – the unacknowledged variety. This had successfully spawned the embellished product niche. The new design initiative acted in the same way as a virus on an organism, causing first disruption of the process and then a failure of the process to operate effectively. Once rid of the virus the organism was considerably weakened, but also immune. It would have been impossible to re-introduce acknowledged

²Design is probably not the only thing that has been employed by senior management teams in myth making. New technologies and information systems have also suffered a similar fate, perhaps with more devastating results – such as when a company fails to acknowledge that new modes of transferring information internally has the capacity to ultimately affect the entire management structure.

design back into Home Furnishings in the year or so after the new initiative had collapsed. The learning that had occurred had been of a very defensive kind, a kind of auto-immune response.

Niche Market Strategies

What did the chief executive have in mind when he referred to the need to ‘broaden our design range’? Was he referring to the development of new product niches, or to the corporate initiative which had emphasised the need for improved design with the investment in a design director and a central design studio? Though not overt, by implication the new arrangements for design devalued the old initiatives of which the embellished niche was a prime example. It is unclear whether the development of embellishment was a *deliberate* strategy or whether it merely *emerged*, though the latter is the more likely. If this was the case then Home Furnishings had no expertise in formulating niche strategies, and perhaps it is therefore not surprising that they did not know how to go about it. Although embellishments emerged, it was not an emergent strategy according to Mintzberg’s frame of reference – Mintzberg maintains that as strategies emerge, they are collected, nurtured and learned from by managers who are in fact crafting strategy (Mintzberg, p.38–42). Yet we can also see that the two key managers at Home Furnishings were nurturing and learning, though this was not acknowledged by senior managers.

In his book *Innovation and Entrepreneurship*, Drucker describes a range of three strategies that operate in niche markets, the toll-gate strategy, the speciality skill strategy, the speciality market strategy. ‘To attain a speciality niche always requires something new, something added, something that is genuine innovation... A speciality skill niche is rarely found by accident. In every single case, it results from a systematic survey of innovative opportunities. In every single case, the entrepreneur looks for the place where a speciality skill can be developed’ (Drucker, p.265–266).

The Home Furnishings sales manager who managed the Marks and Spencer account displayed many of the characteristics we associate with entrepreneurship, and it is likely that he and the product development manager shared responsibility for the innovation of their niche product. This fledgling capability in developing niche products was neither recognised nor encouraged. Drucker can perhaps give us a clue as to why this happened when he describes the dangers of specialised skill strategies. ‘While the speciality skill niche has unique advantages, it also has severe limitations. One is that it inflicts tunnel vision on its occupants. In order to maintain themselves in their controlling position they have to learn to look neither right nor left, but directly ahead at their narrow area, their specialised field’ (Drucker, p.267).

It is likely that senior management at CTG interpreted the “tunnel vision” at Home Furnishings as a lack of creativity and a resistance to change – a weakness to be remedied and not a by-product of a successful niche strategy. Maybe this was to be expected in the

culture of a company such as Courtaulds, which in effect was an administrative binding together of mature individual businesses.

Thus far, we could say that the entrepreneurial and innovative skills within Home Furnishings went unacknowledged, and the narrow focus required to maintain the product niche was understood as intractability. The remedy offered to Home Furnishings by senior management was a design studio, newly staffed by accomplished aesthetic-based stylists and designers. CTG is not alone in its inability to recognise the innovative abilities of long-standing, long-serving managers, an inability well discussed by Rosabeth Moss Kanter in *The Change Masters*. 'The loss to a company from the smothering of innovations is hard to assess very directly. We can only look at the process by which opportunities slip away.' She goes on to discuss what can occur when formal mechanisms are introduced that place the responsibility for innovation elsewhere.

Formal mechanisms make "innovation" itself a kind of speciality done by a specified group of individuals... innovation can occur in this way, but it is unlikely to be very innovative if the distinction makes sense, because the new products or processes are unlikely to move very far beyond what the system already knows... Confining "change" to one part of the organisation, or to a special role, may restrict its value – and create implementation or diffusion problems. (Kanter, p.87.)

The CTG central design studio was placed in this kind of role, and it will be remembered that the design director described design as being "falsely tried and tested". The implementation problems were crippling. However, these were not the only problems facing Home Furnishings after the introduction of the design studio. A major problem developed in what Itami has called '*resource fit*'. The sales manager for M&S went into great detail on how he would have managed the new development had he been given the opportunity; Itami writes, 'Surprisingly, many companies undertake a strategy without realising that they lack the necessary resources' and cites one reason as 'lack of careful analysis' (Itami and Roel, p.111). This was certainly true at Home Furnishings, but since the activities of the new design studio were largely unknown, prior analysis would have been difficult. What was significant in operations, and suggests the effect Itami refers to, was that in the resource planning no one had factored in an element of uncertainty, either as pure R&D time or as leeway for a learning curve. Although investment had been made in the central design studio and responsibility for the new season's designs handed over to it, the strategic and resource implications of such a decision were not only not understood but seem to have fallen, conceptually speaking, outside the bounds of the organisation. Senior management at CTG believed, as did many of the respondents of the questionnaire survey, that in the role of a catalyst for managers' decisions, design would not significantly impact upon the operating core of the business.

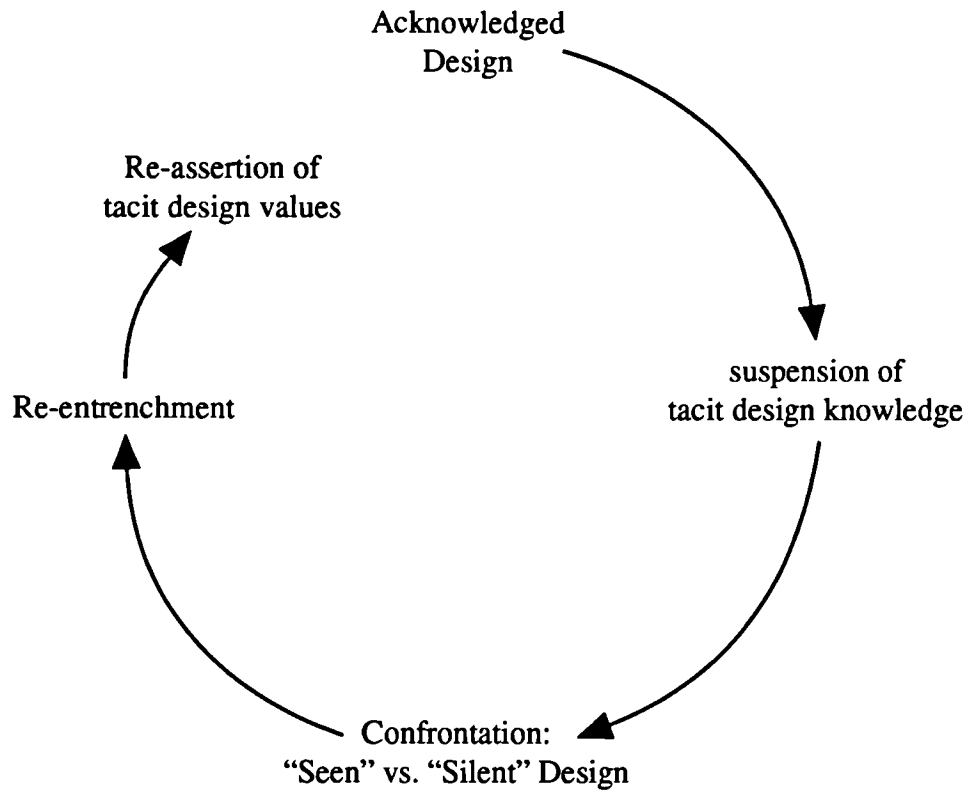


figure 48: five stages in the project lifecycle at Courtaulds Home Furnishings

Section Three

COMMENTARY

So far the idea of the two senses of design has been employed to explain the confusion and complexity in design development. Chapter eight, Strategy, Innovation and the Two Senses of Design, considers how this absence of an acknowledgement of the two senses of design impacts upon business strategy and the management of innovation. This is done by referring to existing management literature.

How could we have lost one sense of design? And why will we need a different perception about design to regain it? In order to answer these questions chapter nine, Conclusion Section One: a theoretical context for the split in design and the lost sense of design, looks outside the management literature to the theories of the category mistake (Ryle) and tacit knowing (Polanyi). With the aid of these two theories we can gain a different perspective upon the process of design development and so gain the necessary insights into the nature of the schism that occurred in design. In chapter nine, Conclusion Section Two: Re-integration of the Two Senses of Design, we review the findings of the research studies, drawing conclusions that enable contemplation of a re-integration of the two senses design.

Chapter 8: Strategy, Innovation and the Two Senses of Design

STRATEGY

The unacknowledged sense of design affects strategy in innovation and new product development. This chapter discusses this, and considers aspects of the literature. Mintzberg proposes a strategist as a learner and a pattern recogniser:

Managers who craft strategy do not spend much time in executive suites, reading MIS reports or studying industry analyses. They are involved, responsive to their materials, learning about their organisations and industries through personal touch.... The real challenge in crafting strategy lies in detecting the subtle discontinuities that may undermine an organisation in the future. And for that, there is no technique, no program, just a sharp mind in touch with the situation. (Mintzberg, p.38–40.)

It follows, therefore, that managers who are unable to appreciate how the design process behaves in both senses cannot be in touch with the situation; if they recognise patterns but have no basis from which to understand them, how do they make sense of them?

In the past few years the word strategy has been used in management so regularly and in conjunction with so many other words – “strategic visions”, “strategic intent”, “strategic marketing” – that it is hard to anchor a definitive meaning in relationship to management at all. Returning to the military origins of strategy seems an appropriate way to consider the basic principles of strategy making.

To improve their chances of winning wars, experienced generals had to formulate, as well as implement, effective strategies. However strategy has always been and always will be an elusive art. Victory in a single battle, or even a war, could not guarantee success in another, as winning generals in one battle could perform less well in the next. Learning from past battles and past mistakes, better preparation, new alliances, larger armies, new military technologies, and different fighting conditions made each battle unique, so past experience and wisdom, although important, were not the only factors contributing to victory. The ability of each general to judge correctly the uniqueness of each situation and to come up with the most appropriate strategy, given his own and his opponent’s relative strengths and weaknesses and the battle conditions, became an important determinant of success, out-distancing the contribution of other factors. (Makridakis, p.146.)

Judgement of a situation and the conditions to be faced are here cited as key determinants of success. Good judgement relies upon both explicit knowledge and intuition. Where design is concerned senior managers are unlikely to have this, yet these research studies

demonstrate that the unacknowledged sense of design is a part of managers' activities. It follows therefore that silent design will be within a stream of considerations of the strategist – either unacknowledged or just called by a different name. In design the strategist can use his intuition but not explicit knowledge, which is denied him by the condition of unacknowledged design. In strategic terms there will be an advantage to be gained from the explicit realisation of the extent of the unacknowledged sense of design and its re-integration with the acknowledged sense. Since the lack of knowledge is currently shared by all, as can be seen from many descriptions of new product development in the literature of innovation and core competencies, where the design development process is virtually ignored, as an area for strategic superiority design has the potential to make tactical contributions.

INVENTION, DESIGN, INNOVATION

The word innovate comes from the Latin *innovare*, to renew or alter and the Oxford English Dictionary definition is 'to bring in or introduce novelties; to make changes in something established; the alternative of what is established; a novel practice, method etc.' (The Shorter Oxford English Dictionary). The meaning of design has already been well discussed. It is given in the Oxford English Dictionary as: 'a plan or scheme conceived in the mind of something to be done; the preliminary conception of an idea that is to be carried into effect by action' – or alternatively as: 'a preliminary sketch for a work of art; the plan of a building; a piece of decorative work'. The differences in these meanings are clarified by considering the meaning of invent, which comes from the Latin *invenire*, to come upon or discover, and the word invention is given as 'the action of devising, contriving, or making up; contrivance or production of a new method, of an art, kind of instrument etc. previously unknown; origination, introduction'. While these descriptions may be rather dry they allow direct comparison with no interpretational bias. Innovation, then, is to make changes in something established. Design can be both planning how an idea may be carried out and planning how an artefact may be fabricated or decorated. Invention is the action of coming upon or devising something which previously didn't exist.

The notion of altering that which is already established, which is the meaning of innovation, is as open to interpretation as is the notion of a preliminary conception of an idea that is to be carried into effect by action, which is the meaning of design. Of the three words the only unambiguous one is invention: it is clear that whatever is invented has to be new. Invention can be used with either the action of innovation or design, but invention is not necessarily present in either. In fact if we were without prior knowledge of how the words are commonly utilised, we may come to the conclusion that invention and design were the most appropriate terms for new product development activities in organisations; since they encompass the discovery of new things and methods and the planning to put ideas into action or production.

Of course the ambiguity that exists in the meanings of both innovation and design cannot

be dismissed and discussion of their meaning is open to personal interpretation. However, it is a fact that continual references in the management literature to innovation are accompanied by the implication that design is less than critical in strategies for new product development. I suggest that many of the activities that those individuals using the word “innovation” are referring to, could better be described by the use of the word “design”, and further that there are times when it would be more accurate to describe the activity as “invention”.

The word “innovation” is used here in discussion of new product development by Rebecca Henderson and Kim Clark. They describe how innovation is traditionally categorised as incremental or radical.

Incremental innovation introduces relatively minor changes to the existing product, exploits the potential of the established design and often reinforces the dominance of established firms. Although it draws from no dramatically new science, it often calls for considerable skill and ingenuity and, over time, has very significant economic consequence. Radical innovation, in contrast, is based on a different set of engineering and scientific principles and often opens up whole new markets and potential applications.... Incremental innovation reinforces the capabilities of established organisations, while radical innovation forces them to ask a new set of questions, to draw on new technical and commercial skills and to employ new problem-solving approaches. (Clark and Henderson, p.9.)

They maintain that the categorisations are incomplete and misleading and they introduce a third category of innovation, ‘architectural innovation’. The entire situation could be made a good deal simpler if the three words innovation, invention and design were employed within the terms of their true meanings. The reason why this is so necessary has less to do with academic or semantic niceties than with the provision of descriptions that provide unambiguous labels for new product development and terms that managers can use to describe the different kinds of activities in the new product development process and their proper integration, including the recognition that not all activities will lie happily side by side.

Radical innovation is surely a combination of invention and design leading to innovation. Described in this way the complexity of the process is clarified – everyone knows that it is hard to make predictions where inventing is concerned. Incremental innovation, the making of small or sequential alterations into products or processes, is clearly easier to manage. It is a simple activity. Clark and Henderson give a definition of architectural innovation:

The essence of an architectural innovation is the re-configuration of an established system to link together existing components in a new way. This does not mean that the components themselves are untouched by architectural innovation. Architectural innovation is often triggered by a change in a component – perhaps size or some other subsidiary parameter of its design – that creates new interactions and new linkages with other components in the established product. (p.12.)

As an example of an architectural innovation Henderson and Clark refer to a manufacturer of large ceiling-mounted fans which introduced a portable fan into its range. 'While the primary components would be largely the same (e.g. blade, motor, control system) the architecture of the product would be quite different' (p.12).

However, surely the process of arriving at this architecture would be a design process. The contriving of the product would be a design activity and would be carried out by a marketer who would have considered the likely success for the company in the portable fan market and the industrial designer and product engineers as they determined how to make it look good and work well. This is the design development of a new product. It could be argued that the process of design, which it will be remembered is about carrying an idea into effect by action, will not always run smoothly. The idea is to make a portable fan (design), which will make a change in the established range (innovation). The idea of portability might open up other portable options to be explored (design leading to innovation leading to design).

The point is that when we omit the word "design" we overload the word "innovate"; meaning is lost and with the loss of meaning we also lose the opportunity to communicate the complexities and subtleties of the entire dynamic and evolutionary process. Henderson and Clark say that 'recognising what is useful and what is not and acquiring and applying new knowledge when necessary may be quite difficult for an established firm because of the way knowledge – particularly architectural knowledge – is organised and managed' (p.13). These are the same problems that this thesis recognises in the organisation and management of design and in the different realities that exist within the two senses of design.

The relationship between product and market in relation to design and innovation was discussed by Kim Clark in an earlier paper where he reminds us of the role of the customer in the innovation process.

I argue that the logic of problem solving in design and the formation of concepts that underlie choice in the marketplace impose a hierarchical structure on the evolution of technology. The pattern of innovation, the kinds of design changes introduced and their timing and sequence, not only depend on the technical alternatives but on the interaction between the internal logic of the product and the evolution of customer requirements. (Clark, p.236.)

The point made here by Kim Clark is, I believe, of critical importance. His acknowledgement of all these variables directs us to consider that the path of new product development cannot be precisely pre-determined. In this paper Clark acknowledges how sequences of design decisions determine patterns of change in product and process.

From the standpoint of the firm the search for competitively successful products and processes can be characterised in terms of the problems of design. Alexander has defined the process of design succinctly:

Every design problem begins with an effort to achieve fitness between two entities: the form in question and its context. The form is the solution to the

problem; the context defines the problem. In other words, when we speak of design, the real object of discussion is not the form alone, but the ensemble comprising the form and its context. (Clark, p.236–237.)

The dynamics in the sequence of design decisions that “emerge over time” involves the interplay of many individuals across not only all functions but also all customers, and is truly evolutionary in all senses of the word. The product, whether it be a semiconductor, a fibre such as Lycra, or a coffee pot, becomes part of the physical world and as such becomes integrated into lifestyle norms. In integration the product interacts with lifestyles and changes occur. For example, coffee makers probably increased the amount of ground coffee that was consumed and decreased the amount of instant coffee consumed. A pot of coffee could be kept hot for some hours making ground coffee more instantly available than “instant coffee”. The product acted upon the lifestyle. In the example of Lycra the product in the first instance acted upon lifestyle by giving women more comfortable and effective undergarments, but recently lifestyle has acted upon the product. Lycra was invented approximately 30 years ago but about five years ago fashion designers began to use Lycra rather differently to make body-conscious skin-tight dresses and trousers. Suddenly the meaning of the product has altered¹. The innovation came from outside the fibre industry and was caused by the design development work of fashion designers. But as pressure on the fibre increases, the fibre industry will undertake design development to make the fibre fit for its new role.

The dynamic between invention, design and innovation is a truly fascinating one and what makes it so fascinating is that we have the innate capacity to move between all three activities. Our civilisation is perhaps all the proof we need, yet often simpler examples demonstrate the strength of these innate capacities more clearly. In this description of a trip made by Conklin, an American ethnologist studying the primitive Hanunoo culture, we see an example of the naturalness of the dynamic of inventing and fabricating which creates innovations.

At 0600 and in a light rain, Langba and I left Parina for Binli. . . . At Anesaas, Langba told me to cut off several 10 x 50cm strips of bark from an anapla kilala tree (*Albizia procera* (Roxb) Beath) for protection against the leeches. By periodically rubbing the cambium side of the strips of sapaceous (and poisonous: Quisumbing, 1947;148) bark over our ankles and legs – already wet from the rain-soaked vegetation – we produced a most effective leech-repellent lather of pink suds. (Lévi-Strauss, p.7.)

The Hanunoo are a primitive tribe – yet here we see demonstrated their ability to perceive a need for a leech repellent, to invent one, to determine a method of carrying the repellent, and to determine the most effective form of application, the reference to pink lather giving indication that all the skin had been treated with no patches left uncovered and when the pink

¹ For further discussion of product meaning see *Product Meaning Space*, unpublished paper, K. Sakakibara, 1991.

colour wore off, one would know that the time had come for re-application. There is design involved in the selection of the best size of pieces to do the job effectively and the mode of carrying them, and innovation occurs with the altered state of the problem of leeches, since with the repellent the health hazard pertaining to leeches is reduced.

However, what is of prime importance is their knowledge, the technology of plants. Lévi-Strauss comments that the Hanunoo tribe have more than one hundred and fifty terms for the parts and properties of plants with which they can discuss characteristics and significant features, particularly medicinal or nutritional values. Here then is new product development activity in all comparative aspects – it has a technology, the plant knowledge, and a market context, reducing fear of leeches when travelling. And in the process of removing the bark from the trees, cutting strips and carrying them for some hours, the bark gains a physical reality of its own, separate from that when it belonged to the tree. It has its own meaning and context and it affects lifestyle. Most of our products are now highly complex and we experience a multiplicity of problems to be solved. There are potentially so many invention, design, innovation scenarios occurring simultaneously in the new product development process that in an attempt to simplify this state of affairs we have, I believe, focused over-much upon the outcomes: the innovations. This leaves organisations with insufficient ways to recognise and structure the dynamics of the new product development process.

The Process of Innovation and the Organisation

The exact nature of design problems is also affected by the nature of the organisation. The context within which the problem is to be resolved has an internal organisational reality in no less a way than the product will ultimately have an external market reality. In CTG we saw that the predominant internal reality made it more difficult for Home Furnishings to maintain the idea of specialised niche markets. A very vivid description of this phenomenon is provided by Tracy Kidder in *Soul of a New Machine*, after Tom West has taken a look at his competitor's product (Tom West is the "hero" of the book and leader of the project to produce a new machine).

Looking into the VAX, West had imagined he saw a diagram of DEC's corporate organisation. He felt that VAX was too complicated. He did not like, for instance, the system by which various parts of the machine communicated with each other; for his taste, there was too much protocol involved. He decided that VAX embodied flaws in DEC's corporate organisation. The machine expressed that phenomenally successful company's cautious, bureaucratic style. Was this true? West said it didn't matter, it was a useful theory. (Kidder, p.36.)

West goes on to describe, using his "theory", how their machine, "Eagle", will reflect Data General's need 'to maximise the win', in effect suggesting a more "entrepreneurial" lean machine, matching the origins of the company. The organisation's context or reality, as West suggests, is so important that it influences the design. We see this also in the

example of the Hanunoo tribe. They don't conceive of a "boxed" product but collect their "product" when necessary from the source (the tree). Organisational contexts and their different realities play a major role not only in the dynamics of invention, design and innovation but, as Clark suggests and as Kidder describes, upon the evolution and nature of the products themselves. The core values of organisations and their importance in strategic new product development is discussed in the management literature under various names: core competencies (Hamel and Prahalad, 1990; Hayes, Wheelwright and Clark, 1988); invisible assets (Itami, 1987); and the knowledge-creation process (Nonaka 1989). These and others represent the concern to uncover more about the value to organisations of that which organisations know but cannot tell (Polanyi). The tacit aspects of knowledge carried within organisations is described in various ways. This is Hamel and Prahalad's view:

Core competencies are the collective learning in the organisation... Competencies are the glue that binds existing businesses. They are also the engine for new business development. (Hamel and Prahalad, p.82-83.)

While it is important to recognise the existence of the tacit aspect of knowledge, it is equally important to recognise that utilisation of tacit knowledge occurs as that knowledge surfaces. The Hanunoo tribe's one hundred and fifty terms for plants enables "core competencies" to be recognised, and knowledge to be created. Language plays a vital role in shaping usable concepts. A metaphor, like Tom West's, becomes an ordering concept behind which many people can muster. The Hanunoo's one hundred and fifty terms becomes a system against which new discoveries and new designs can be tested. For competencies to create the "glue", some form of formalised acknowledgement of the glue must exist. It is in the acknowledgement of knowledge that effective deployment of that knowledge, or strategy, can come into existence. Hamel and Prahalad suggest that few western companies give studied consideration to their core competencies, and as a consequence they lose them.

The embedded skills that give rise to the next generation of competitive products cannot be "rented in" by out-sourcing and OEM supply relationships. In our view, too many companies have unwittingly surrendered core competencies when they cut internal investment in what they mistakenly thought were just "cost centres" in favour of outside suppliers. (Hamel and Prahalad, p.84.)

Unless there is a process for acknowledging these "embedded skills" by, for example, practising them in the tactics of the company then in effect these companies do not have usable "core competencies". In the example of CTG and Home Furnishings, they effectively "out-sourced" design when they constructed a central design studio and moved product development away from the two individuals who had the "embedded knowledge" from developing a niche market in embellished bed linens, to place it within the bailiwick of people who had design knowledge and "design" in their job titles but no design

competence in the context in which it was required. How are core competencies understood? Hamel and Prahalad write, ‘the tangible link between identified core competencies and end products is what we call the core products, the physical embodiments of one or more core competencies. Honda’s engines, for example, are core products, linchpins between design and development skills that ultimately lead to a proliferation of end products’ (p.85).

Hamel and Prahalad suggest that core competencies are to be understood neither as core products, which seems fair, nor as designs or developments, but as linchpins between design and development and end product, which may also utilise a core product. Now I do not wish to be obtuse, but in what communicable form do they exist? As a manager, how do I recognise if I have a core competence? In the current situation, we understand design from only one sense as the *direct activity* of fashioning the artefact whether it is an electronic component, a coffee pot or a dress. The activities of all others involved, since they are not named, exist in the “ether” of the company, i.e. there is no term that can be used to make their activities a reality. However, if we can acknowledge the other sense of design, that which currently is silent, and give it a voice, then we can understand that core competencies can, in some circumstances, lie within the process of design, as individuals turn ideas into actions and achieve fitness between two entities, the form in question and the context. The core competence is the sum of all the “intelligence” that is brought to bear on the solution to problems and the generation of new ideas from within a particular context. All this “intelligence” adds up to a “conceptual lens” from which to see the world. Just as the fashion designer “sees” details in clothing, in terms of an ongoing dialogue as fashions shift, and the Hanunoo tribe “sees” qualities in plants that we would be incapable of seeing, so a manager at Honda will “see” engines through a different conceptual lens from a non-engine person. To try to be clear about this point I will give an example from personal experience. Working with a group of managers from a shoe manufacturer and retailer, I quickly learnt that they “saw” shoes differently from me. As we visited shoe shops, this group (representative of all functions bar accounting and design) saw details like stitch length, quality and properties of leather (i.e. stretch), and last shape. I could not participate in their discussion since I could only discuss style and colour in a rather general way, whereas they discussed style and colour through the details I mentioned above. They understood the design of the shoe as the sum of its parts, saying also that not until the shoe was on the foot could one tell if it was a good design or not. As a group, these managers knew everything they needed to interpret an idea into a wearable shoe, fit for its purpose. They had not only the knowledge but a shared language with which to maintain a dialogue between the examples in reality and new details they had in their mind’s eye. It is through this process that new designs, be it engines or shoes, emerge. As a well qualified designer with a great store of theoretical knowledge I could only join in as an enthusiast and someone willing to learn. My theoretical knowledge base was not likely to enable me to produce well designed shoes; I was not as able in this instance as the pattern cutter from the shop floor.

We can understand that Honda is good at designing engines and is good at turning ideas

that involve engines into a multiplicity of products – a fitness between the form in question and the context. This is only a little different from the Hanunoo tribe who were good at making “products” that involved plants or trees. We can also understand that this acknowledgement affects knowledge, since turning ideas into actions builds knowledge. Hamel and Prahalad suggest that the isolation involved in Strategic Business Units fragments core competencies, which then ultimately fade away. If we understand that a sizeable slice of core competency can be an activity in the design process, then if communication is severely limited in the environment for turning ideas into actions, then so too is discourse – which is the generator of many ideas.

The theory of knowledge creation argues that there are two types of knowledge, tacit and explicit, and that they are both utilised in the process of cognisance. ‘Information is created as a result of the conversion of tacit knowledge into articulate knowledge’ (Nonaka, p.4). This occurs in two stages, the first an interpretation at a personal internal level, the second an articulation by means of words, gestures, pictures etc., which conceptualises and communicates the experience. Nonaka writes, ‘The meaning of information is necessarily context-specific and can be generated by forming a new combination of concepts. The new means is often born from intuition and speculation, which are attained through first-hand experience. Dialogues and reflective thinking to enquire about the “essence” of phenomena are indispensable means of generating new meaning’ (Nonaka, p.8).

For both Honda and the Hanunoo tribe this is so: meanings will be context-specific, new meaning will come from a combination of intuition and speculation, in effect messing around with elements that are familiar to produce the new. Nonaka uses the term “first hand experience”: the implication is knowing through involvement in actions, events, or, I would suggest, business tactics. This is a design process where many individuals are involved. In the Home Furnishings example those with the “first hand experience” were marginalised in the knowledge creating process and failure was the result.

Nonaka continues, ‘In order to facilitate continual creation of information in an organisation, the association and networks of concepts must be flexible and obsolete associations and networks need to be destroyed and renewed in these interactions’ (p.8). In accepting the truth of this statement, we can explain why those companies referred to much earlier in the thesis with fixed and formal ways to manage design came off worst. The earlier MSA plots demonstrated that mature, slow growing, non-innovative companies were most frequently those with formal methods of managing design. In common with everyone else these companies only have a descriptive system for a small part of design (though maybe differently from others); this formalisation inhibits flexibility and so prevents managers from developing new concepts. Deborah Dougherty and Trudy Hiller, in a research study conducted to understand why organisational structures and procedures impede new product development, concluded that the constituent activities to develop new product either violate legitimate practices or fall into a vacuum where no shared rules exist to make activities meaningful. The use of structures such as champions, skunk works and venture units they

describe as in some situations actually perpetuating 'the illegitimacy of product innovation. The implication stems from our finding that ceremonial legitimacy is not associated with success' (p.28–29).

The existence of two senses of design and the lack of acknowledgement of one of the senses can be employed to explain the vacuum described by Deborah Dougherty and Trudy Hiller. It has the effect of creating in certain senses a universal 'core rigidity' (Leonard-Barton p.91). The rigidity lies in the inability to see design activity in managers' jobs and thereby removes a vital link in the chain. The design activity cannot be expressed and therefore cannot be in the conscious domain of discourse where ideas flourish and change can be debated. We all rely upon language to make manifest our activities, and currently managers in most organisations are forced to resort to the language of their own functional specialisms. To refer to the Hanunoo tribe again, it would be as if the one hundred and fifty terms were not shared between men, women and children, but that each had their own set of one hundred and fifty terms. There would of course be three different realities. Sharing the same knowledge base means sharing the same system of descriptions and that set of descriptions must have a universality within the context, i.e. plants or engines. A universality of descriptions cannot be constructed when one aspect has a priority over another. Dorothy Leonard-Barton identifies and describes a negative in core competence as core rigidities. These are, she says, the dark side of core capabilities which as deeply embedded knowledge sets are not merely neutral but are active in creating problems.

In many manufacturing firms, for example, the design engineer naturally dominates, as a logical outgrowth of the traditional source of innovation and because the output of the design engineer is directly evaluated by the market. In contrast, the expertise of manufacturing engineers is extended on projects that cannot be so directly tied to the bottom line and therefore evaluations of their output are more ambiguous. A reinforcing cycle of values and managerial systems levels power and authority to the design engineer, who assumes primary responsibility for project leadership. ...projects derive enormous support from core capabilities. In fact, such capabilities continually spawn new products and processes because so much creative power in the company is focused on identifying new opportunities to apply the knowledge base that has built up over time. However, these same capabilities can also present a dark side to new product and process development. (Leonard-Barton, p.23–24.)

In this description the dominance of one knowledge set, that of the design engineer (who is the acknowledged designer), prevents the seeing of other knowledge sets which are in reality a part of the total knowledge set of the design engineer, because of course the new product does not reach the market without those knowledge sets being utilised. But since other knowledge sets are not acknowledged, they are not valued and so not stored, what is stored therefore is a corrupted knowledge base, and over time the corruption affects the evolution of new concepts and ideas.

Rigidities can affect all projects – even those that are reasonably congruent

with current core capabilities. To the degree that such rigidities hamper effective co-ordination among functions represented on the development team, the establishment of a new skill set, or acceptance of new technical systems, they can cripple or at least slow the development process. (Leonard-Barton, p.25.)

Expectations about roles can be self-fulfilling prophecies. The expectation that marketing can provide no insight into product definition will result in a limited role for marketing in the project thus preventing any potential input. (Leonard-Barton, p.33.)

We see devices emerging in companies that help in overcoming some of the worst aspects of core rigidities. One such is the heavyweight product manager described by Kim Clark and Takahiro Fujimoto.

As the concepts guardian, they keep the concept alive and infuse it into every aspect of the new product's design. As one heavyweight product manager told us, "We listen to process engineers. We listen to plant managers. But we make the final decisions. Above all we cannot make any compromise on the concept. The concept is the soul of the vehicle, we cannot sell it". (Clark and Fujimoto, p.114.)

However, while this practice may help in the short run, it is less likely to be the best long term solution. Knowledge building comes out of a dialogue between individuals. Knowledge will ultimately exist in too narrow a band if the synthesis is seen to reside in one individual. Over time, synthesis will become the role of that one individual, which will give rise to a further corruption in new product development and lead to a decrease in core capabilities with a resultant increase in core rigidities.

Another device likely to act as an aid is the method described by Steven Wheelwright and W. Earl Sasser Jr. in their concept of the new product development map.

...Managers need a way to see the evolution of a company's product lines – the "where we are" – in order to expose the markets and technologies that have been driving the evolution in the "where we've come from". Such a map presents the evolution of current product lines in a summary yet strikingly clear way so that all functional areas in the organisation can respond to a common vision. (Wheelwright and Clark, p.113.)

As a device, this makes visible the system by which, in any particular company, invention design and innovation occur, and can translate these into meaningful landmarks and contours. Another device is that of metaphor, which seems at this point in time to be more comfortably utilised in the cultural base of Japan than it does in that of the west. The use of metaphor is described by Ikujiro Nonaka in the paper already referred to.

The use of metaphor is highly effective for facilitating direct commitment to the creative process. Analytical methods can be used in generating new concept

via inductive or deductive reason, but are insufficient in creating more radical, meaningful concepts. (Nonaka, p.31.)

Nonaka cites occasions when metaphors have been used in the development of successful products. One example is in the “Tall Boy” concept for Honda’s best selling model, the Honda “City”. The development of this car was based upon the metaphor of a “theory of automobile evolution and the image of the sphere”. Hiro Watanabe, the development team-leader, and his group ‘viewed the automobile as an organism and sought its ultimate form in a conceptual effort to transcend the human-machine relationship’ (Nonaka, p.31).

Nonaka maintains that inductive or deductive reasoning methods are less effective than the non-analytical metaphor-based methods. However, it must be remembered that what is of critical importance in the generation of new concepts is a well functioning descriptive process. The Japanese language is more image-based than our own predominantly Latin-based language and therefore the two cultures may not in fact utilise metaphor in quite the same way.

We cannot sustain knowledge creation and/or core competencies by inventing “panaceas”. The value of restoring design, understood in both its senses, is that we might be less likely to grasp desperately at a variety of devices, and might be more able to allow a language to evolve for communication of the total range of design decisions within new product development.

A prime example of a device that has been grasped at to provide a language for communication is that of “quality” and it says much for the state of product development that quality systems and awards in fact measure and reward process alone. David A. Garvin writes, ‘Baldrige critics note that the award does not reflect outstanding, or even exceptionally good, product quality. Here they single out Cadillac, a 1990 winner that has yet to crack the top ranks of most surveys of automobile quality (Garvin, p.8). ‘...The Baldrige award was never designed to reward product or service excellence alone. Quality results do matter.... But the bulk of the award focuses on management systems and processes’ (Garvin, p.84). While no direct criticism of quality initiatives is implied, emphasising one aspect in any total process is surely bound to cause some imbalance and dysfunction.

The two senses of design can restore to our organisations a certain balance in knowledge creation. The continuum of invention, design and innovation exists at the core of human endeavour; the paradox of the desire to maintain continuity and the desire to over-turn that which is established is the dynamic which defines our race. Design exists in both the process of turning ideas into action and the sketches or plans for particular artefacts, and as such it carries within its meaning the difficulties of achieving practical realisation. Of course the meaning that I am suggesting here for the word “design”, turning ideas into actions, can mean determining to walk down the street and then so doing. I am not suggesting that everything is design. But I am maintaining that within the context of an organisation, and within any particular core competence, many individuals put ideas into action using detail

knowledge derived from their knowledge of a core product. They are not necessarily called designers but they are active agents in part of a design process that generates the continuity of an organisation's new products.

Of course critics might challenge this, and suggest that if design has come to mean just one thing then it is better left that way. I would answer them that if another term, i.e. innovation, could suffice as well, then all would be well and good. But this chapter demonstrates that not everything can be adequately explained by the use of the word "innovation", even with the addition of three categories of innovation, nor by a term such as core competence. The addition of the idea that there are two senses of design activity, one acting beyond the named designers provides additional and vital insight. Gareth Morgan describes ways of thinking taken for granted in organisations as 'cognitive traps' (Morgan, p.367). The dominance of the words "strategy" and "innovation" are cognitive traps to the understanding of design and new product development.

It is now time to consider how a critical element of design could have become so mis-categorised as to be lost from cognisant thought in our organisations.

Chapter 9: Conclusion

SECTION ONE: A THEORETICAL CONTEXT FOR THE SCHISM IN DESIGN

The Category Mistake

The philosopher Gilbert Ryle explains what is meant by the phrase “category mistake” with the aid of a series of illustrations:

A foreigner visiting Oxford or Cambridge for the first time is shown a number of colleges, libraries, playing fields, museums, scientific departments and administrative offices. He then asks “But where is the University? I have seen where the members of the colleges live, where the Registrar works, where the scientists experiment and the rest. But I have not yet seen the University in which reside and work the members of your University.” It has then to be explained to him that the University is not another collateral institution, some ulterior counterpart of the colleges, laboratories and offices which he has seen. The University is just the way in which all that he has already seen is organised. When they are seen and when their co-ordination is understood, the University has been seen. His mistake lay in his innocent assumption that it was correct to speak of Christ Church, the Bodleian Library, the Ashmolean Museum and the University, to speak, that is, as if “the University” stood for an extra member of the class of which these other units are members. He was mistakenly allocating the University to the same category as that to which the other institutions belong.

The same mistake would be made by a child witnessing the march-past of a division, who, having had pointed out to him such and such battalions, batteries, squadrons, etc., asked when the division was going to appear. He would be supposing that a division was a counterpart to the units already seen, partly similar to them and partly unlike them. He would be shown his mistake by being told that in watching the battalions, batteries and squadrons marching past he had been watching the division marching past. The march-past was not a parade of battalions, batteries, squadrons and a division; it was a parade of the battalions, batteries and squadrons of a division.

One more illustration. A foreigner watching his first game of cricket learns what are the functions of the bowlers, the batsmen, the fielders, the umpires and the scorers. He then says “But there is no one left on the field to contribute the famous element of team spirit. I see who does the bowling, the batting and the wicket-keeping; but I do not see whose role it is to exercise *esprit de corps*.” Once more, it would have to be explained that he was looking for the wrong type of thing. Team spirit is not another cricketing operation supplementary to all of the other special tasks. It is, roughly, the keenness with which each of the special tasks is performed, and performing a task keenly is not performing two tasks. Certainly exhibiting team spirit is not the same thing as bowling or catching, but nor is it a third thing such that we can say that the bowler first

bowls and then exhibits team spirit or that a fielder is at a given moment either catching or displaying *esprit de corps*.

These illustrations of category mistakes have a common feature which is to be noticed. The mistakes were made by people who did not know how to wield the concepts University, division and team spirit. Their puzzles arose from their inability to use certain items in the English vocabulary.

The theoretically interesting category mistakes are those made by people who are perfectly competent to apply concepts, at least in the situations with which they are familiar, but are still liable in their abstract thinking to allocate those concepts to logical types to which they do not belong. (Ryle, p.17–19.)

Ryle is intent on attacking what he describes as the “Cartesian myth”. The “Cartesian myth” surrounds the doctrine of René Descartes, namely the separation of the body and the mind as two distinctly different things, a bifurcation into two separate “lives”, one of the “physical” body and one of the “mental” mind.

Descartes apparently found himself facing a dilemma which Ryle describes as follows: ‘When Galileo showed that his methods of scientific discovery were competent to provide a mechanical theory which should cover every occupant of space, Descartes found in himself two conflicting motives. As a man of scientific genius he could not but endorse the claims of mechanics, yet as a religious and moral man he could not accept, as Hobbes accepted, the discouraging rider to those claims, namely that human nature differs only in degree of complexity from clockwork. The mental could not be just a variety of the mechanical’ (Ryle, p.20).

Ryle describes how Descartes constructed himself an escape route based upon differences in human behaviours, “intelligent” and “unintelligent” actions having a difference in their causation. Minds are things, but different sorts of things from bodies. Mental processes have causes and effects, but different sorts of causes and effects from movements of the body. However, as Ryle continues to relate, no positive descriptions were found for the workings of the mind, so that they were eventually described by negatives alone, i.e. they were not in space, they were not accessible to public observation, they were just bits of ‘not clockwork’. Ryle suggests that therefore they were being represented as ‘ghosts in the machine’.

Though the human body is an engine, it is not quite an ordinary engine, since some of its workings are governed by another engine inside it – this interior governor engine being one of a very special sort. It is invisible, inaudible, and it has no size or height. (Ryle, p.21.)

Ryle describes the mistake made by Descartes, as error in his logic. Realising that the problem was not one of mechanics he assumed therefore that it must be ‘one of some counterpart to mechanics’. Ryle believes that this creates an either/or, or both circumstance, since the dogma of “the ghost in the machine” can claim that there exist bodies and minds, and mental processes and physical processes, and also mechanical causes of corporeal movement and mental causes of corporeal movement. Ryle compares this state of affairs

to improper categorisation, as if a person said “I bought a left hand glove and a right hand glove and a pair of gloves”. Ryle is not proposing that we have to opt for the existence of bodies or minds, but that we do have to understand that there are not two different species of existence, ‘for existence is not a generic word like “coloured” or “sexed”’; rather we must understand that what can be indicated are two different senses of “exist” in a somewhat similar way to the word rising – “rising” has different senses, as in “the tide is rising”, “hopes are rising” and “the average age of death is rising”.

A man would be thought to be making a poor joke who said that three things are now rising, namely the tide, hopes and the average age of death. It would be just as good or bad a joke to say that there exist prime numbers and Wednesdays and public opinions and navies, or that there exist both minds and bodies. (Ryle, p.24.)

The difference between the idea of two different things existing and two senses of one thing existing is important to an understanding of what is meant by the existence of two senses of design. There is no intention here to construct a direct parallel between Ryle’s hypotheses and the two senses of design. On the other hand, there is great relevancy in the idea that a category mistake can give rise to situations which cannot be explained and which can become “ghosts in the machine”.

The ambiguities surrounding many examples of design given in this study suggest that the idea of a “ghost in the machine” is not so far fetched. We saw this occurring in Home Furnishings, particularly in some of the statements made by the Chief Executive. The following statement made by the Chairman of Courtaulds, Sir Christopher Hogg, is another illustration of mis-categorisation in design.

I perfectly well understand the importance of design. But that is not to say that my education, experience or natural instincts lead me with confidence to produce it myself, or back others to produce it on my behalf. I believe that a large number of managers have exactly the same problem. ...I believe that if you want to influence a whole organisation, your actions, and those of others who are seen to be acting on your behalf, are more important than your words. If there is an inconsistency between the two, watch out. So I know that I could not just harangue everybody about the importance of design, and expect something good to happen, particularly if I continued to wear blue suits and brown shoes.... There was, therefore, nothing for it but to identify obstacle number one as myself. (McAlhone.)

Sir Christopher’s statement is an example of the “ghost in the machine” – design is indicated as a strange and mystical thing, something he can believe in but that he cannot understand. In this way design takes on the mantle of a religious belief. Yet it is probably safe to assume that Sir Christopher Hogg, who held many senior jobs in Courtaulds before becoming Chairman, probably did not make a great many blunders in managing product-based companies. Blue suits and brown shoes apparently were not too much of a disadvantage. It is not individuals such as Sir Christopher Hogg who are the obstacles to the

utilisation of design, but the improper categorisation of design. Further, the improper categorisation of design makes design far more difficult to understand for individuals who are involved in the processes of producing products. To explain this I will return to one of Gilbert Ryle's examples of a category mistake, that of the game of cricket.

It will be recalled that the foreigner does not see who contributes "team spirit". 'I see who does the bowling, the batting and the wicket-keeping; but I do not see whose role it is to exercise *esprit de corps*.' Ryle continues, 'Team spirit is not another cricketing operation, supplementary to all of the other special tasks. It is, roughly, the keenness with which each of the special tasks is performed, and performing a task keenly is not performing two tasks.'

Consider that we did just this, that we determined that team spirit was another cricketing operation. Then let us consider the experiences of those involved in the game of cricket: there are the players, bowlers, batsmen and the wicket-keeper, there are the onlookers who are watching the game, and then there is our new individual, the "team spiriter". The game is then played, as before, and team spirit is automatically generated in the usual way. But let us consider how team spirit is understood by each of the groups involved. Where does the most ambiguity reside? Ambiguity about team spirit does not reside in the on-looker, for he simply experiences a good game of cricket – if he thinks about team spirit, well there is the highly visible "team spiriter" doing his stuff. Ambiguity doesn't exist for the "team spiriter" either, since he is producing plenty of team spirit activities, which have been defined, let us say, as jumping up and down, singing songs, wearing bright colours and producing slogans. However, ambiguity does exist, for the other players: bowling, batting and wicket-keeping are skills to do with bats and balls and catching and running (not to mention the strategy of the game). But team spirit is now understood as a matter of songs, bright colours, slogans and so on. If I am an ace bowler and everyone musters behind me and the game goes well and we win, and I am asked to give an interview and during the course of the interview I am asked about team spirit, then I am likely to say that we have good team spirit but that I must confess to being a novice, since I am better at throwing a ball than I am at making up a song or a slogan. So we can see that the confusion is greatest in those who are generating something which is important but which no longer has a name to be called by. Once the "team spirit" category mistake is established it is hard to overcome since, as Ryle says, 'certainly exhibiting team spirit is not the same thing as bowling or catching, but nor is it a third thing such that we can say that the bowler first bowls and then exhibits team spirit, or that a fielder is at a given moment either catching or displaying *esprit de corps*' (Ryle, p.18). In a similar way a manager could not possibly say that he was managing a product development project, and after taking project development decisions, then he made separate design decisions.

An example closer to the subject of design is considered next in an observer observing the making of a shoe. To make a shoe requires leather, a last, and knowledge of how the shoe must perform. Who might be involved? An expert in leathers, a maker of lasts, and an individual whose job it is to determine the nature of the shoe, for instance, that the shoe must

be bought by women, that it must flatter the foot, that it must keep the foot dry in heavy rain. We also need a buyer.

Our observer sees the three individuals meeting to discuss what they will make, and what they might sell. The discussion will range across many topics, including heel height, stitch length, colour, shape leather quality and so on. He then sees the expert choose leather and sees someone making a last in relationship to the agreed criteria. The observer then witnesses the testing of the prototype on a foot, for water resistance etc., and he observes the adjustments (to items like stitch length and construction of the sole and upper) that are made to make the shoe conform well to the criteria. He then moves on to observe the buyer as she considers the shoes on offer and selects a pair to buy. "This is a well designed shoe," she says as she purchases the shoe. The observer thinks, I saw everything except the design – where is the design? In the same way as with *esprit de corps*, "design" is not the same thing as for instance choosing leather or making lasts but nor is it a third thing. So we could not say that the expert firsts chooses leather and then makes a design decision, nor that in determining the criteria for the shoe the individual responsible is either setting criteria *or* designing.

If we allocate design as a third thing and make someone a designer and assign him the role of styling then, as before in the cricketing example, ambiguity does not reside in the designer who is busy with design, as we have determined it, in the style and appearance of the end product. Ambiguity does not reside in the buyer, who is buying a well performing shoe which is therefore a "good design". Ambiguity does however reside in the activities of the others, the leather expert who knows how to achieve a good resistant surface finish with strength and suppleness and not too much stretch, and also with the individual who makes a last that flatters a foot and will not create a crippling effect. Neither of these individuals are "designers" in the way we have now defined design as the style and appearance of the end product. In the cricket and team spirit example we know that to confuse *esprit de corps* with the activity of bowling is a category mistake and we are comfortable with the fact that while we can see "bowling" we can't see team spirit – it is just not expressed in the same way. But with design, we do not realise that there is a confusion caused by a category mistake. We do not recognise the design which *cannot* be seen because the styling of the end product, which *can* be seen, is called design.

The mind and body category mistake was made because, in certain respects, new scientific knowledge clouded issues, making it a good deal harder to know what could be *known*, as previous absolutes had been overturned. In a similar way, industrialisation which brought new scientific knowledge to the business of making things, clouded the issues for design; no longer did a craftsmen determine and fabricate a whole thing, if he fabricated at all. In this way one might say that category mistakes are more likely to occur at times of paradigm shift (Kuhn), when for a time much of what is known is suspended or overturned to make room for the new.

The decision making process whereby we fabricate products generates design, and at the

end of the process we discuss the end result, the product of everyone's labours, in terms of its design. The mistake is made when we believe that if we can refer to the end result as a "design", then design must be a separate activity along with choice of raw materials, construction, and criteria for functionality. It is within these decisions that the design is generated and the more complex the product, then the harder it is to identify discreet decisions. For the textile industry, Sir Christopher Hogg is correct when he implies that sensitivity to colour combinations is a criterion, but it is one amongst many. Sensitivity to colour combinations alone does not create textiles. But one effect of a category mistake is to place a "ghost in the machine". Paradoxically, Sir Christopher Hogg might have been able to describe more about design if he had been asked to discuss the "core competencies" of Courtaulds or his strategy for the future. We have in fact begun to adopt substitute terminology. The adoption of such open ended and general terms as "core competencies" in effect reflects the existence of the ghost since it implies all that we can no longer find words for. The existence of the category mistake has the effect of decreasing knowledge. Earlier references were made to the idea of tacit knowing as described by Michael Polanyi. Here I will discuss Polanyi's theories of tacit knowing, since I believe they provide valuable insights into how a category mistake in design was so easily made.

Tacit Knowing

Polanyi begins with the fact that "we can know more than we can tell". In the first of his many examples he describes knowing more than we can tell in the following way.

We know a person's face, and can recognise it among a thousand, indeed among a million. Yet we usually cannot tell how we recognise a face we know. So most of this knowledge cannot be put into words. But the police have recently introduced a method by which we can communicate much of this knowledge. They have made a large collection of pictures showing a variety of noses, mouths and other features. From these, the witness selects the particulars of the face he knows, and the pieces can then be put together to form a reasonably good likeness of the face. This may suggest that we can communicate, after all, our knowledge of a physiognomy, provided we are given adequate means for expressing ourselves. But the application of the police method does not change the fact that previous to it we did know more than we could tell at the time. Moreover, we can use the police method only by knowing how to match the features we remember with those in the collection, and we cannot tell how we do this. This very act of communication displays a knowledge we cannot tell. (Polanyi, p.4-5.)

In another example Polanyi refers to experiments conducted with humans whereby certain syllables triggered electric shocks. The subjects apparently became able to prevent or prepare for shocks but were apparently unaware that they were doing so. Polanyi suggests that this experiment demonstrates the existence of two kinds of knowledge. For Polanyi, there is a functional relation between the two aspects of knowing, which he names from the

language of anatomy. “Proximal” is the word he uses for his first term, for the meaning of that which we may not be able to tell. “Distal” is the word for his second term, which is the thing we are attending to and therefore can tell. The proximal is the carrier of the many bits of information that we need in order to attend to determining and describing that which is the distal. Polanyi gives an example of how these are related to each other and yet are separate.

To see more clearly the separation of a meaning from that which has this meaning, we may take the example of the use of a probe to explore a cavern, or the way a blind man feels his way by tapping with a stick... anyone using a probe for the first time will feel its impact against his fingers and palm. But as we learn to use a probe, or to use a stick for feeling our way, our awareness of its impact on our hand is transformed into a sense of its point touching the objects we are exploring. (Polanyi, p.12.)

In this instance the stick is a tool with which meaning is transposed and integrated. Yet Polanyi suggests not only that this is neither more nor less than the way that the syllables were used to gain knowledge of an impending shock, but also that we should not disregard the way the meaning comes to us. Although it seems as though once the meaning is integrated the tool has done its job, the process of interiorising that meaning is important in itself; in effect the naming or telling of the thing becomes less understood if we destroy or dismiss the sense we have about the things we cannot tell. In fact, meaning is a combination of both the proximal and the distal. ‘An explicit integration cannot replace its tacit counterpart. The skill of a driver cannot be replaced by a through schooling in the theory of the motorcar’ (Polanyi, p.20). In this section of his book Polanyi concludes ‘I think I can show that the process of formalising all knowledge to the exclusion of any tacit knowing is self defeating’ (Polanyi, p.20). Polanyi suggests that the first step in the pursuit of new knowledge is the recognition of the shape or nature of that which is to be studied and to make this first step we use tacit knowing, and of course we continue to use tacit knowing as we recognise each new step we make. He uses the example of identifying a frog, which he says is first identified informally by tacit knowing. If then we attempt to develop a mathematical theory of the frog we continue to refer back to the frog as first defined, and therefore any theory of the frog will lie within tacit knowing. For Polanyi therefore, tacit knowing is not an alternative way to know, it is not escapable, it is the way we come to know and how we extend our knowing.

If Polanyi is to be believed then tacit knowing cannot be put on or taken off as a pair of gloves; the proximal and the distal are not “stand alone” components of knowing. Though we name the distal it does not carry meaning without the proximal, in effect the proximal is “silent” and the distal is “seen”. As Polanyi demonstrates, the situation where one sense of knowing is silent does not have disastrous effects until or unless we come to formalise it, as in his suggestion that schooling in the theory of the motor car does not produce a skilled driver. Due to the category mistake made in design, though, we have done just this, we have

done the same as if we had separated schooling in theory from driving in practice. In design we have gradually lost the understanding of the relationship between the proximal and the distal in the design development of new products as mechanization took command and the production of things became broken down into stages or sets. Acknowledged or formalised design now exists apart from the unacknowledged or informal design. When the formal design is in some way over-emphasised and forced upon the organisation, as was the case at Home Furnishings, we see a collapse. If we return to Polanyi's first example of the face we can consider how this formalisation might be manifest. There is knowledge of the face to be reconstructed, there is knowledge of the choices of noses, eyes, mouths etc.. Let us also say there is knowledge of using the system. We might compare knowledge of the face to be reconstructed to marketplace knowledge, and we might compare the knowledge of choice of noses, etc., to the knowledge of the designer, and the knowledge of using the system to the knowledge of production. In this comparison, these knowledge bases will be represented by at least three individuals all with their own "closed circuit" of proximal and distal knowing. Consider now that we transpose onto them the task of reconstructing the face, we should ask how much longer will it take to transfer the knowledge between the three individuals, how much confusion will be generated and what might be the accompanying level of frustration? We might assume that they will be worn down by the communication complexities and at some point will agree to accept an approximation rather than an accurate picture. Making three separate distinctions in the instance of reconstructing a face renders the process rather ridiculous. Yet the category mistake made in design ensures that a similar, and similarly ridiculous state of affairs is the norm. What is more we cannot even very readily point out the stupidity since the category mistake in design is the official doctrine, in the same way that Ryle maintains that the body and mind separation of Descartes is official doctrine.

In summary, Ryle's concept of the category mistake, in the context of two senses of design, demonstrates how the wrong categorisation of things gives rise to confusion which goes on to compound the confusion with every new step taken. His phrase the "ghost in the machine" adequately describes mystique as replacing understanding. Polanyi's discourse on tacit knowing also informs and adds to our understanding of the category mistake made in design. The idea of the two senses of knowing, the proximal and the distal, increases our understanding of how the two senses of design interact. This suggests how easily a category mistake can come to be made when the presence of tacit knowing is not acknowledged or understood. The relationship between what he refers to as proximal knowing and distal knowing provides a concept whereby proximal knowing is effectively a conduit for knowing and also forms a part of distal knowing, of the meaning itself. In Ryle's example of the cricketing category mistake, we see that what creates the mistake is the lack of integration between proximal and distal knowing, since team spirit is a form of knowing that we cannot tell.

SECTION TWO: RE-INTEGRATION OF THE TWO SENSES OF DESIGN

Implications of the Category Mistake and Tacit Knowing

Many of the chapters in this thesis are devoted to detail of how the design development process operates. The two pilot study chapters considered both the formal devices in design that are introduced and the informal actions taken by managers. The questionnaire study collected data on the attitudes and practices of managers in different functions and the Home Furnishings chapter follows the story of one particular episode of design development. In all instances there are demonstrations of the way that managers unconsciously re-integrate the proximal and the distal. The pilot study provided evidence that formal methods to manage design are to a great extent ineffective – that the organisation’s “culture” is a much more influential tool, and is surely an example of tacit knowing. The pilot study also demonstrated how the “hot spots” in design development activity surround interactions between managers. Only rarely were there “hot spots” in interactions between acknowledged designers and managers. None of the interview data suggest that the acknowledged designers’ output is poor, but it would appear that it is not in a form in which it can enter the situation of the organisation. A process of re-integration must take place. The way that this is known by managers is tacit – the acknowledged designers’ activity having a somewhat similar effect as the syllables did in Polanyi’s example of the electric shocks – that is, triggering action where not the action but only the outcome is referred to. We saw in the pilot study that few instances of managerial decision making in design is called “design” by the manager. These actions are not verbally accounted for.

The meaning of the use of certain phrases, for example, “design is a catalyst”, becomes clearer in the light of the theory of the category mistake. Acknowledged designers are catalysts for action. The activities and output of designers trigger a sequence of managerial activities which must convert the designer’s meaning into a different meaning within the context of the organisation or project. The greater the distance between the two, designer context and organisational context, the less likely are optimal results within an acceptable time frame.

A further proof that there are wide discrepancies between the understandings of managers and designers came from the questionnaire study. The questionnaire study found, not surprisingly, that within organisations the only significant variance in beliefs came from the acknowledged designers. The nature of the situation so far discussed implies that this group is operating within a different context and could be expected not to share the views of others in their organisations. There is a difference in the situation of their tacit knowing, and therefore how they come to an assessment of meaning from their circumstances is different. Another result of the questionnaire study, that project criteria was a significant issue in determining practices and beliefs about design development, is a further factor which serves

to strengthen the case made above. If we doubt this, then we only have to reflect upon the episode at Home Furnishings to understand that what occurred there robbed the managers of the opportunity to re-integrate and create meaning within the context of the situation. The mistake made was very similar to the one I previously described, with the example of the face, where those who had seen the face handed over the responsibility of re-creation of the face to those who knew about the components, but had not *seen the face*. It was absolutely true when the design director for Home Furnishings said 'designers were falsely tried and tested.' Sadly, it was no ones fault, just the effect of Ryle's "ghost in the machine". Mystique over design substituted for an understanding of design.

The data in this study contribute detail to concepts such as "core competencies" (Hamel and Prahalad) and ideas such as "guiding visions" (Leonard-Barton et al.)¹ by demonstrating how much the process of design development is in the hands of the manager. The concept of the two senses of design enables the nature of that managerial activity in design to be better understood, as activities which provide the product with its meaning, and therefore its integrity. While the activities of the acknowledged designer make a contribution, he cannot alone produce product integrity. The design of the product exists as an entity which is achieved through a combining of the two senses of design. Design is not two different activities, as has been said before. In simple products, design can be vested in one individual, for example the acknowledged designer, acting as craftsman, produces the product entity. He can establish all meaning in the process of selecting materials and then fabricating the product. The product entity is then a product of both senses of design but all aspects are vested in one individual. What I am hoping to convey is that concentrating on numbers of individuals and numbers of activities misleads an enquiry on design. Design cannot reside in just one of the activities outlined above nor in one or two individuals. True, design is a plan conceived in the mind, but as Polanyi points out we cannot come to the plan without having used tacit knowing to determine the thing to be planned. In an organisation, the corporate mind is not one mind but a collection of minds. The design, in the plan or the sketches for the scheme of things, represents the meaning that the thing or product is ultimately to have. The drawing up of the intention of the thing or product, in a set of outline specifications or a product plan, is done by tacit awareness of a set of circumstances and focused knowledge of a product in its context of markets, technologies, fashions etc.. The focus is on the product, the awareness of the set of circumstances is tacit, yet it is with this that we arrive at the product plan or specification. Of course if we are aware of a different set of circumstances, so the product plan or specification will be different. It is here, right at this early point, that one sense of design occurs, together with "core competencies" or "guiding visions". As products or things become more complex many more individuals will be involved and many more design cycles will occur, but the two senses of design will not

¹ 'The project vision interacts across functions and across time. It provides an understanding of the context in which a project is conducted, both in terms of all the knowledge and services that surround a product when it finally comes to market and in terms of the capabilities that the company is building over time in a particular technology or process.' (Leonard-Barton et al., p.7)

suddenly become split into different things. However, there is a problem because the category mistake is well established, and only certain activities are called design. If we introduce design as being much more broadly based, and also introduce the idea that managers do design, is there a risk of compounding the confusion? The choice would seem to be that we can either maintain the category mistake, or we can determine that (in the short term at least) re-integrating the two senses of design would have to begin with the somewhat false notion that the two senses of design manifest themselves in different expressions of design. The word design can then be described in the first instance as an umbrella term, within which there are two experiences of design, the acknowledged “seen design” and the unacknowledged “silent design”. (See figure 49) Although this is not a totally integrative device it is a practical one. Discussion can occur within organisations about the experiences of the two senses of design. The umbrella diagram acts as the stick did in Polanyi’s example. In this case it becomes a conduit for translating the environment.

[In] the centre of the umbrella are the specialised design activities, which can be referred to as “seen design”. Beside them, still under the umbrella, are the silent designers of the other, related functions, especially marketing and production, who link design with manufacturing processes and purchasing customers. And holding all this together is the general management process, again silent with respect to design itself, which ensures the appropriate level of co-operation among the various specialised functions and the broad fit of product, process, and context.

Conceived in this way, design becomes not simply one activity in the new product development process but the fit of all the activities that affect the performance and appearance of the product. It thus emerges as a means to explore and manage the various dimensions of design and its various interfaces so that several different realities blend into one integral product. (Dumas and Mintzberg.)

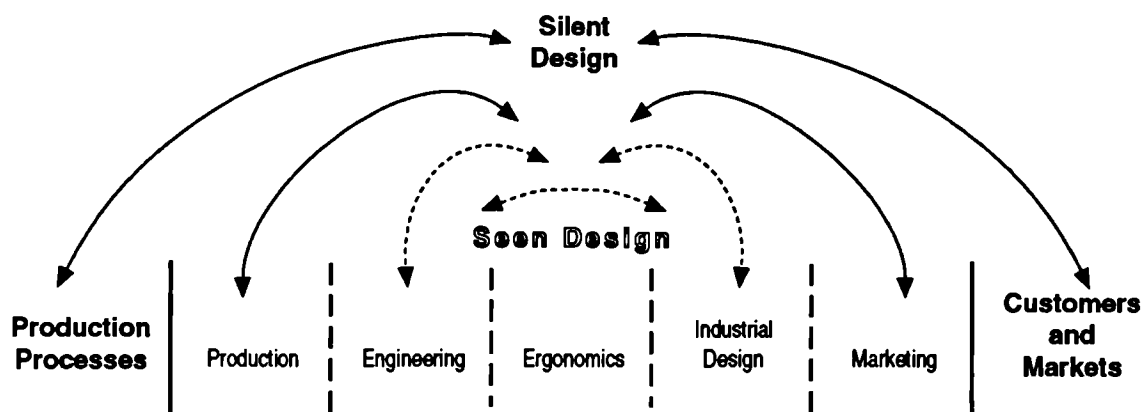


figure 49

To summarise, the concept of tacit knowing assists in the explanation of how the two senses of design operate and integrate. Managers use their tacit knowing, their awareness of the circumstances, both to define and to integrate. Since they are attending to the product,

all knowledge used and built in the process of attending to the product is tacit. This defining activity is the start of the design and in the start of the design are also circumscribed the rules for its development. The two senses of design, acknowledged and unacknowledged, could theoretically be re-integrated, yet practically this will cause confusions and it would be more appropriate to consider different expressions of design. In this way both the unacknowledged or more tacit activities of the managers and the acknowledged activities of the professional designer can co-exist and can come to create a different understanding of the relationship between the two.

INSIGHTS AND PRACTICAL APPROACHES TO RE-INTEGRATION

The conclusions of this thesis have far reaching implications for the situation of design development within new product development and innovation. So far these implications have been discussed at a theoretical level, with the evidence collected in the study, and while essential to the nature of an academic thesis, the theoretical discussion thus far does not appear to provide for a practical approach to change. However, many insights in this study came as the result of working with teams of managers in product development projects. The brief description that follows will serve to indicate how the conclusions of this thesis contribute in a practical way to the improvement of new product development.

The phrase “we know more than we can tell” sets off alarm bells in many managers, triggering a concern that not telling means not communicating. Individuals feel that they must be able to tell, preferably in words or numbers, and that without these props they are trapped. But there are other phrases we should remember, “actions speak louder than words” and “a picture tells a thousand words”. Words and numbers are not the only communicators. Actions and pictures are communicators also, and what is more, they have a greater potential to communicate at the level of tacit knowing. They are therefore the best means of communicating when we “know more than we can tell”. Polanyi’s example of the police identi-kit system is an extremely good example. An example is described below where a successful new product development process was generated using products and pictures with few words and no numbers.

During the course of research for this thesis, the chief executive of one company became interested in improving the sensitivities of managers to design. In particular he had in mind the product engineers. The company designed, made and retailed shoes world-wide. This project, which occurred after completion of the pilot study stage of the research, had the benefit that matrix charts had been completed for this company. Matrix charts indicated that interaction between designers and managers was limited, since there were no “hot spots” in their interactions. Design development activity was at medium levels and widely dispersed. Range builders were responsible for market assessments, product planning and specification, designers were responsible for producing a design to a specification which

would then be passed “over the wall” to product engineering for an interpretation. In the interpretations, the design was made ready to be mass-produced within factory constraints. The company was proud of their technological development in the soles and construction of shoes.

Problems facing the company were most acute in the area of women’s shoes, where fashion and styling are critical and are evidenced in subtle aspects of detailing. Within the company there was a belief that designers and Italians understood design details better than did others. How could they compete therefore, without employing an army of designers and Italians?

I was asked to develop a programme for the existing workforce to push the boundaries of sensitivity to detailing. This is how the programme operated: managers were formed into cross-functional teams of 6 or 7 individuals. A typical team would represent factory managers, product engineers, retailers, range builders, perhaps an individual responsible for sourcing leather or a pattern cutter and occasionally someone from R&D. For obvious reasons no acknowledged designers participated in any of these teams. The programme spanned five days over a period of three weeks. In this time, each team developed and made a prototype of a new product. They then presented the prototype, together with a market positioning statement, to the chief executive and the board. In every instance, the new products were extremely sensitively detailed, and a high proportion of these prototype products were sensitively positioned in what would have represented a new market position for the company.

In developing the programme, I sought a sequence of activities which would draw out the embedded skills and sensitivities of shoe makers. Much like the identi-kit process, it was to be a tool or a kit of parts which brought to the surface the knowledge that was tacit. With a face, our understanding of the perceptions of the person or his or her character is conveyed inextricably by the combination of the features. So with a product, our perceptions of for example a shoe, whether elegant, fussy or hard wearing, etc., are also conveyed by the arrangement of its details, its materials, stitching and shape. However, there is one difference in the purpose of the identi-kit and any technique to develop a new product. The identi-kit enables likeness to be replicated by choosing from an array of existing features. When developing a new product, however, we are hoping to create new features, not a likeness of something already existing. But it is also likely that we will be making an adaptation of a dominant product type rather than creating a radically new product. Adaptation is common at all product scales, and within many technologies. For example, shoes and automobiles have much in common, because both technology and styling changes tend to affect detail rather than total product concept in terms of task performance. Since the invention of the petrol engine, the car has not altered to any significant extent. Similarly the shoe is a “dominant design”. New product design is more commonly a re-design of a dominant design than it is a “radical design”.

The programme began by considering the marketplace, but not by following a typical

market analysis process. A company needs to be ahead of its own market, having a sixth sense of what is to come, particularly where any aspect of women's wear is concerned. We began with the consumer preferences of fashion design students. We went shopping with these students and returned to the workshop with a pair of shoes that they had chosen. The shopping trip was followed by a process I had devised using many visual comparisons, not of shoes but of other products at a variety of scales. The visual comparison process enables the characteristics that are conveyed in product details to be understood and discussed and then to be utilised as components in the development of a new product.

Each group then determined a set of product characteristics to which the shoe they were working with belonged. An object that was later to become significant in one group was a prototype Japanese train that rode on a cushion of air. The front end of this locomotive had great elegance. The train became a metaphor, enabling this group to prototype an extremely elegant and attractive soft women's shoe with all the air-cushion technology which was, at the time, built only into men's shoes. By attending to the group of product characteristics, this group's awareness of shoe construction came naturally into play. But their knowledge of shoe construction was utilised by them in a very different fashion from their normal product development methods. This alternative process generated a shoe of far greater sensitivity with better market potential. The process enabled teams of managers to use their "core competencies", a detailed knowledge of shoe construction and shoe markets, in a design process to develop a new product. In a very short period of time, they had made shoes which demonstrated that there was no lack of sensitivity to design detail. What had been lacking was a vehicle to unlock the design process.

The end result of this process, which uses the dynamics of tacit knowing because they are at the very core of the design development process, was a group of managers who had learnt that they did have the "know-how" to produce shoes which could compete with Italian detailing. This "know-how" just required a key to unlock it. The board of this company was initially very shocked by the capabilities residing within its own product engineers.

Of the many things that were learned during the programme, there was one which related to the structure of the company. The formal structure had recently changed in a restructuring exercise. This had been well researched and recommended by a top team of consultants but it had actually taken little account of the needs of product development and was ignorant of the subtle complexities in product design development which is the life blood of all manufacturing companies. After the programme was completed, this company needed to make alterations to the reporting relations of product engineers.

Visual comparison, which begins with overall perceptions and continues in the establishment of the details within which the perception is carried, is a process of which everyone is capable. The process is merely a tool – operating in a similarly to the way Polanyi describes the use of a stick in a dark cave, which becomes a conduit whereby we can gain a picture of the environment and particulars of the cave. It is very important to remember that the interpretation we make of what we feel through the stick will depend as much upon

our prior knowledge as upon our immediate location in time and space. The stick cannot inform us of things we have never previously encountered and we will, in making a verbal account of what we feel, constantly refer back to the things that we know.

In attending to the development of new product within a design process as described above, a new product becomes imbued with the knowing that is particular to a group or a company. Once in existence the product is then an entity from which to begin the cycle again. The product in use has a role to play. Comments of users carry meaning not only for a small sector of the organisation who gather market data, but for all those who participated in creating the product entity. In the shoe organisation, I was struck by a phrase coined by manager, that you couldn't judge a shoe till it was on the foot. During the programme this sentiment was frequently expressed. Rarely in these conversations was there a shoe or an appropriate foot (the workforce is predominantly male) – yet everyone in the group knew or had a sense of which form would enhance a foot and which would not. Whether it is a coffee machine, a shoe, an automobile or a semiconductor (where the relationship is admittedly of a different order), the product entity is not in existence without the user. In the shoe company managers at all levels and from all functions, but most particularly from product engineering, seemed to have stored a wealth of knowledge on the interface between the shoe and the foot.

Devices such as the method described above, visual or verbal metaphors, mapping techniques, all form excellent tools, but they should not be seen as ends in themselves. They only assist in the triggering of the dynamic between the proximal and the distal knowledges. To become overly focused upon techniques is ultimately to confound the process whereby knowledge is gained. The brief description of the development programme is included to demonstrate that a practical development programme which was underpinned by the theoretical conclusions of this study produced effective results. The new product development process was proven to be improved by adopting the method of using visual and verbal comparisons. The company used the method soon after the final programme was completed, when facing a crisis over new product development in one particular factory, and found they were able to generate new product in a quarter of the time of their traditional new product development methods. However, the company also had to face certain implications of the structural issues that the insights of the development programme had generated. The structural issues were as clear, if not clearer, to the participant managers as they were to the senior management team. However, further discussion of this programme falls outside the purpose here, which is solely to demonstrate how the theoretical findings of this study can translate into powerful new product development programmes.

RE-INTEGRATION OF DESIGN AND DIRECTIONS FOR FUTURE RESEARCH

Chapter Three demonstrated that there has been little or no integration between researchers or writers on design and researchers or writers on the management of new product development or technology management. I hope this study has provided sufficient groundwork to prove that this separation should not be prolonged. I also hope that this study might be sufficiently persuasive to encourage other researchers in management fields to consider design as a legitimate aspect in future studies into new product development processes, whether these are of an organisational, strategic or operational bias.

The most important insight to come from this study has been the extent to which managers across many different functions take forms of design decisions that are within the design development process. In future research on the design development process in new product development this insight will make a significant contribution, clarifying a number of managerial activities which have so far gone unacknowledged or have been described with various terms including core competencies, empowerment, entrepreneurship, knowledge creating, guiding visions, architectural innovation and so on. This is not to suggest that such terms are not legitimate within their contexts but more to suggest that within the research community in new product development it is hard to build knowledge on decision making in design development, when activities are so variously described. An opportunity to build a core of knowledge would be provided by the use of the framework of the two senses of design.

Also in this study there are many indications that issues of structure are significant. For example, the Home Furnishings study demonstrated that the way a company understands design and holds design within the structure of the organisation are inextricably linked. Research into organisation structures and their impact upon new product development has formed a predominant view that units of a smaller scale, where the power is vested in a team, produce far more effective results. However, certain Japanese researchers would point to examples in Japanese team working of too much homogeneity (Sakakibara) stifling certain dynamics in the design development of new product. The two senses of design will assist in the description of design development and so will provide the opportunity to gather up different design development scenarios for comparison with each other. Within a scenario would be descriptions of for example, managerial contributions, designer contributions, project intent, user conditions, technological constraints and development timing and sequence.

It is unlikely that there is just one best way to undertake new product development. A framework for understanding the dynamics of design will provide better knowledge which will spawn greater flexibility.

Informed by the theory of the category mistake and the two senses of knowing, proximal and distal, the two senses of design provide a framework where perceptions of both

envisaged product outcome and processes to realise envisaged product can be considered in a conceptual or theoretical way using data gathered in design development scenarios. The emergence of the dominant model in design came about within the context of industrialisation in Britain in the latter half of the 19th century. The origins of the category mistake made in design are therefore deeply embedded in industrialisation in Britain. We might surmise that the category mistake is most powerfully felt in Britain. However, the way in which industrialisation and education systems were disseminated across the globe means that few cultures escaped the influence of the design category mistake. Yet we also know, principally through events in Japan, that ideas are significantly affected by the cultural context into which they enter. The quality initiative of Deming is a prime example of how an idea rejected in one culture can flourish given a different set of cultural norms. Although the current model of design is that which has dominated the West, when it is overlapped upon a different cultural context, the dominant model is affected and altered. If we look carefully, we will see elements which will enable a different model to emerge. The example of cultural differences in East and West generates an obvious example, yet subtle differences do exist across more apparently homogeneous groups, for example, within the countries of Europe and across companies in different industrial contexts.

Historians and anthropologists allow us insights beyond the apparent immutability of our own particular cultural contexts. In the total nature of things the current and dominant model of design, which emerged during the late nineteenth century, is neither fixed, nor does it constitute an ancient immutable truth. We do ourselves no favours in shackling design to this older order of industrialisation.

Appendix I: Matrices

MATRIX 1 RESULTS

		Artefacts										
		Input by Designer	PRODUCTS				ENVIRONMENTS			INFORMATION		
			R & D	Engineering	Process	Sourcing	Building	Space	Equipment	Operational	Product	Corporate
Steps	EVALUATE											
	ADVISE											
	PLAN											
	SPECIFY											
	SUPERVISE											
	DEMONSTRATE											
	IMPLEMENT											

Organisation: British Home Stores

		Artefacts										
		Input by Designer	PRODUCTS				ENVIRONMENTS			INFORMATION		
			R & D	Engineering	Process	Sourcing	Building	Space	Equipment	Operational	Product	Corporate
Steps	EVALUATE											
	ADVISE											
	PLAN											
	SPECIFY											
	SUPERVISE											
	DEMONSTRATE											
	IMPLEMENT											

Organisation: British Rail

		Artefacts										
		PRODUCTS				ENVIRONMENTS			INFORMATION			
		Input by Designer	R & D	Engineering	Process	Sourcing	Building	Space	Equipment	Operational	Product	Corporate
Steps	EVALUATE											
	ADVISE											
	PLAN											
	SPECIFY											
	SUPERVISE											
	DEMONSTRATE											
	IMPLEMENT											

Organisation: Clarks Shoes

		Artefacts										
		PRODUCTS				ENVIRONMENTS			INFORMATION			
		Input by Designer	R & D	Engineering	Process	Sourcing	Building	Space	Equipment	Operational	Product	Corporate
Steps	EVALUATE											
	ADVISE											
	PLAN											
	SPECIFY											
	SUPERVISE											
	DEMONSTRATE											
	IMPLEMENT											

Organisation: Courtaulds Contract Clothing Division

		Artefacts										
		PRODUCTS				ENVIRONMENTS			INFORMATION			
		Input by Designer	R & D	Engineering	Process	Sourcing	Building	Specs	Equipment	Operational	Product	Corporate
Steps	EVALUATE											
	ADVISE											
	PLAN											
	SPECIFY											
	SUPERVISE											
	DEMON-STRATE											
	IMPLEMENT											

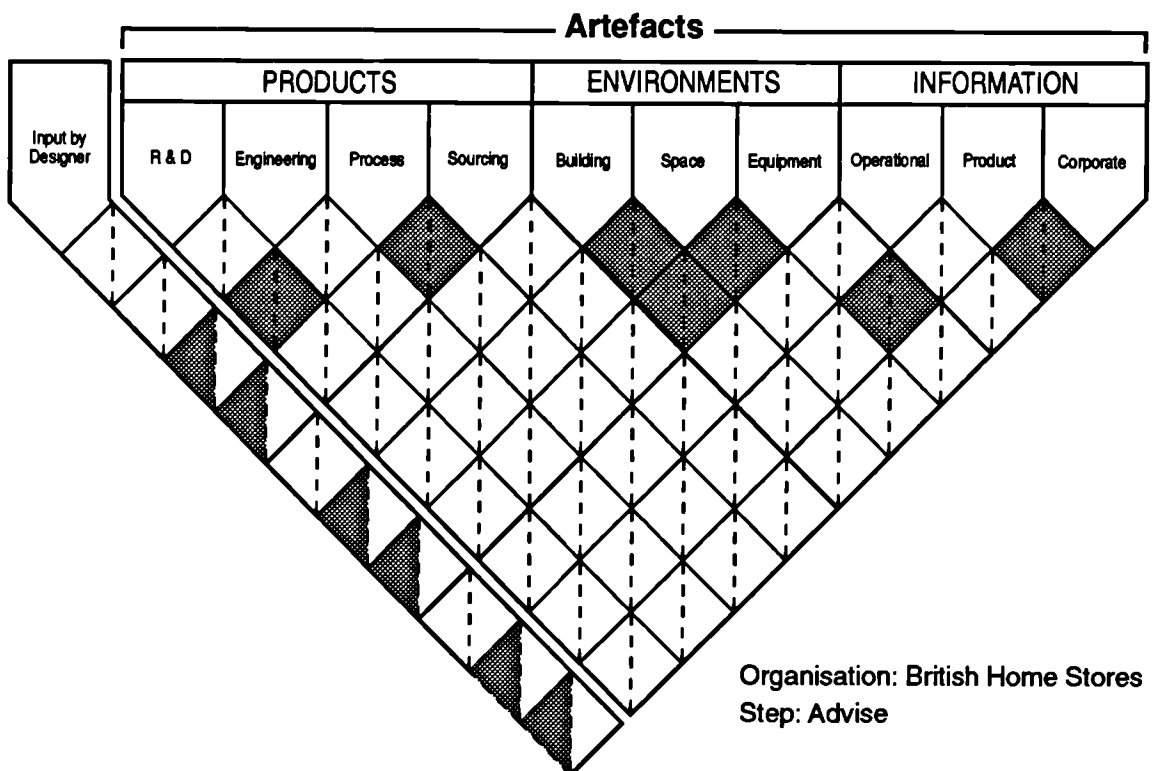
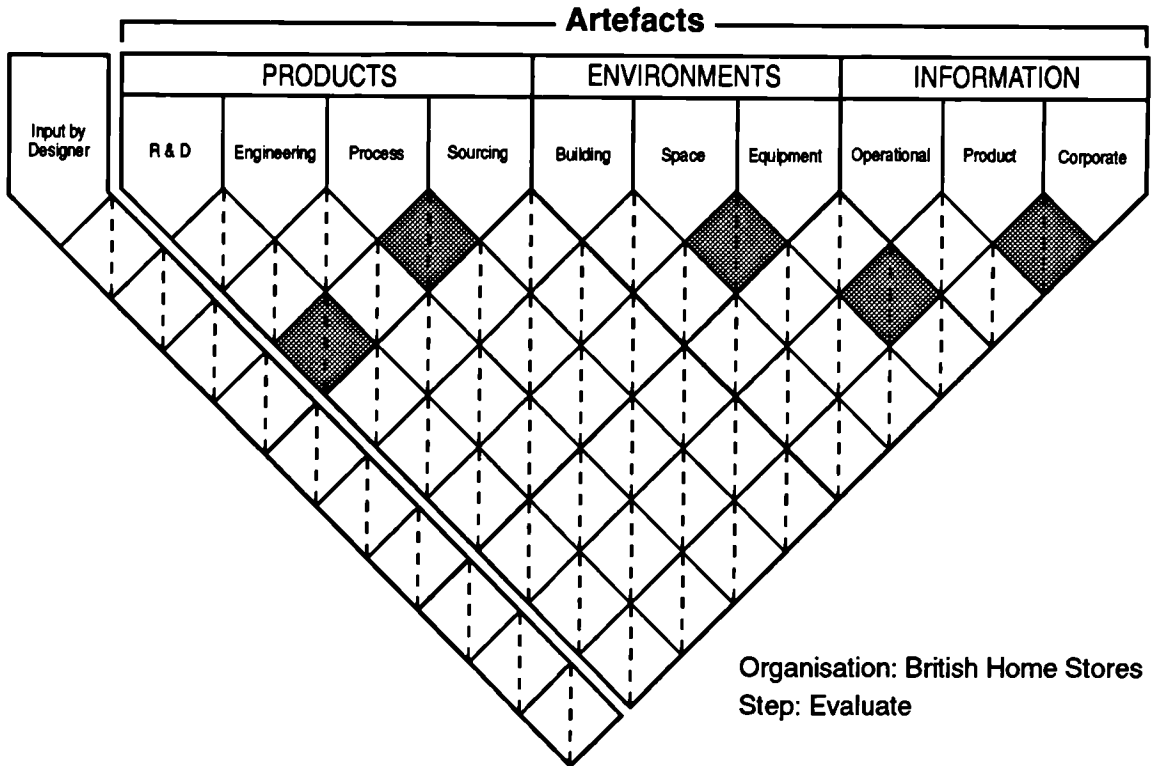
Organisation: Sealink

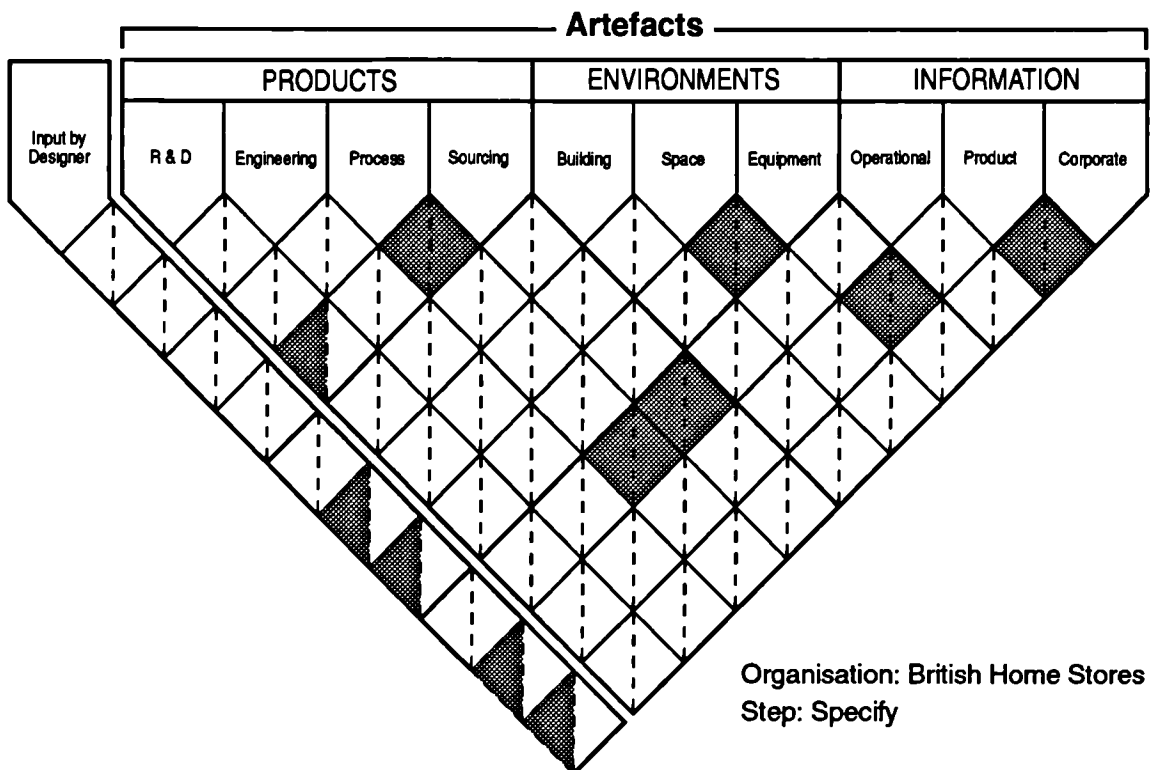
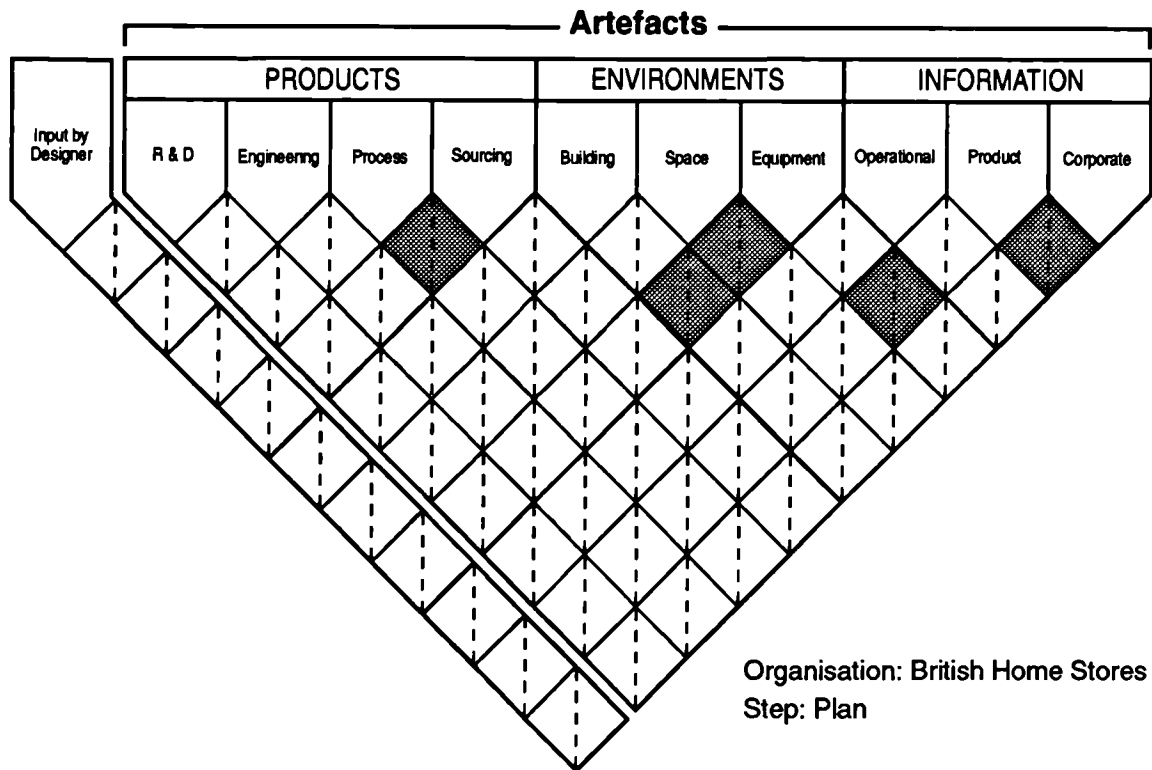
		Artefacts										
		PRODUCTS				ENVIRONMENTS			INFORMATION			
		Input by Designer	R & D	Engineering	Process	Sourcing	Building	Specs	Equipment	Operational	Product	Corporate
Steps	EVALUATE											
	ADVISE											
	PLAN											
	SPECIFY											
	SUPERVISE											
	DEMON-STRATE											
	IMPLEMENT											

Organisation: W.H. Smiths

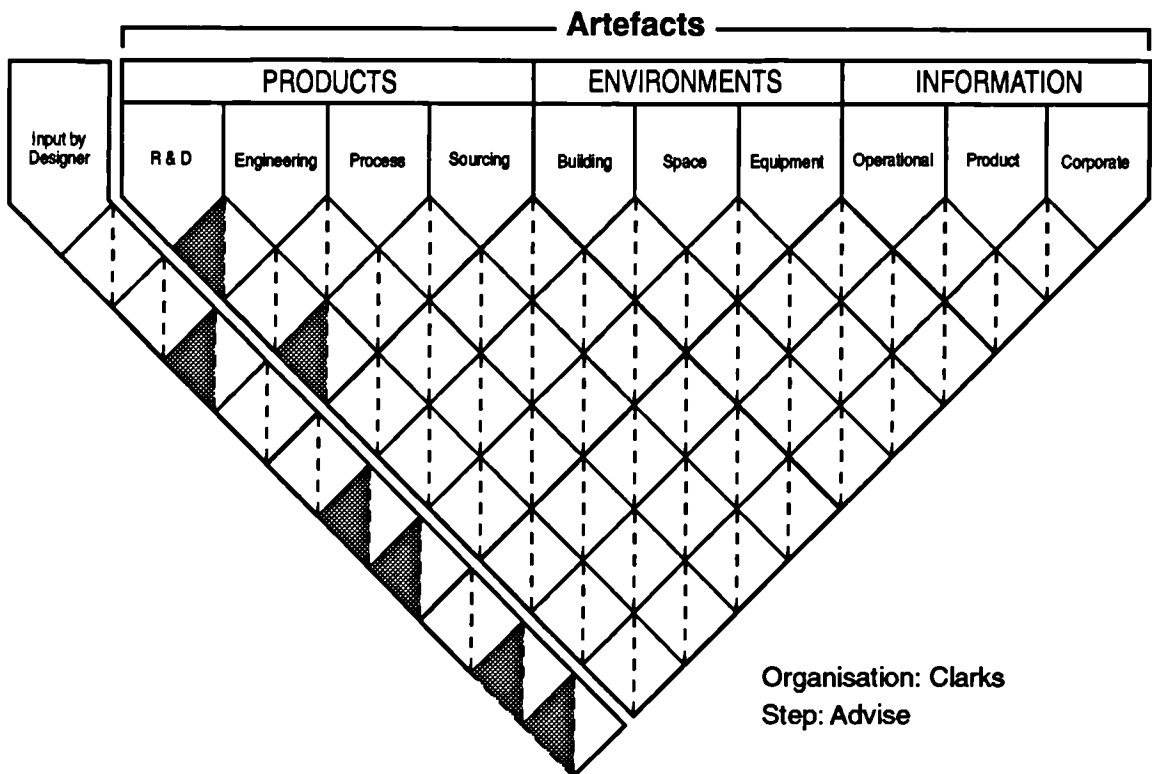
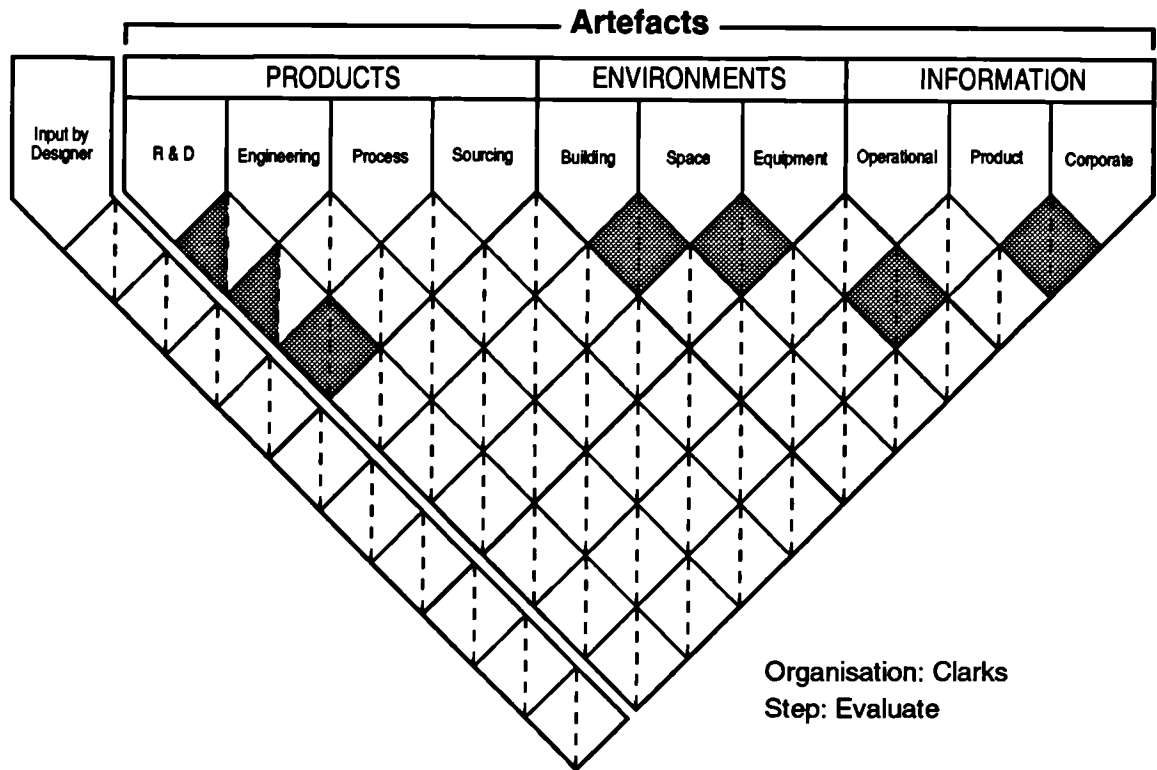
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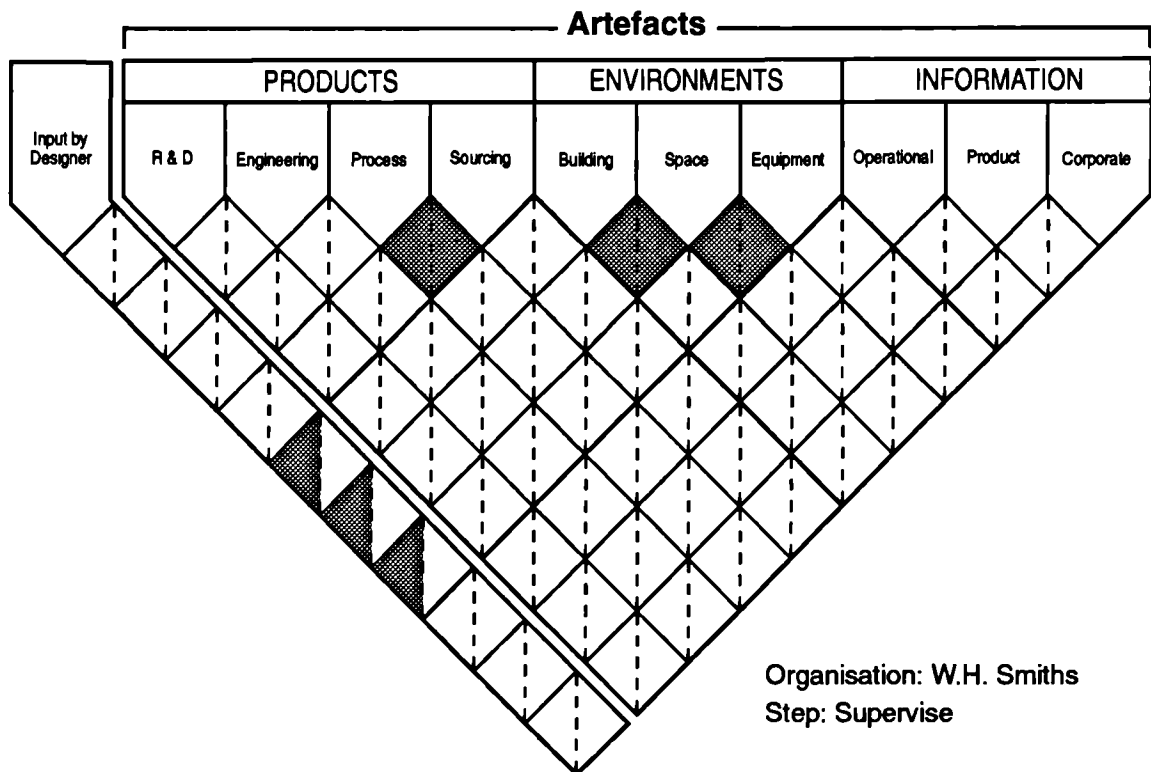
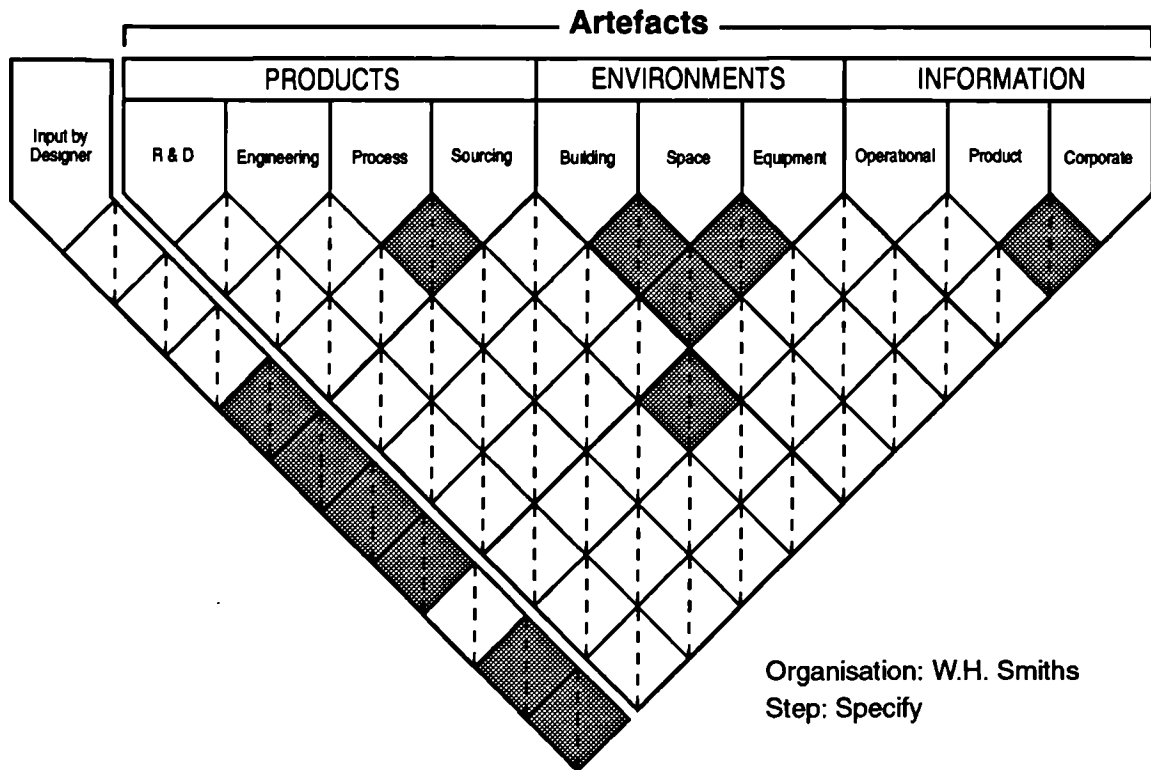
British Home Stores





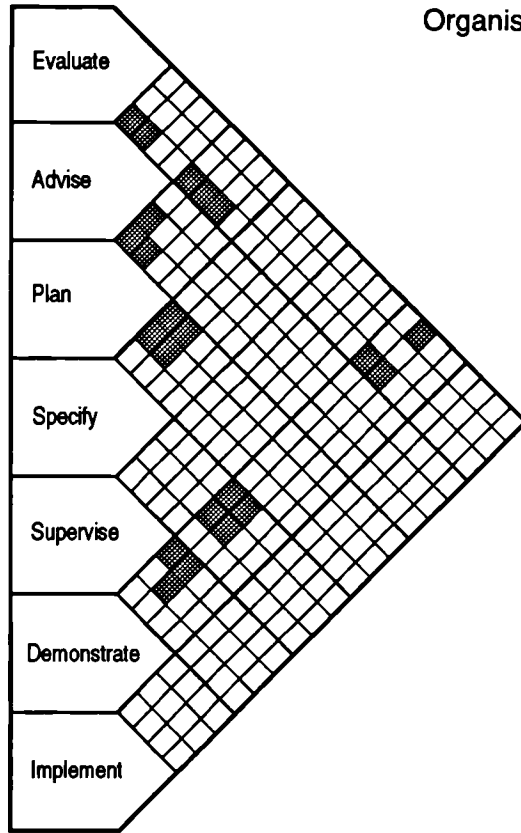
Clarks Shoes





MATRIX 3 RESULTS

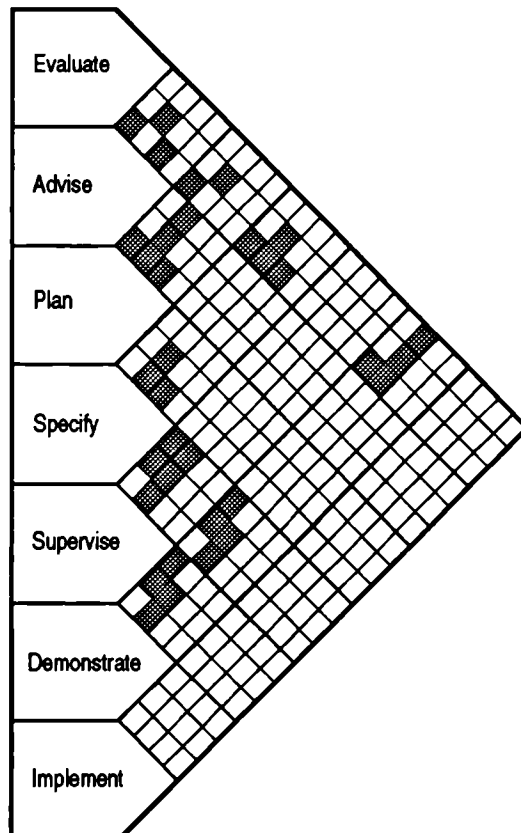
Organisation: British Home Stores



Personnel Key:

XXXXXX Director	Buyer	Packaging
Marketing	In-house Designer	Design Consultant
Chief Executive		

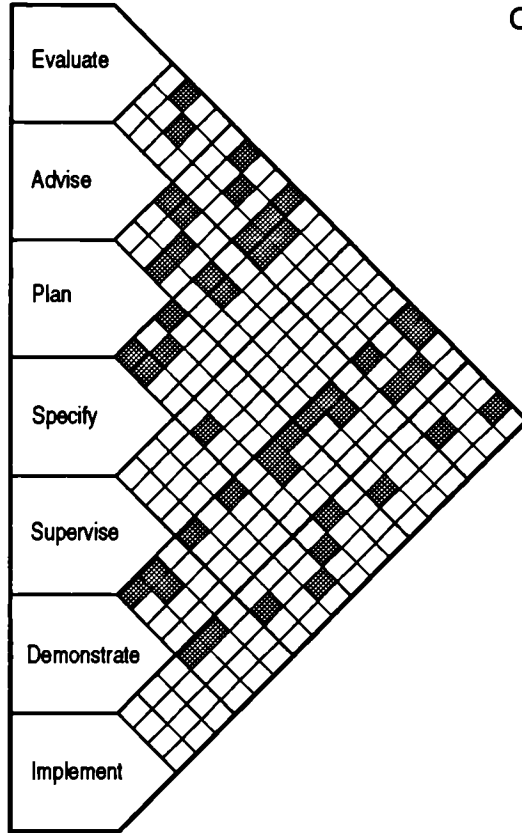
Organisation: British Rail



Personnel Key:

Sector Director	Industrial Designer	Industrial Designer
Chief Architect	Project Director	Design Director
Marketing Director		

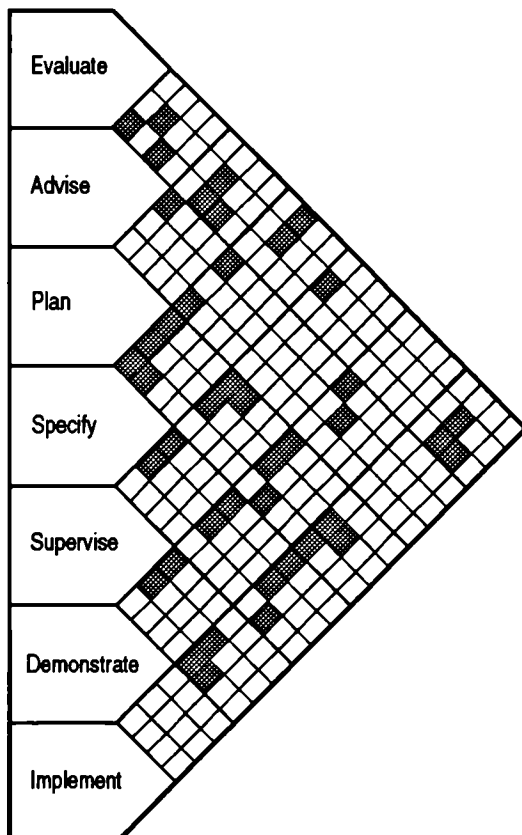
Organisation: Clarks Shoes



Personnel Key:

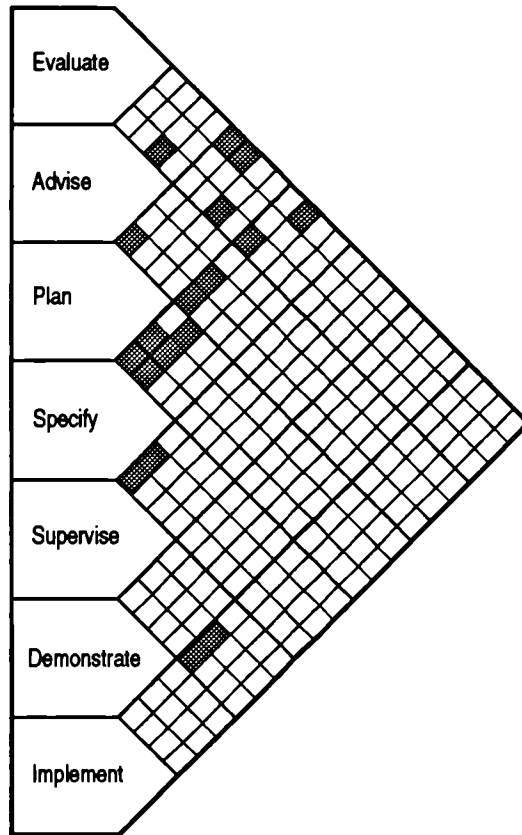
Design Manager	Production Engineer	Range Builder
Factory Manager	R&D	Marketing Director
Retail Development	Managing Director	Manufacturing Director

Organisation: Courtaulds Contract Clothing Division



Personnel Key:

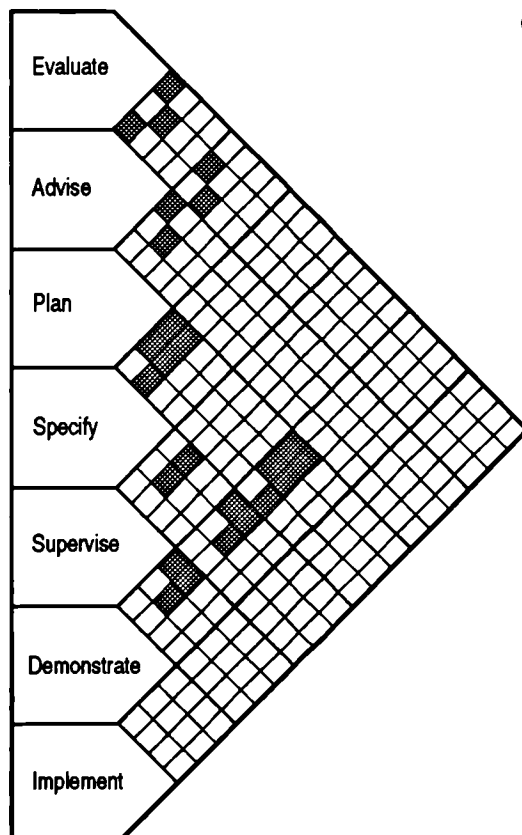
Fabric Technologist	Factory Manager	Design Director
Chief Executive South Wales	Chief Executive	Sales
Chairman		



Organisation: Sealink

Personnel Key:

Naval Architect	Consultant Designer	Marketing Director
Operations Director	Operations Director	Communication Director
Chairman		



Organisation: W.H. Smiths

Personnel Key:

Chairman	Development Director	Design Consultant
Marketing Director	Chief Architect	Design Manager

Appendix II: the Questionnaire

THE ORGANISATION OF DESIGN IN BRITISH INDUSTRY

Introduction

There is much more discussion about design and its importance to industry these days.

So far we know very little about the effects of design and design management on companies except those held up as examples of best and worst practice. Our research asks questions in order to begin to discover what is common practice, so that we may start to gain a realistic picture of general practice in design management.

Most questions use an answer scale. Occasionally, were we feel your opinion could be best expressed more clearly with a written answer, we ask for a brief one.

Your answers will be treated as confidential.

Thank you for your help.

Angela M.P. Dumas
Design Management Unit
January 1987

Instructions

- 1) Please complete all the questions in the order in which they occur. Below are some examples of question types.

EITHER Please tick appropriate answers.
e.g. Sex (please tick appropriate box).

OR Write answers where necessary.
e.g. Your job title *Marketing Director*
(If you need more space to write, please use the blank side of the questionnaire and number your answers.)

OR Many questions involve 6 point rating scales. The extremes are located at each end of the scale. Please tick which box best expresses your opinion. (Tick one box only.)

e.g. What kind of accountability does the job of designer carry in your company?

Accountability						Accountability					
Low			High			Low			High		
1	2	3	4	5	6	1	2	3	4	5	6
a) <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	b) <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In the example a) the indicates high accountability

In the example b) the indicates only slight accountability

- 2) Please read each question carefully and treat each response separately despite any apparent repetition.
- 3) If you have any problems understanding or completing the questions please ask the administrator for help.

Section A – Company Information

Could you please give me some details about your company?

A1) Company name and address

A2) What industry is your company in?

Apparel	Retail	Transport	Electronic	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A3) How many people are there in your department?

1–5	6–10	11–20	21–50	51–100	100+
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A4) We are interested in how your company is structured. Would you please draw an organisational chart, from the top (i.e.. Board of Directors) down at least three levels, showing functions and support functions.

A5) Does your company have a documented corporate plan?

Yes No

A6) If yes, how often is this plan revised?

Annually	Bi-annually	3–5 yearly	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section B – Personal Information

The following questions ask you about yourself.

The information will be disclosed to no one but the researcher.

B1) Your name

B2) Your age

B3) Your sex

Female Male

B4) Would you please describe your training and education since leaving school

B5) Your job title

B6) Would you please describe briefly the major tasks and activities in your job

B7) How long have you been in this job?

Section C – Design in your company

Now we would like to ask you some general questions about your company or firm.

The word “design” can be, and often is, legitimately used in many different senses. The word “designer” can be confusing as it is not only used to refer to those people who were trained professionally as designers. There are people in companies whose jobs are not to design something, but who have to take decisions that affect design. Here are some instances.

1) The products a company manufactures

2) The environment in which it conducts business (factories and shops are different examples)

3) The information the company produces for communication and efficiency (e.g.. anything from advertising, company reports to internal memo sheets)

Bearing in mind these examples, please answer the following questions.

C1) If you have designers working in your company, does the definition of designer relate to the following backgrounds?

Engineering	Design college	Apprenticeship	Other	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C2) What kind of accountability does the job of designer carry in your company?

Low					High
1	2	3	4	5	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C3) In your company are there people whose job carries accountability for design, but who are not called designers?

Yes No N/A

C4) If your answer was Yes to the question above, where does their expertise lie?

Engineering	Marketing	R&D
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales	Publication	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C5) Does your company use a design consultancy fairly regularly?

Yes No

C6) Is design considered in a section of your company's corporate documents?

Yes No

C7) Is there any form of design manual in your company?

Yes No

If No, proceed to question C11

C8) If Yes, is it a design manual for a unified corporate identity?

Yes No

C9) Is there a document which sets out guidelines for involvement with design projects as distinct from a corporate identity manual?

Yes No

C10) Do you have access to any of these?

Design manual	Corporate identity manual	Procedures for design projects
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C11) Is there a separate document (from those mentioned above) for specifications?

Yes No N/A

If No, proceed to question C14

C12) If your answer to the above question was Yes, do the specifications cover any of the following?

Product	Supplies	Room sizes	Equipment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature	Light	Working environment	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C13) If there are any other kinds of specifications, could you please describe them briefly?

C14) If you do have access to formal design documents (manuals, specifications, etc.), how often do you refer to them?

	Daily	Weekly	Monthly	6-monthly	Annually
Corporate identity manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procedures for design projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C15) In your opinion, how much importance does the company give overall to design?

Low					High
1	2	3	4	5	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C16) When your company launches a project involving design, is it structured in the same way as any other project?

Yes No

C17) Would you please rate a project involving design in terms of its complexity and its interactive qualities:

Complexity					
Low					High
1	2	3	4	5	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Interactiveness					
Low					High
1	2	3	4	5	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C18) To what extent do you agree with the following statements?

	Disagree					Agree
	1	2	3	4	5	6
Design must be tightly controlled from the top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The design process can act as a catalyst in many projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design should be a central function in any organisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C19) Designers could be involved in new projects in three areas:

Below are three lists, one for Products, one for Environments and one for Information. Under the headings relevant activities are listed; could you please say, in your opinion, which of these has a high possibility of involving a designer in your company. This could be either an in-house designer or a consultant designer and would also include architects.

PRODUCT		Involvement of designer					
In-house designer		Low					High
		1	2	3	4	5	6
	Research and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Production development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Sourcing (materials, etc., or as part of production process)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consultant designer		Low					High
		1	2	3	4	5	6
	Research and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Production development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Sourcing (materials, etc., or as part of production process)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ENVIRONMENT

Involvement of designer

In-house designer or architect

	Low 1	2	3	4	5	High 6
Building stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Building stock refurbishment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Space planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Equipment decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Consultant designer or architect

	Low 1	2	3	4	5	High 6
Building stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Building stock refurbishment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Space planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Equipment decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INFORMATION

Involvement of designer

In-house designer

	Low 1	2	3	4	5	High 6
Operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promotional/Marketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Corporate/Institutional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Consultant designer

	Low 1	2	3	4	5	High 6
Operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Promotional/Marketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Corporate/Institutional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section D – Finance and Design

This section asks you some general questions on financing design in your organisation.

D1) If you have a design function in your organisation, is it a profit centre?

Yes No

D2) Do you believe a design function can be a profit centre?

Yes No Uncertain

D3) In your opinion, is it preferable for the design function to be centrally controlled?

Yes No Uncertain

D4) If you have answered Yes to the previous question, is your answer based on the assumption that this arrangement means you would not have to use finance from your or your own unit's/department's budgets for design work?

Yes No

D5) In your company, whose budget finances a design project?

	Entirely	Partially	Not at all
Your own budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your job budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D6) If you are discussing a design project, do you believe it is important to exercise greater budgetary control than you would with non-design projects?

Yes No

D7) In your organisation who approves decisions on project expenditure?

	Individually	As part of a team
Design studio manager	<input type="checkbox"/>	<input type="checkbox"/>
New product development manager	<input type="checkbox"/>	<input type="checkbox"/>
Production manager	<input type="checkbox"/>	<input type="checkbox"/>
Project manager	<input type="checkbox"/>	<input type="checkbox"/>
Marketing manager	<input type="checkbox"/>	<input type="checkbox"/>
Sales manager	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

D8) To what extent do you disagree or agree with the following statements?

Budget problems on projects involving design are caused by:

	Disagree					Agree
	1	2	3	4	5	6
Insufficient information from the designer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insufficient understanding on the part of the designer of the organisation's objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpredictable costs because the project spans a long period of time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpredictable production costs because of the nature of the design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too little investment in research and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A lack of common goals between managers and designers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interference from the top during the project causing changes to be made	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too little power invested in the designer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too little power invested in the design manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D9) If your company has a design function, how much influence do you consider it has when it comes to allocation of resources (people, money, materials, etc.). We ask you to answer the question at two levels: specific and general.

Specifically concerned with design

	Influence					
	Low					High
	1	2	3	4	5	6
Financial expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staffing expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Within the company generally

	Influence					
	Low					High
	1	2	3	4	5	6
Financial expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staffing expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project expenditure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D10) In your opinion should the following people have any influence on the allocation of resources to design or to projects involving design?

	Influence					
	Low 1	2	3	4	5	High 6
Design studio manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New product development manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Production manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marketing manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D11) Within your company is there another person who has influence on the allocation of resources to projects involving design? Could you please tick the box and give the title where appropriate.

There is no other person

Yes, there is another person who has influence

If yes, please give title

Section E – Management of Design

This section asks you to answer some questions on design personnel and to give your opinions about the roles design personnel play in organisations.

E1) In your organisation is there a design manager or director?

Yes No

If No, then proceed to question E6.

E2) If your answer was Yes to the above question, how many years has this job existed?

E3) If your organisation has a design manager, to whom does he or she report
(Please give the title, not a person's name.)

E4) Does any person on your Board represent the design function? If Yes, would you please give his or her position.

E5) If your organisation has a design manager or director, how do you rate him or her in terms of the following?

Power					
Low 1	2	3	4	5	High 6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reward					
Low 1	2	3	4	5	High 6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Frustration					
Low 1	2	3	4	5	High 6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E6) In your opinion, do you think it is appropriate to invest power in a design manager or director?

Yes No Uncertain

E7) If you have had experience of working with external and/or internal designers and you were asked to lead a team where designers were involved, which would you choose? Please select only ONE from the following list.

External designers

Internal designers

Predominantly external designers

Predominantly internal designers

An equal mix of internal and external

I do not have the experience to answer

E8) If you were to be involved in selecting a design manager or director, would you consider design expertise or managerial expertise to be the more important?

Design expertise more important

Managerial expertise more important

Both equally important

E9) To what extent do you disagree or agree with the following?

The Design MANAGER should:

	Disagree					Agree
	1	2	3	4	5	6
Develop design awareness within the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Develop and encourage new products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Act as a catalyst for others as they make decisions about design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oversee design in the company "hands-on"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Re-style existing products in order to add value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Design DIRECTOR should:

	Disagree					Agree
	1	2	3	4	5	6
Develop design awareness within the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Develop and encourage new products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Act as a catalyst for others as they make decisions about design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oversee design in the company "hands-on"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Re-style existing products in order to add value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E10) How important do you think the following activities are in achieving good design management?

	Importance					
	Low					High
	1	2	3	4	5	6
The evaluation of artefacts or products in relation to objectives set out by the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Providing professional advice or seeking professional help after an evaluation process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Planning the strategies for artefact or product development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drawing up specifications as part of the development process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supervising, monitoring and evaluating day to day decisions in the design process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensuring that artefacts or products are fully tested during the development process by models or samples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If the organisation is a manufacturer, involvement in the full or part production of the artefact or product in relation to quality control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- E11) From your own observations of design and design management in the UK what do you feel would enhance design in industry generally?

Section F – The Future

In this section we would like to ask you some questions on the future of design management.

- F1) If your company has a design manager or director, where do you believe future development of the job lies?

- F2) In your organisation, if you do not have a design manager or director, has there been discussion about the possibility of creating this job?

Yes No Uncertain

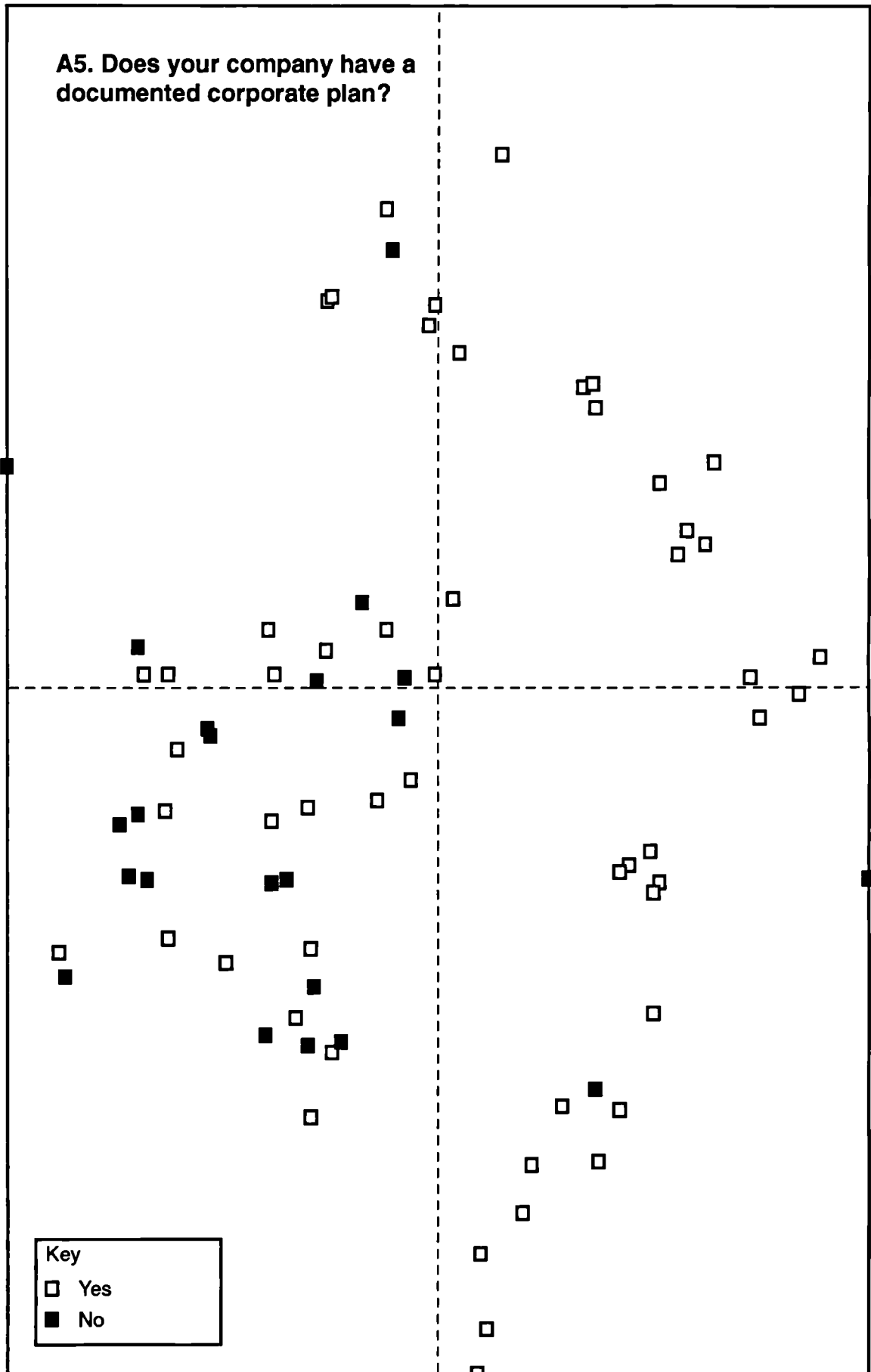
- F3) If you do not already have a design manager or director, in your opinion is there a role for such a person?

Yes No Uncertain

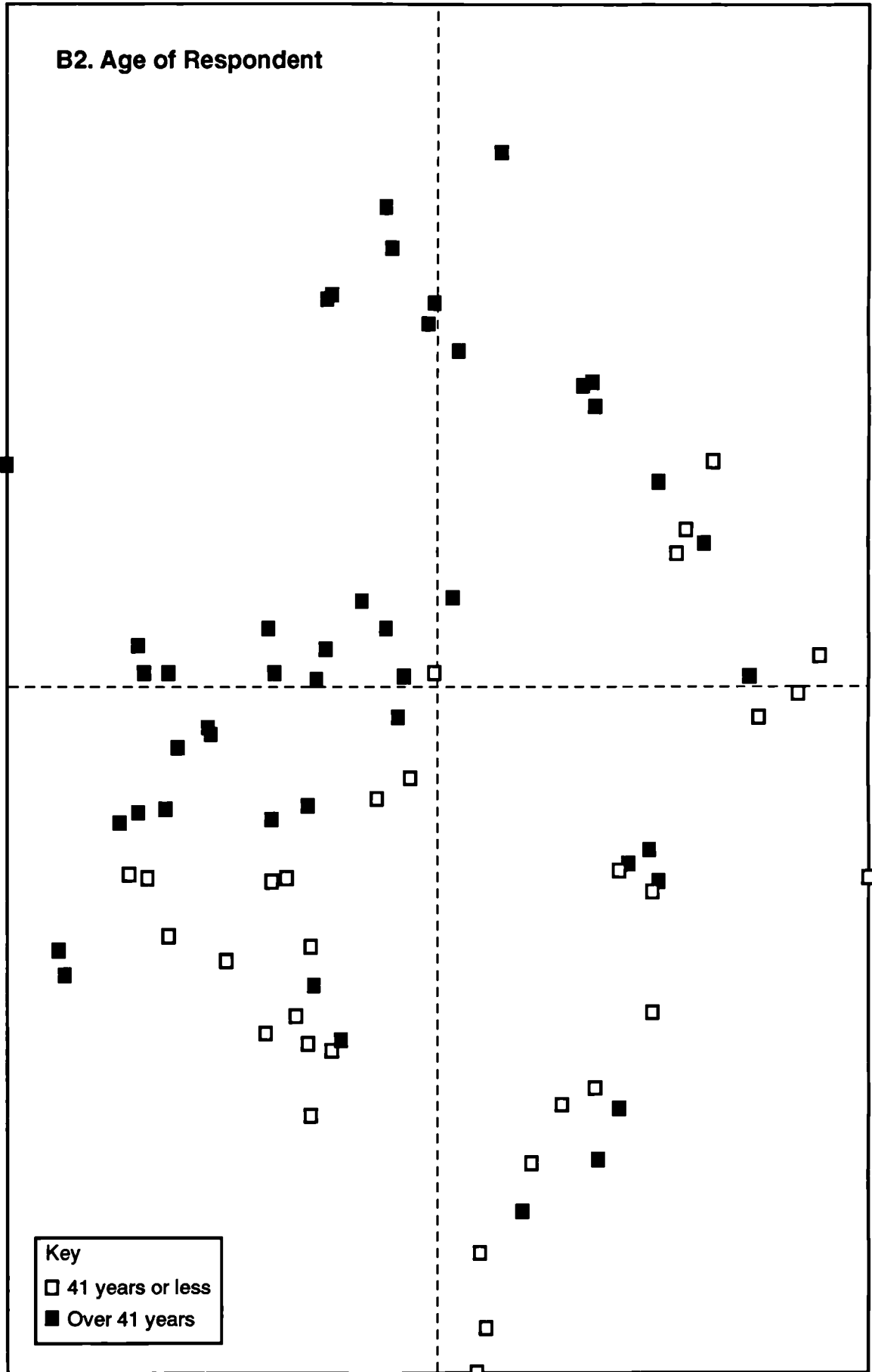
- F4) If you were to be involved in the choice of a design manager or director, what would you consider to be the main focus of the job over the next five to ten year period?

- F5) In choosing a design manager, would you be looking for any particular qualities, other than those needed to be a good manager?

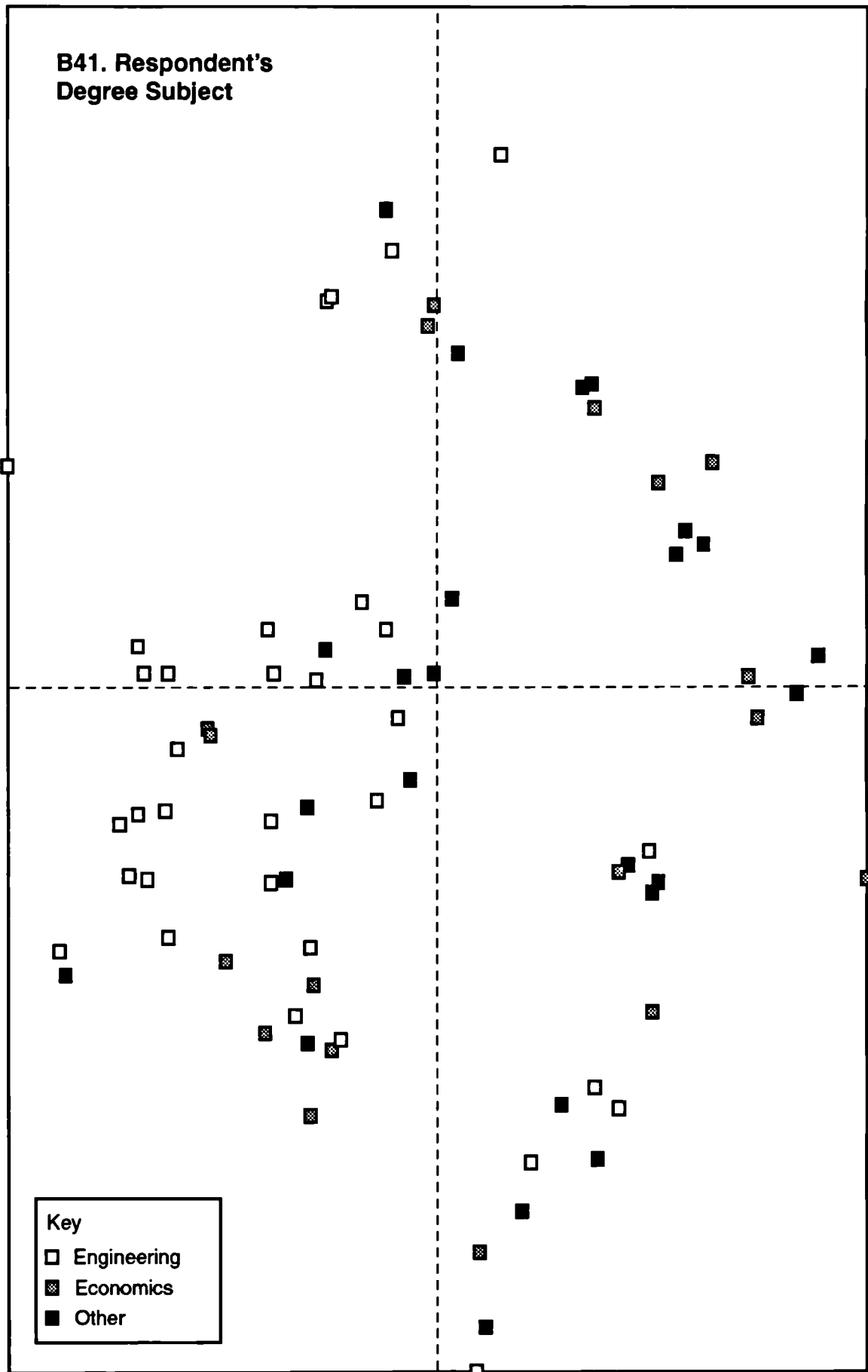
Appendix III: MSA plots



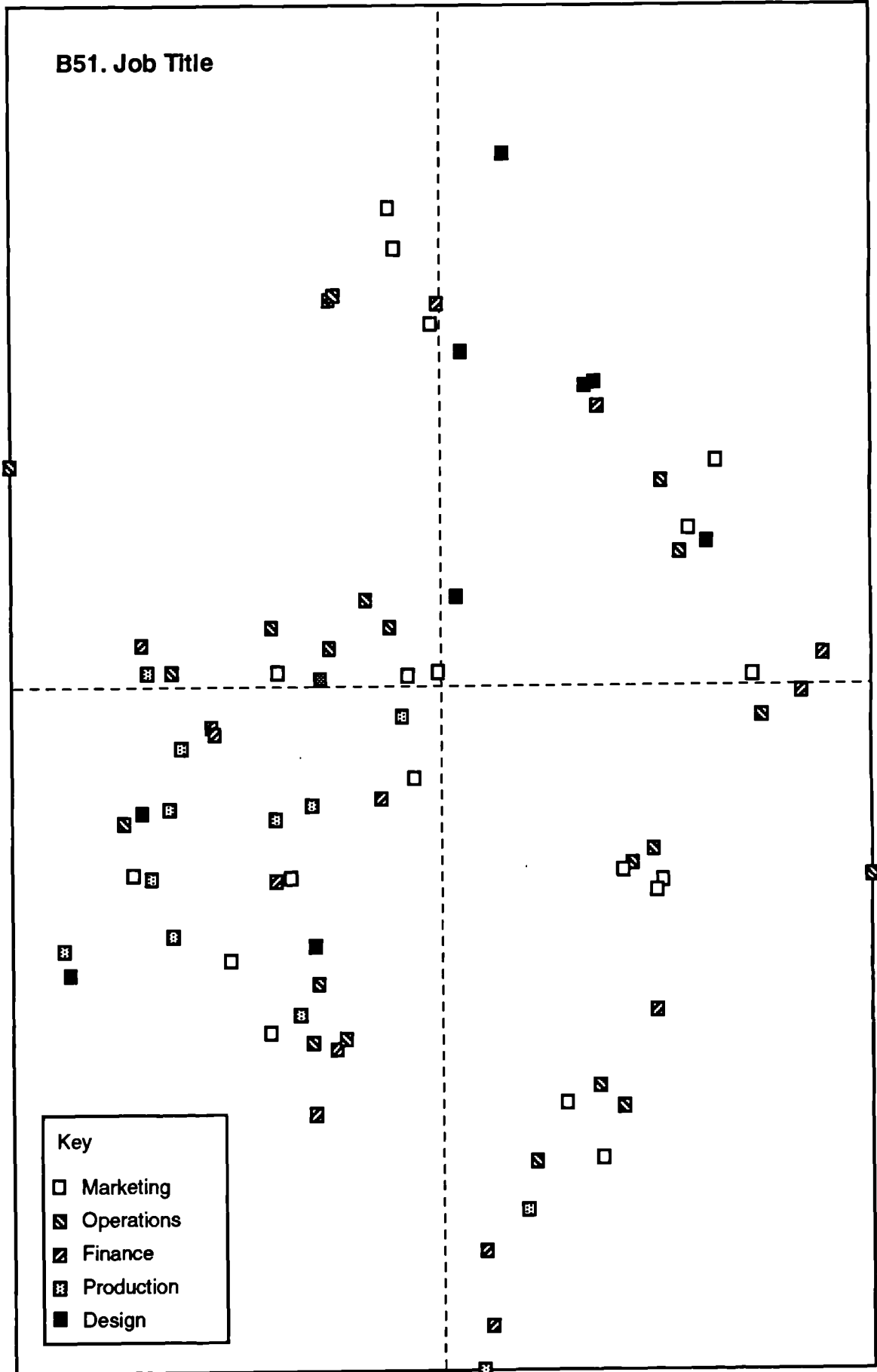
B2. Age of Respondent



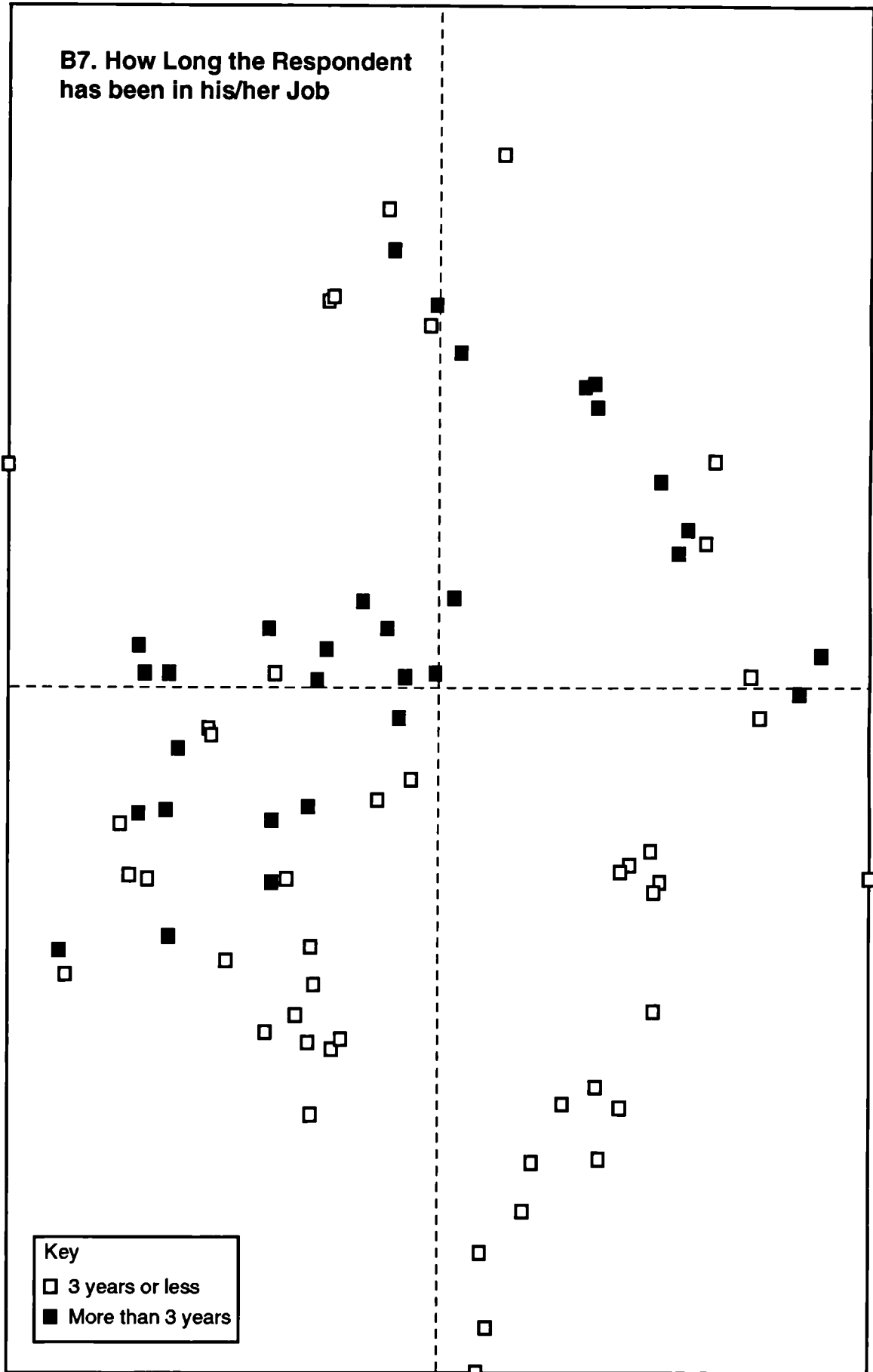
B41. Respondent's Degree Subject



B51. Job Title

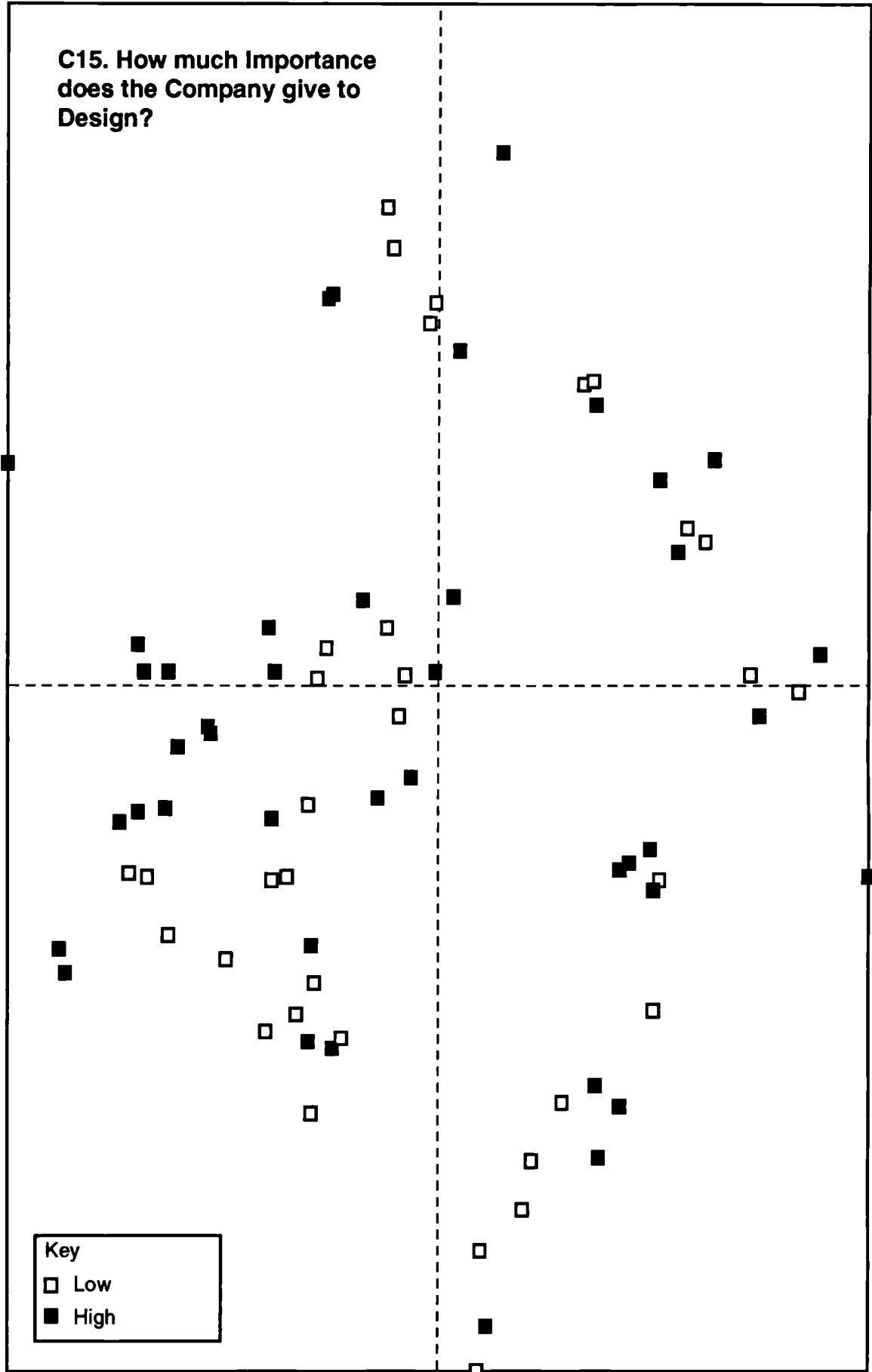


B7. How Long the Respondent has been in his/her Job



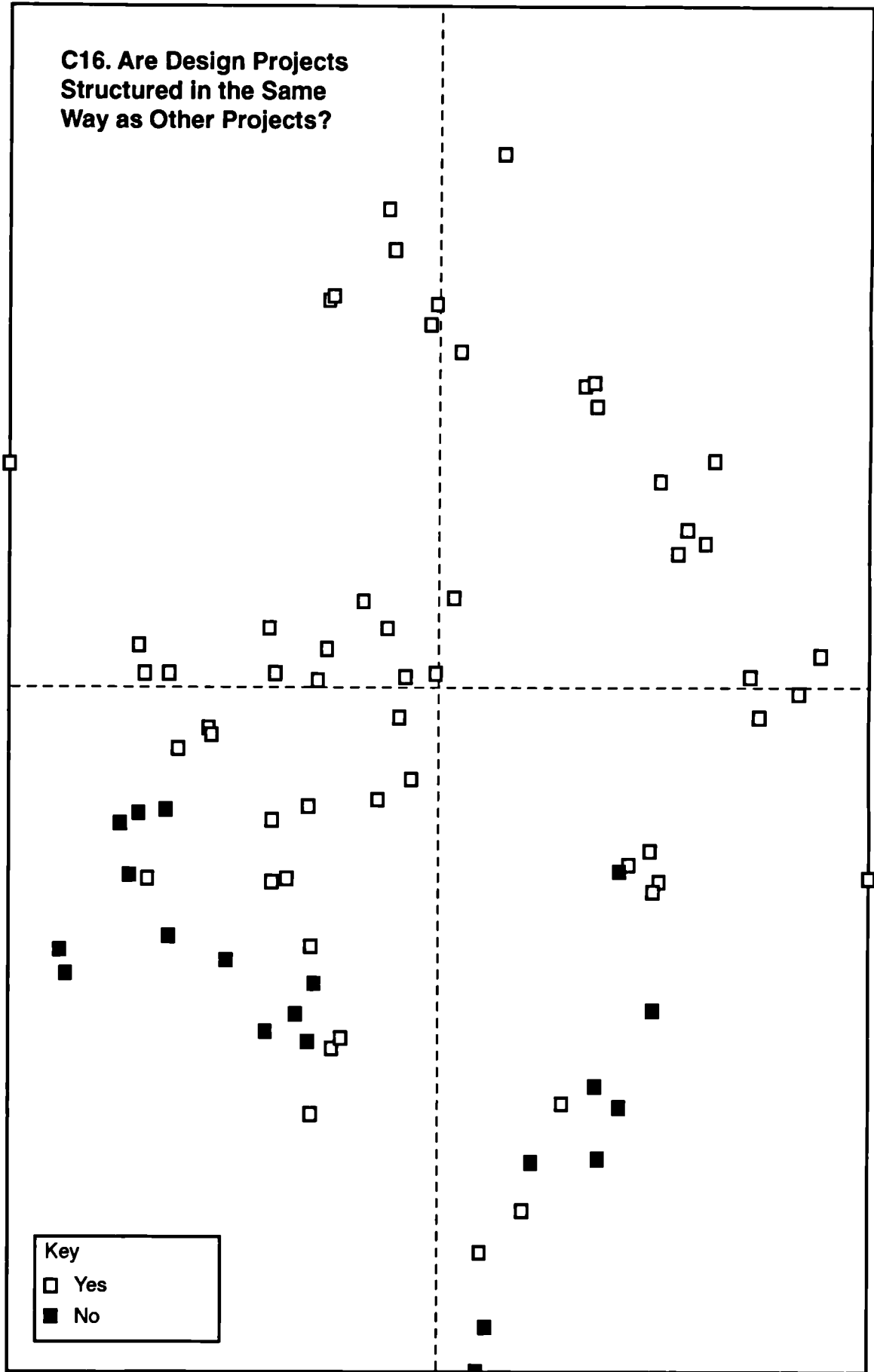
Key
□ 3 years or less
■ More than 3 years

C15. How much Importance does the Company give to Design?

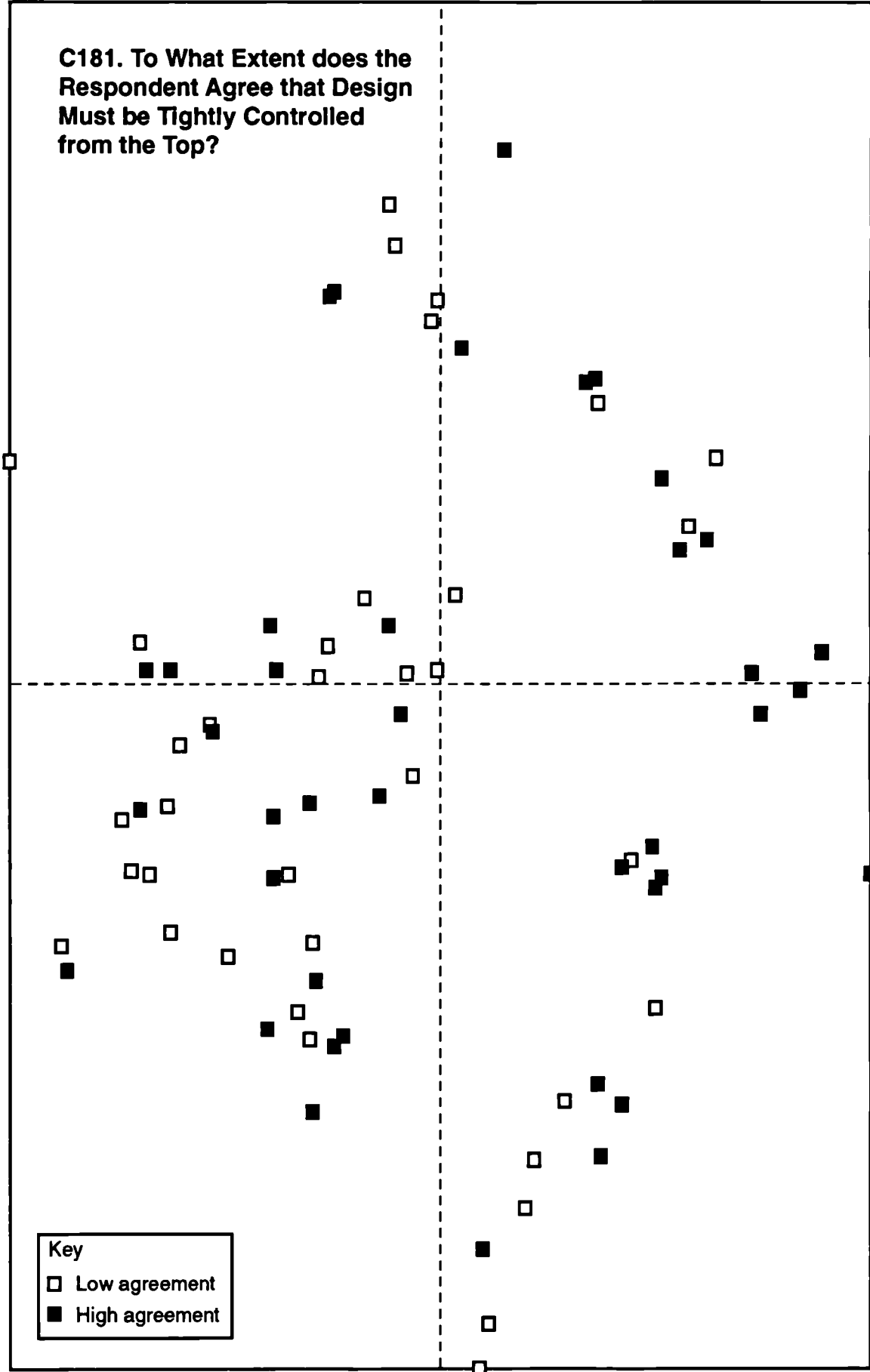


Key
□ Low
■ High

C16. Are Design Projects Structured in the Same Way as Other Projects?

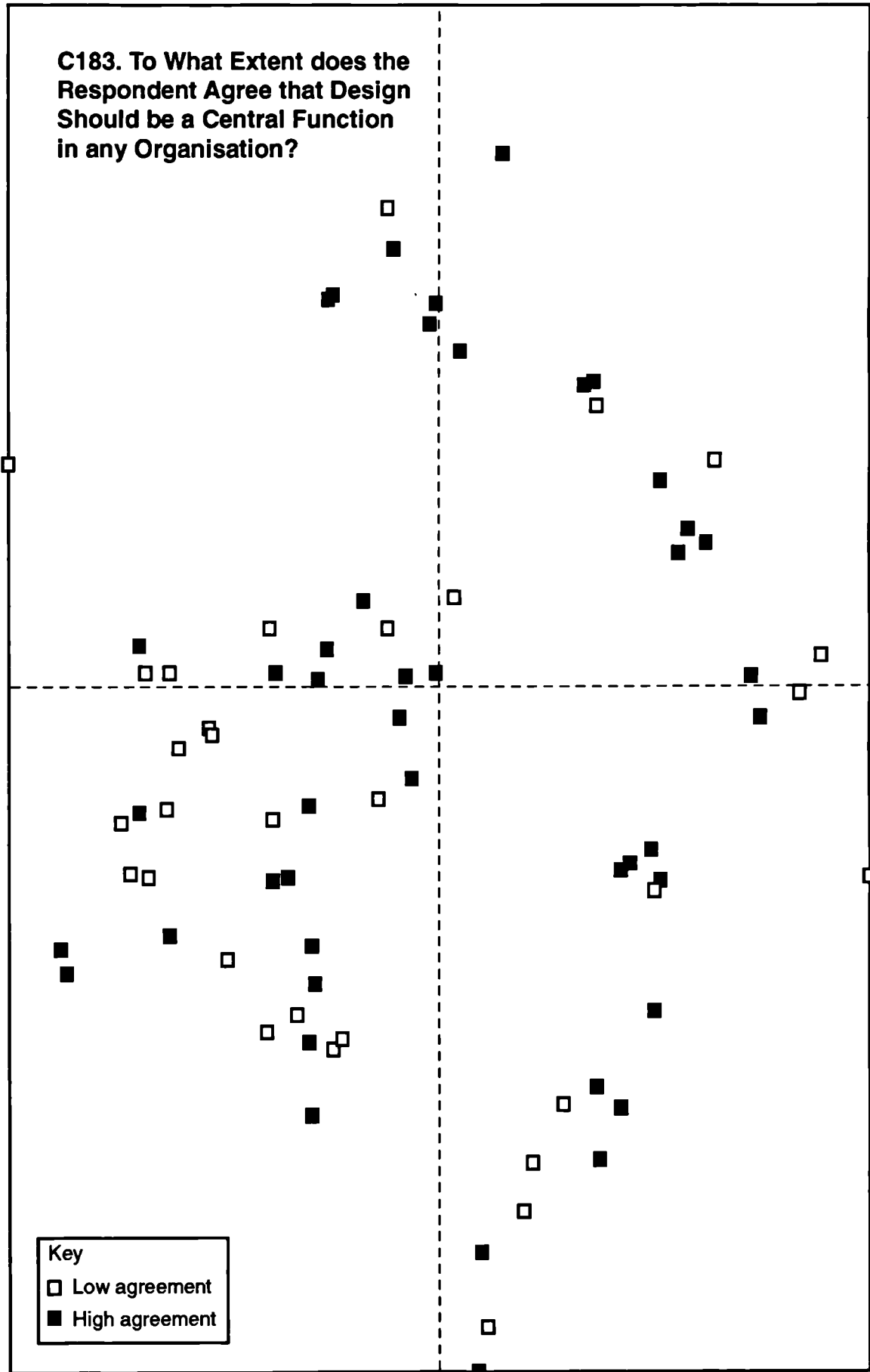


C181. To What Extent does the Respondent Agree that Design Must be Tightly Controlled from the Top?

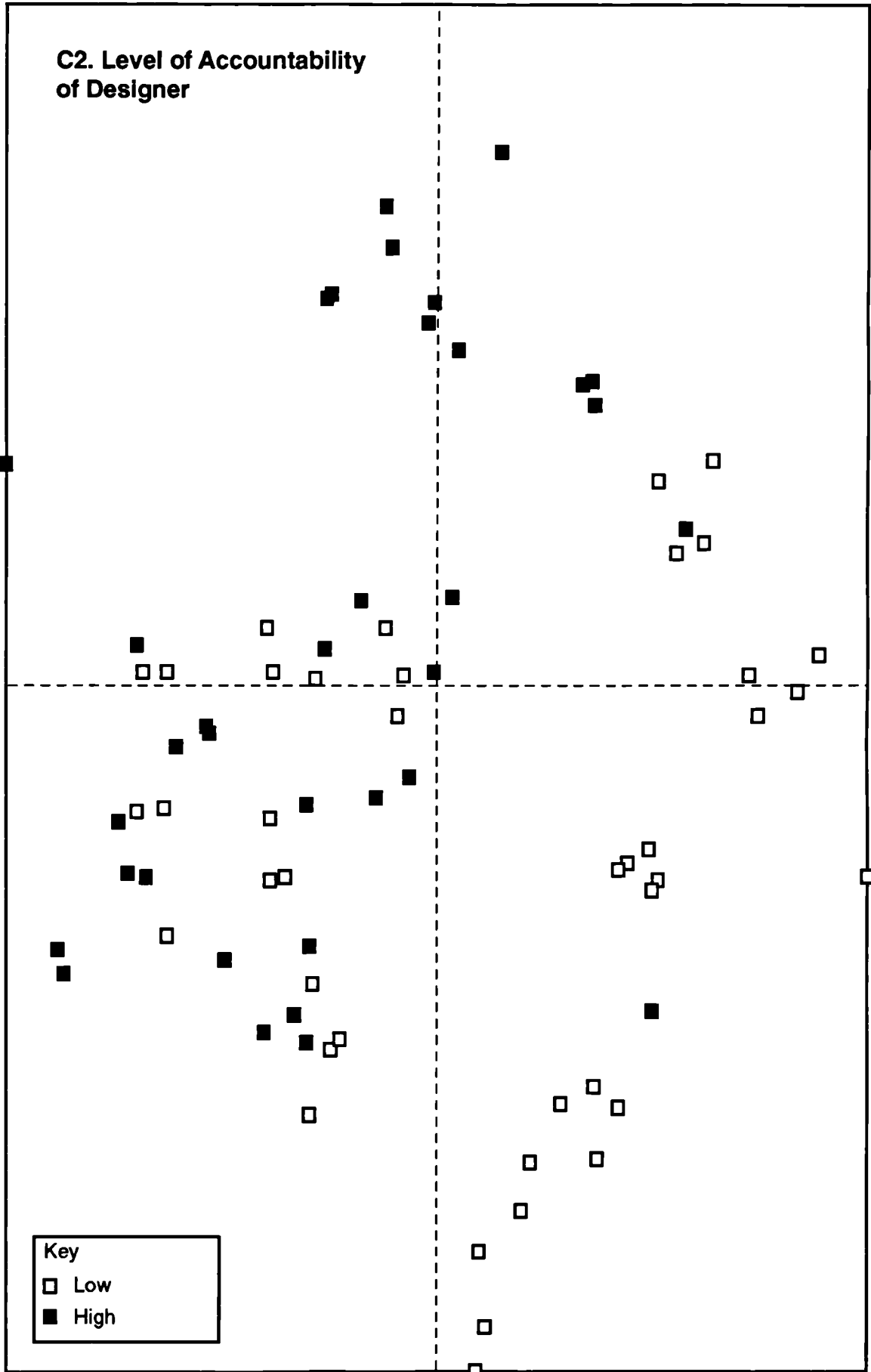


Key
□ Low agreement
■ High agreement

C183. To What Extent does the Respondent Agree that Design Should be a Central Function in any Organisation?



**C2. Level of Accountability
of Designer**

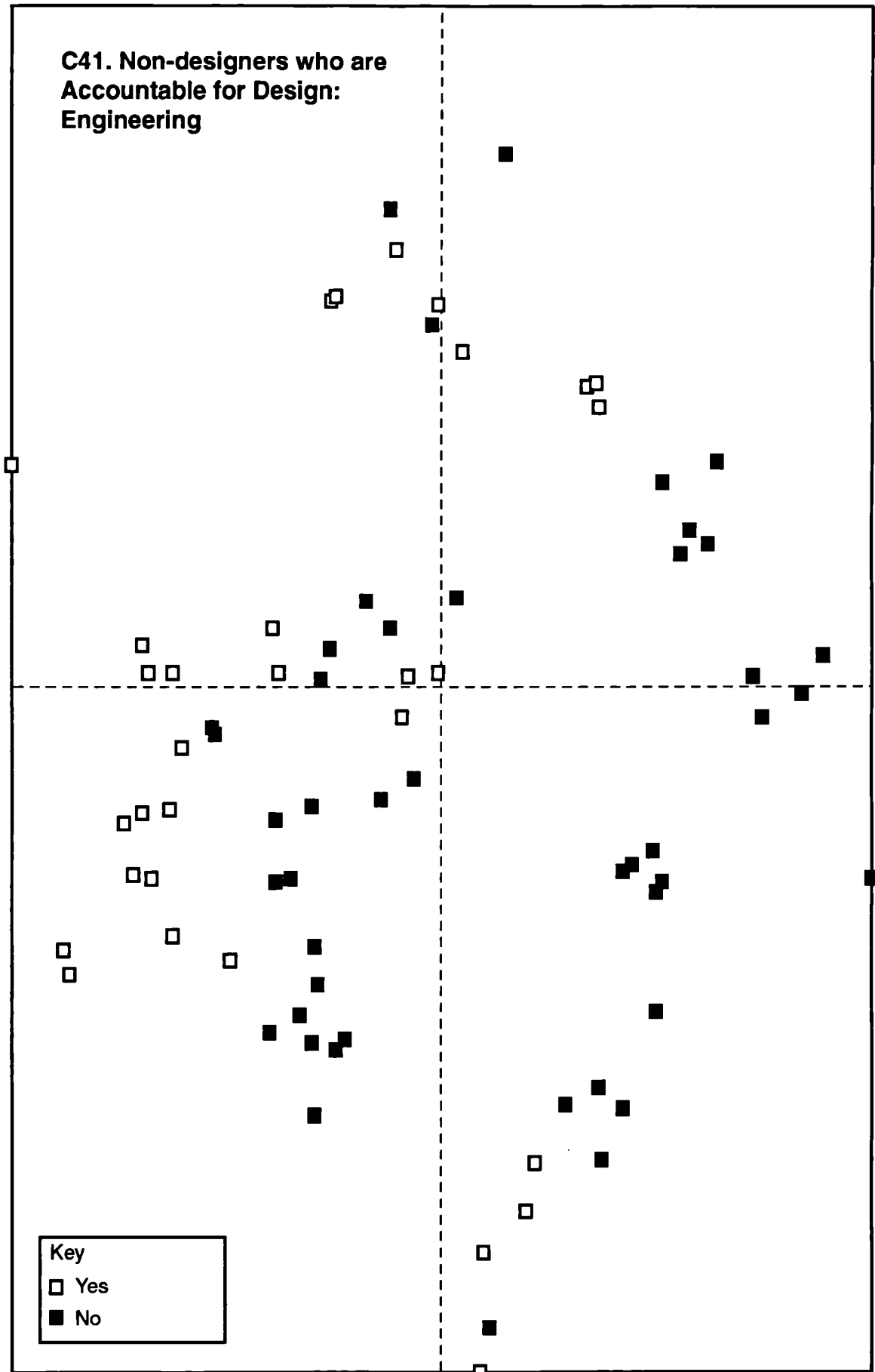


Key

□ Low

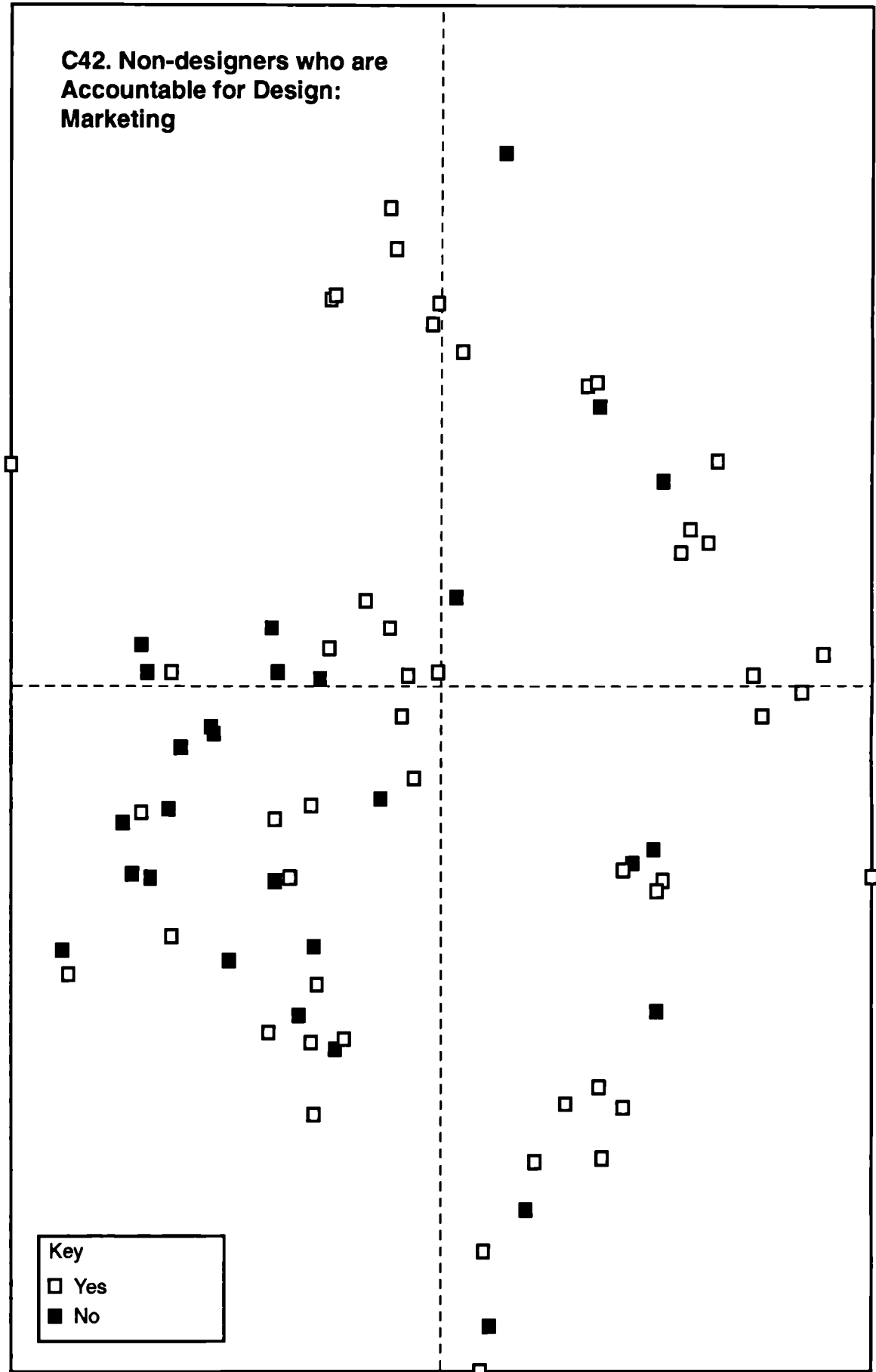
■ High

**C41. Non-designers who are
Accountable for Design:
Engineering**



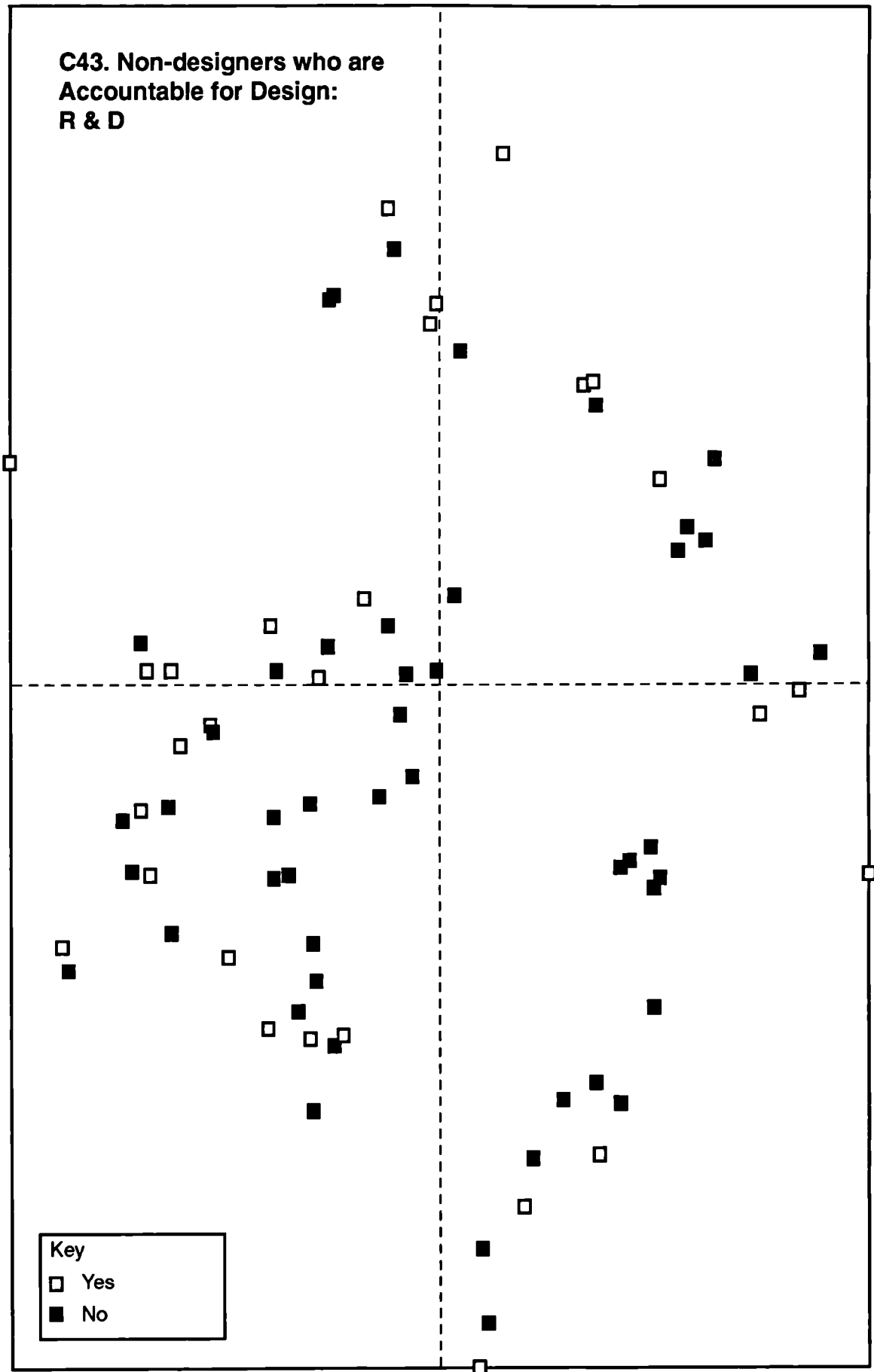
Key
□ Yes
■ No

**C42. Non-designers who are
Accountable for Design:
Marketing**

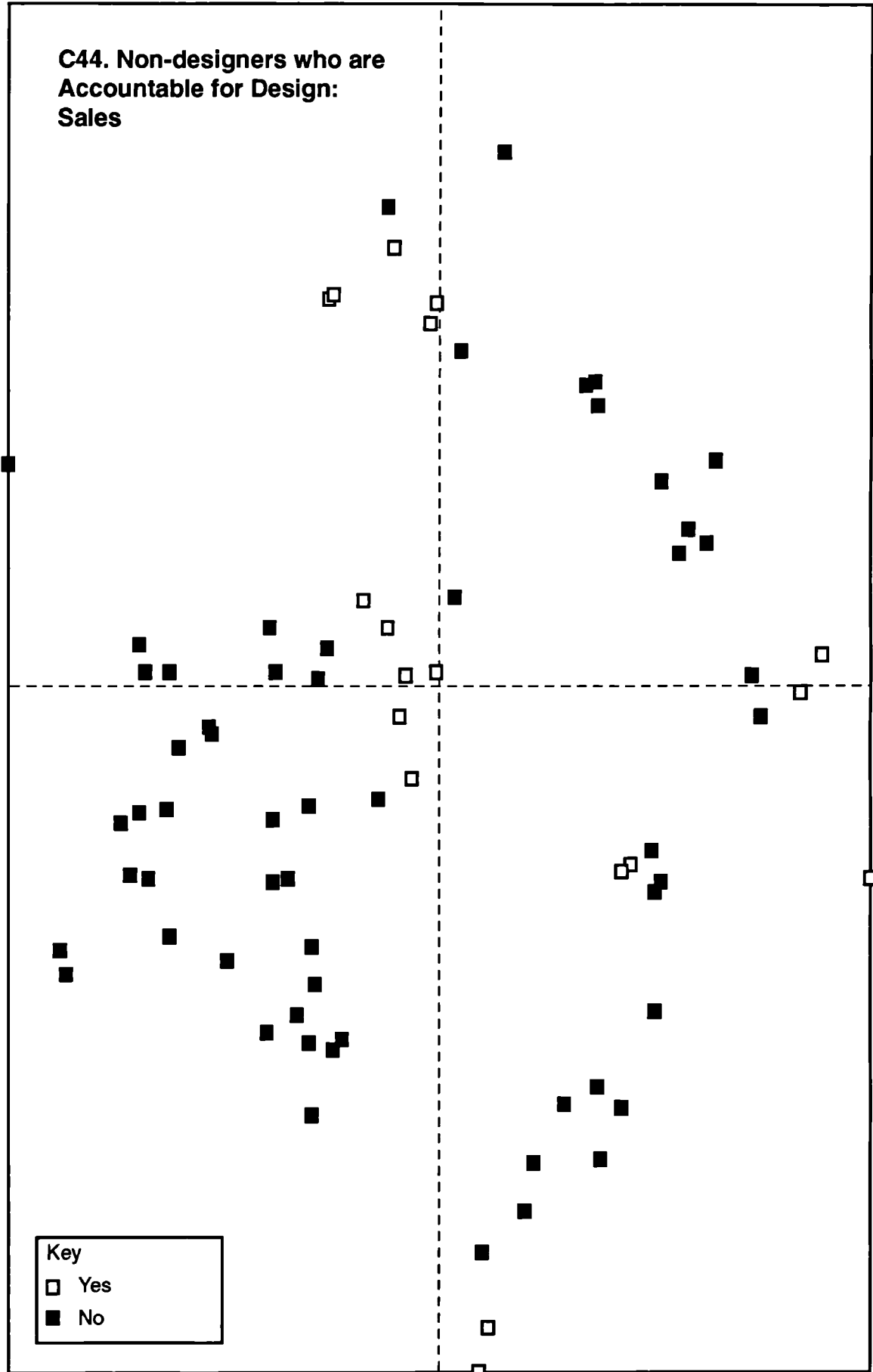


Key
□ Yes
■ No

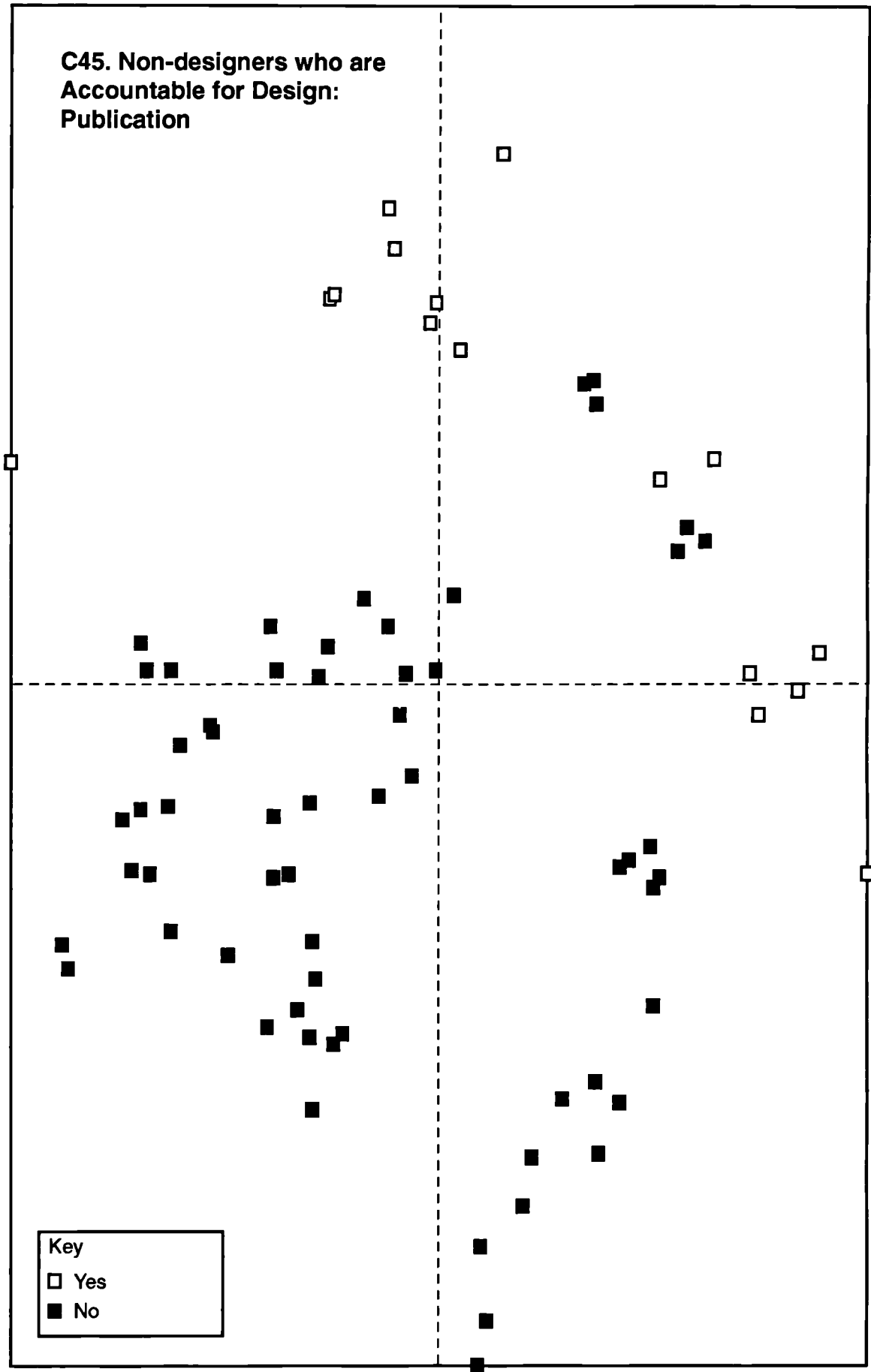
**C43. Non-designers who are
Accountable for Design:
R & D**



**C44. Non-designers who are
Accountable for Design:
Sales**

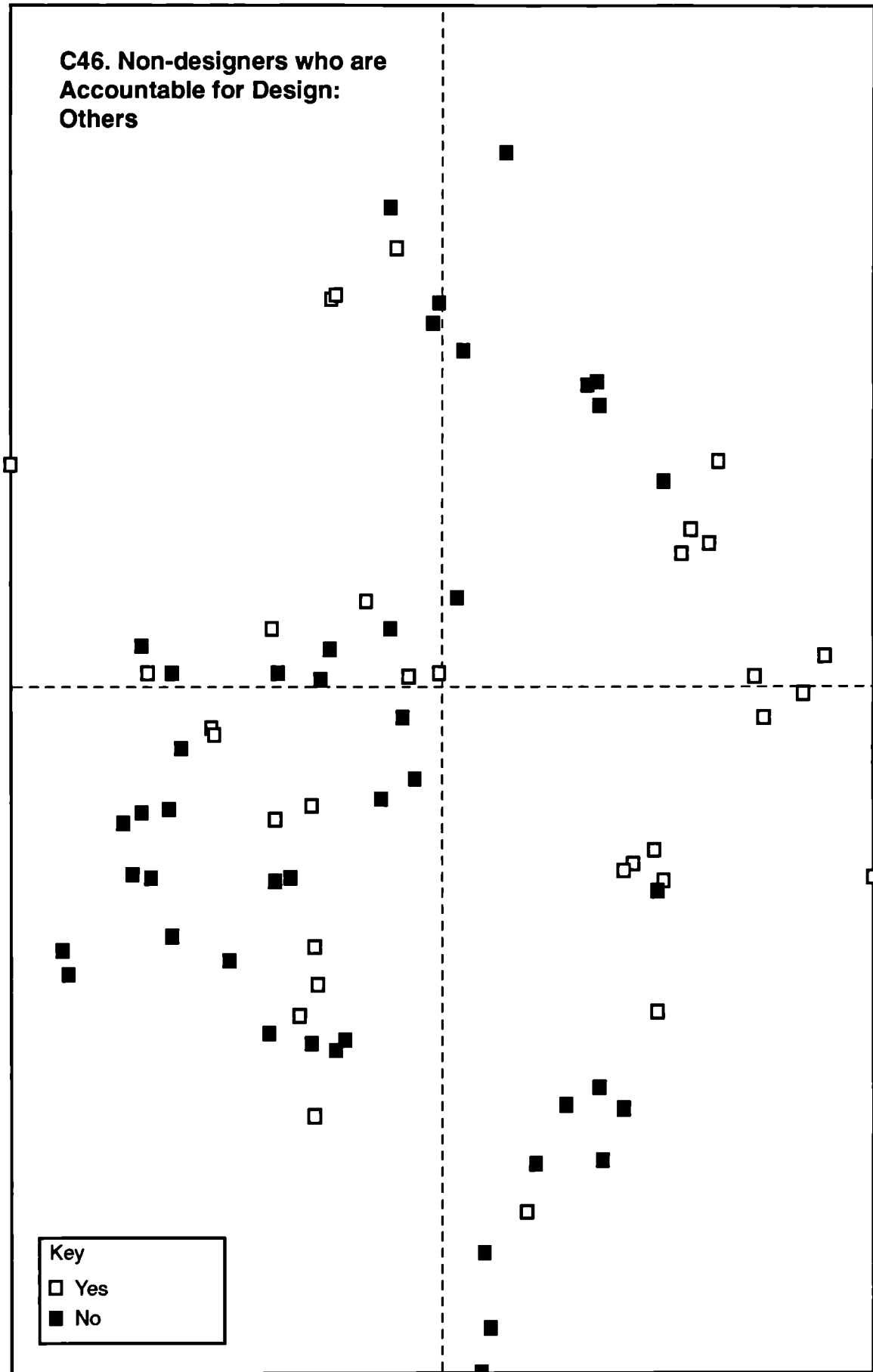


**C45. Non-designers who are
Accountable for Design:
Publication**



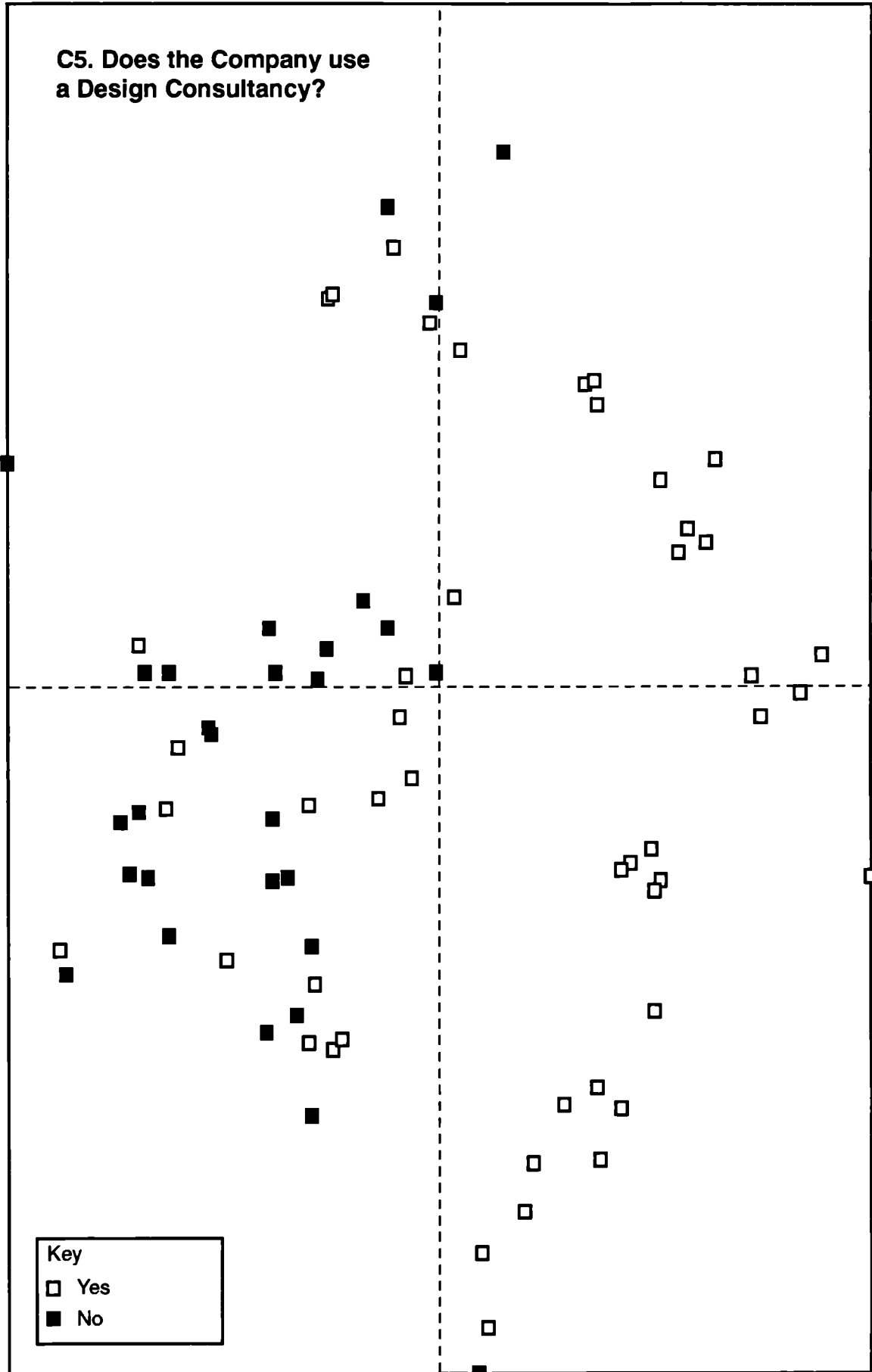
Key
□ Yes
■ No

**C46. Non-designers who are
Accountable for Design:
Others**

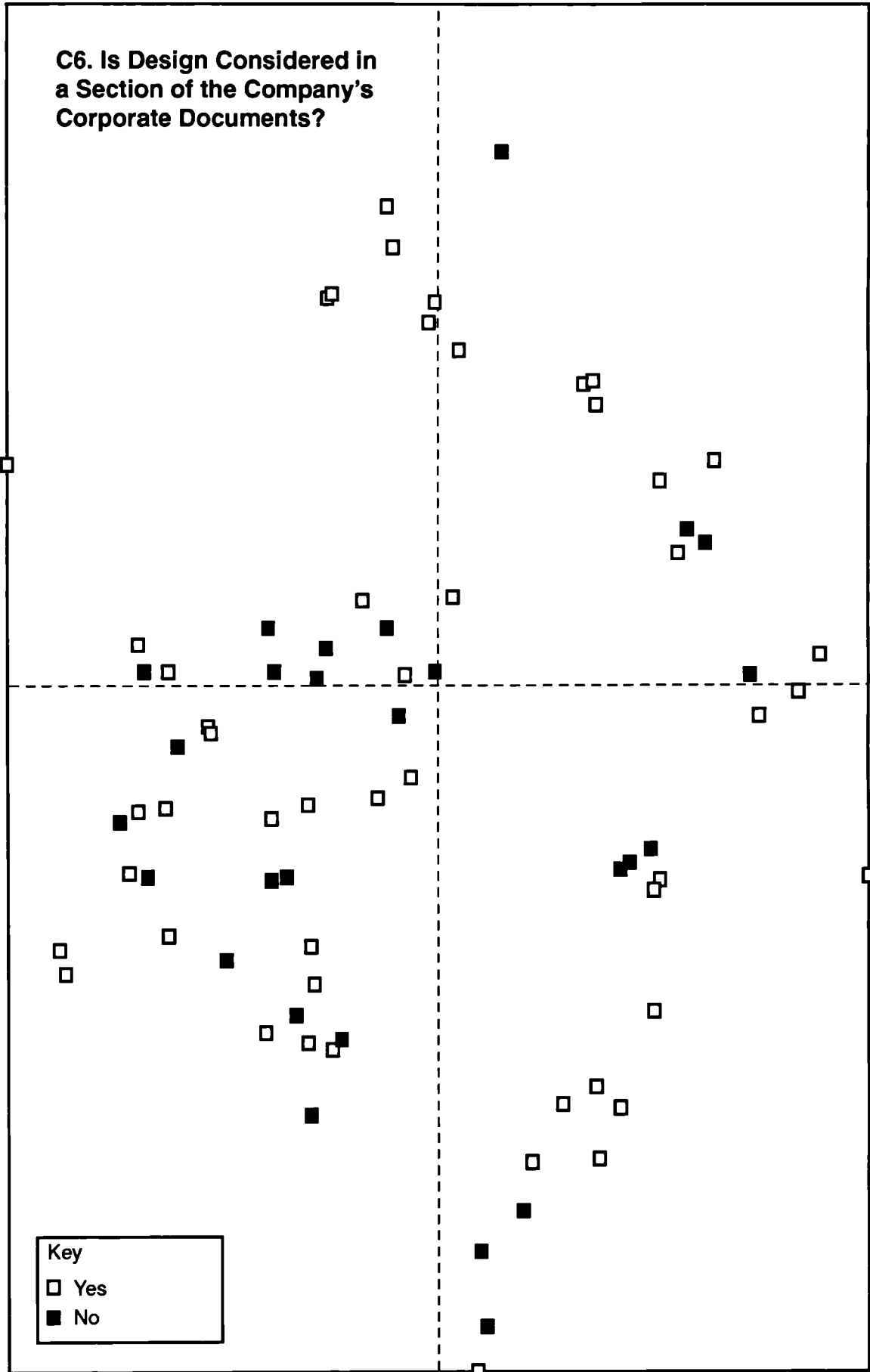


Key
□ Yes
■ No

C5. Does the Company use a Design Consultancy?

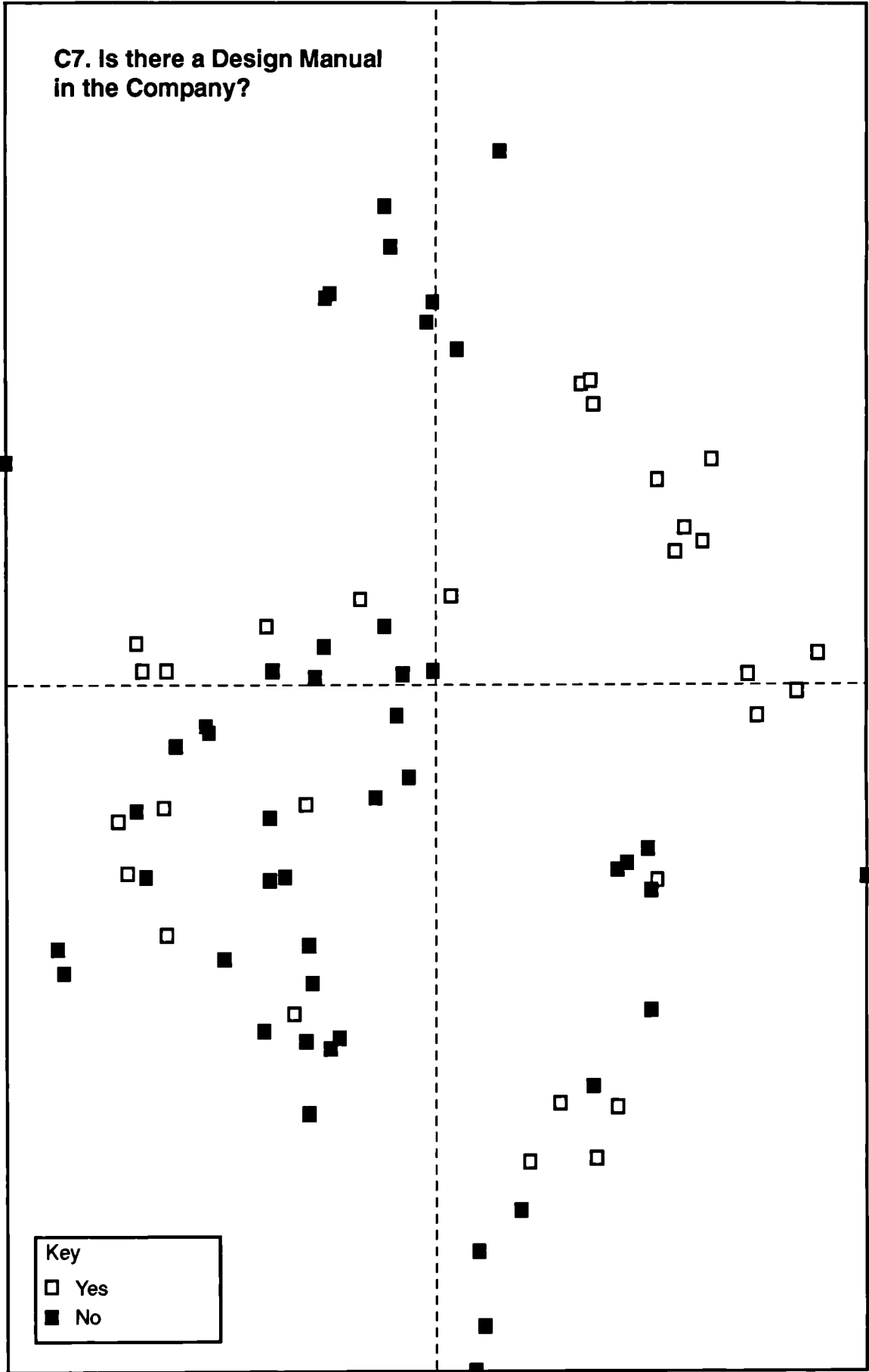


C6. Is Design Considered in a Section of the Company's Corporate Documents?



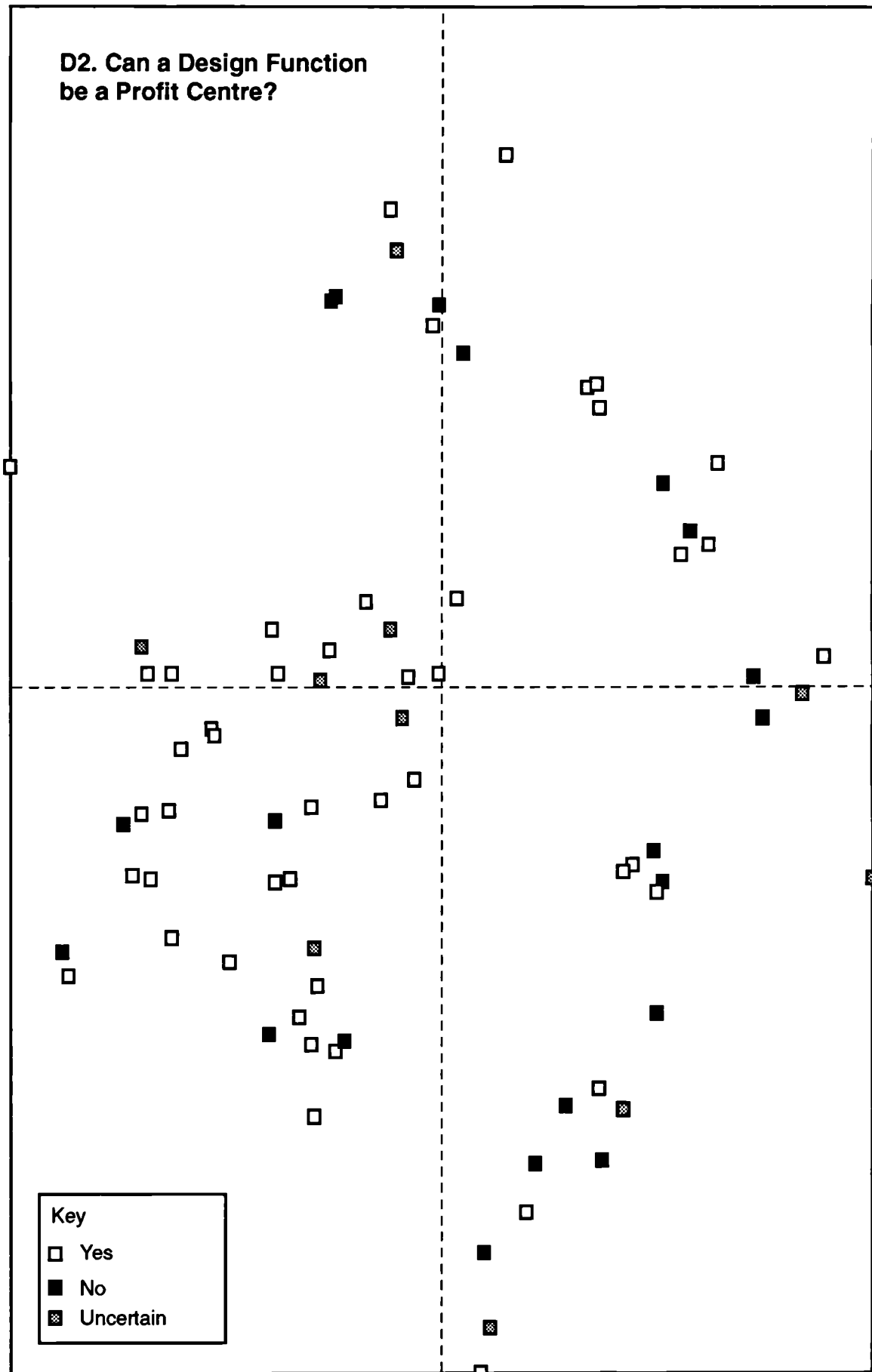
Key
□ Yes
■ No

**C7. Is there a Design Manual
in the Company?**

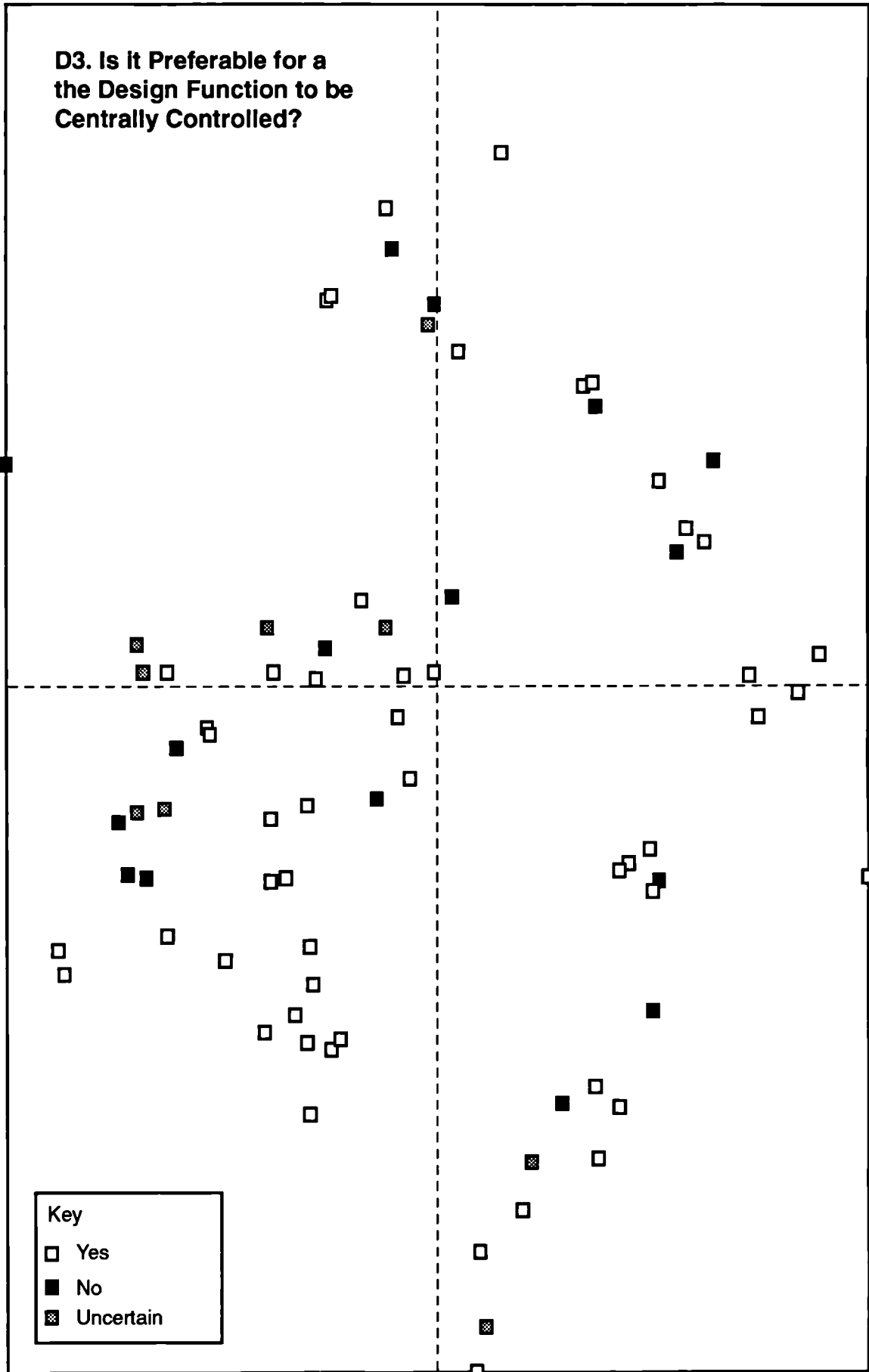


Key
□ Yes
■ No

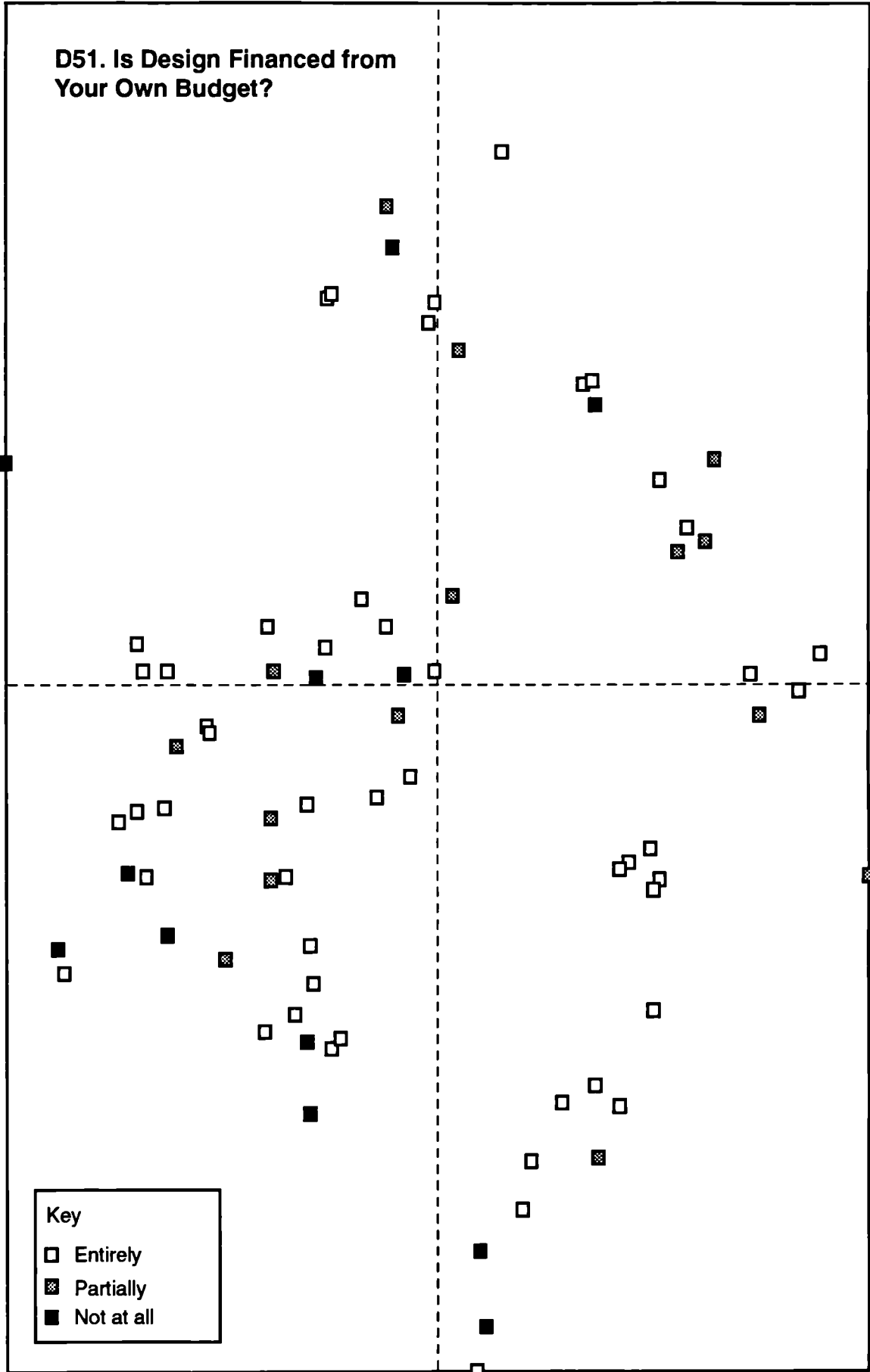
D2. Can a Design Function be a Profit Centre?



**D3. Is it Preferable for a
the Design Function to be
Centrally Controlled?**



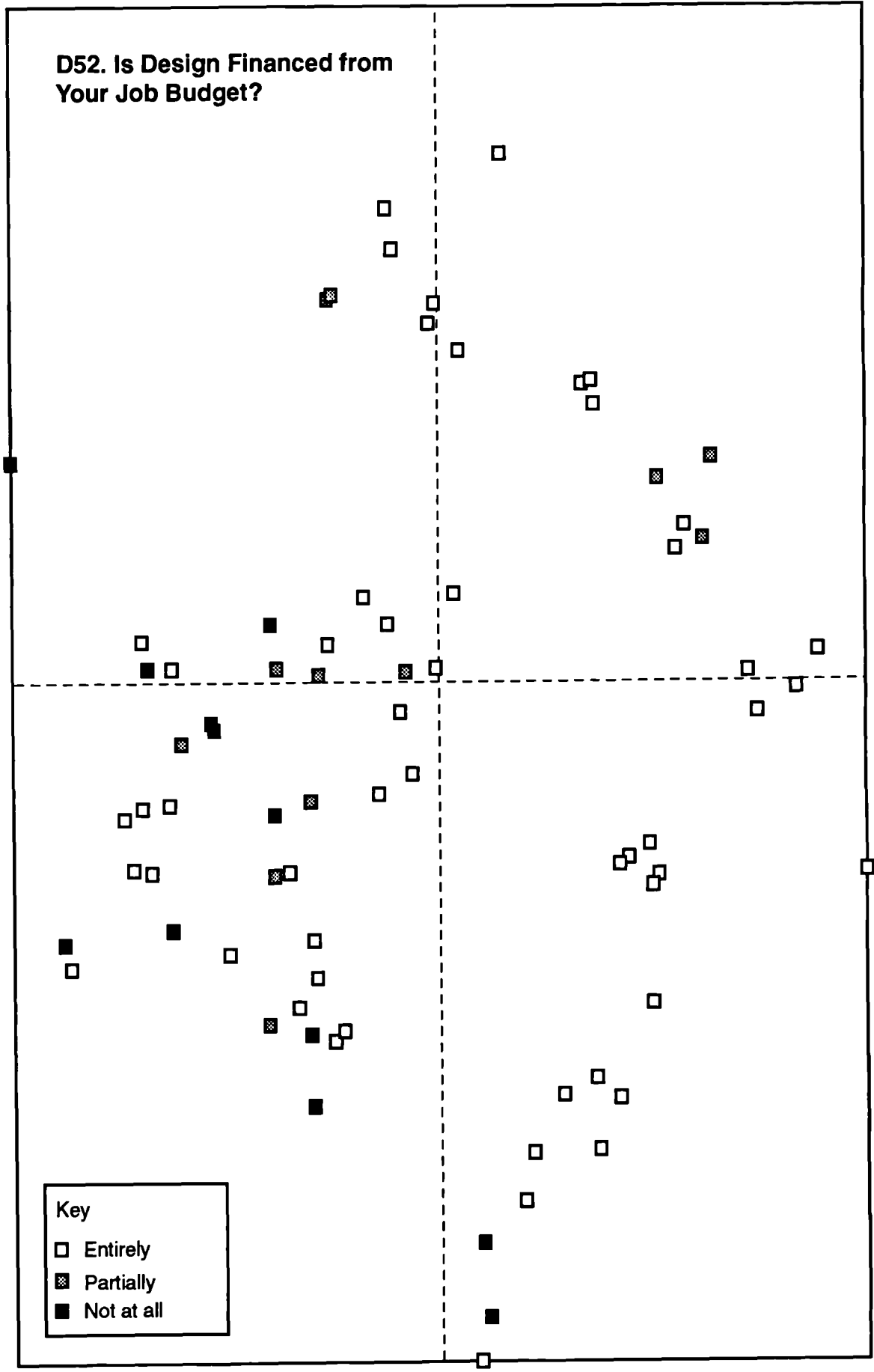
D51. Is Design Financed from Your Own Budget?



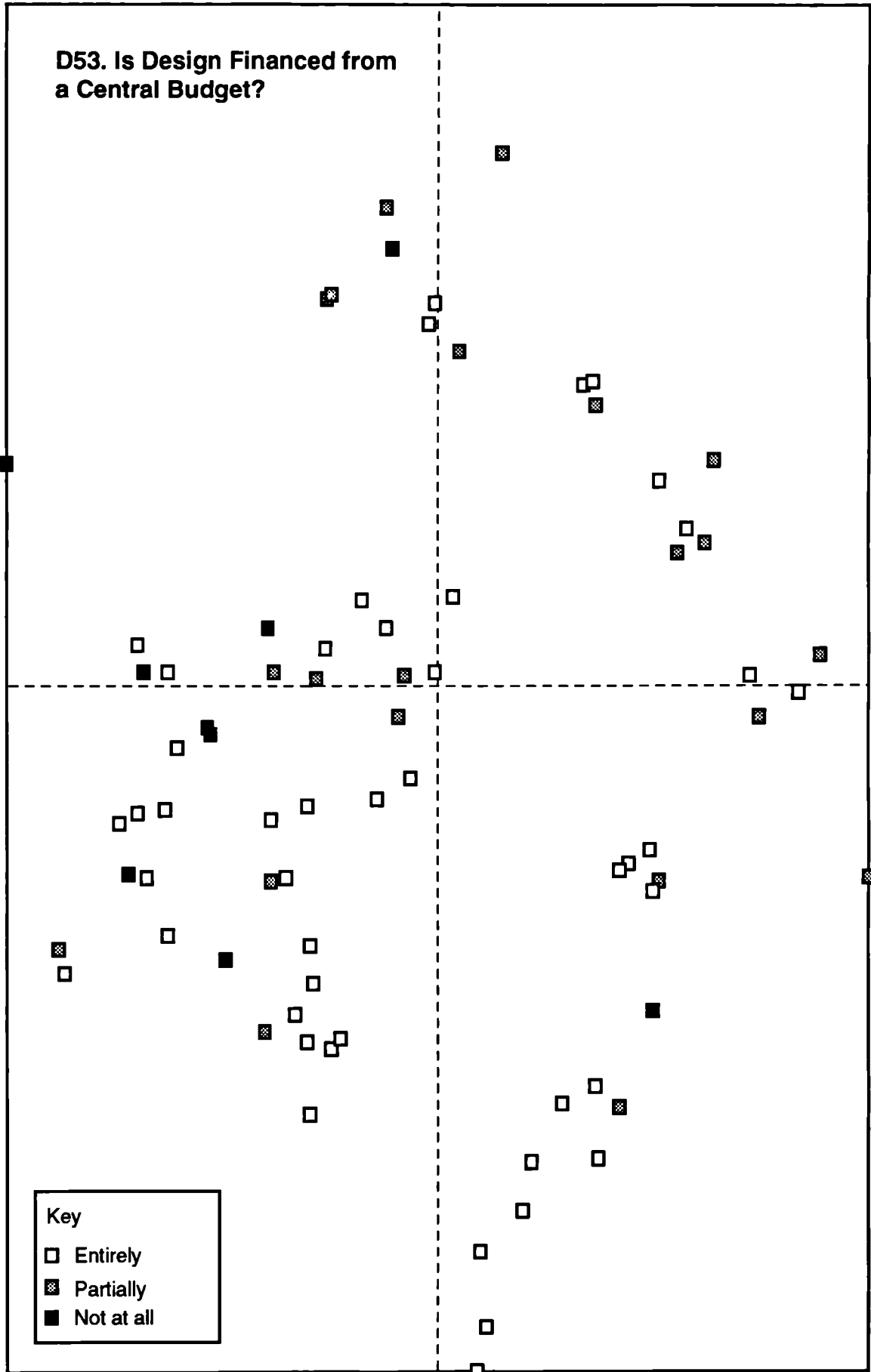
Key

- Entirely
- ▣ Partially
- Not at all

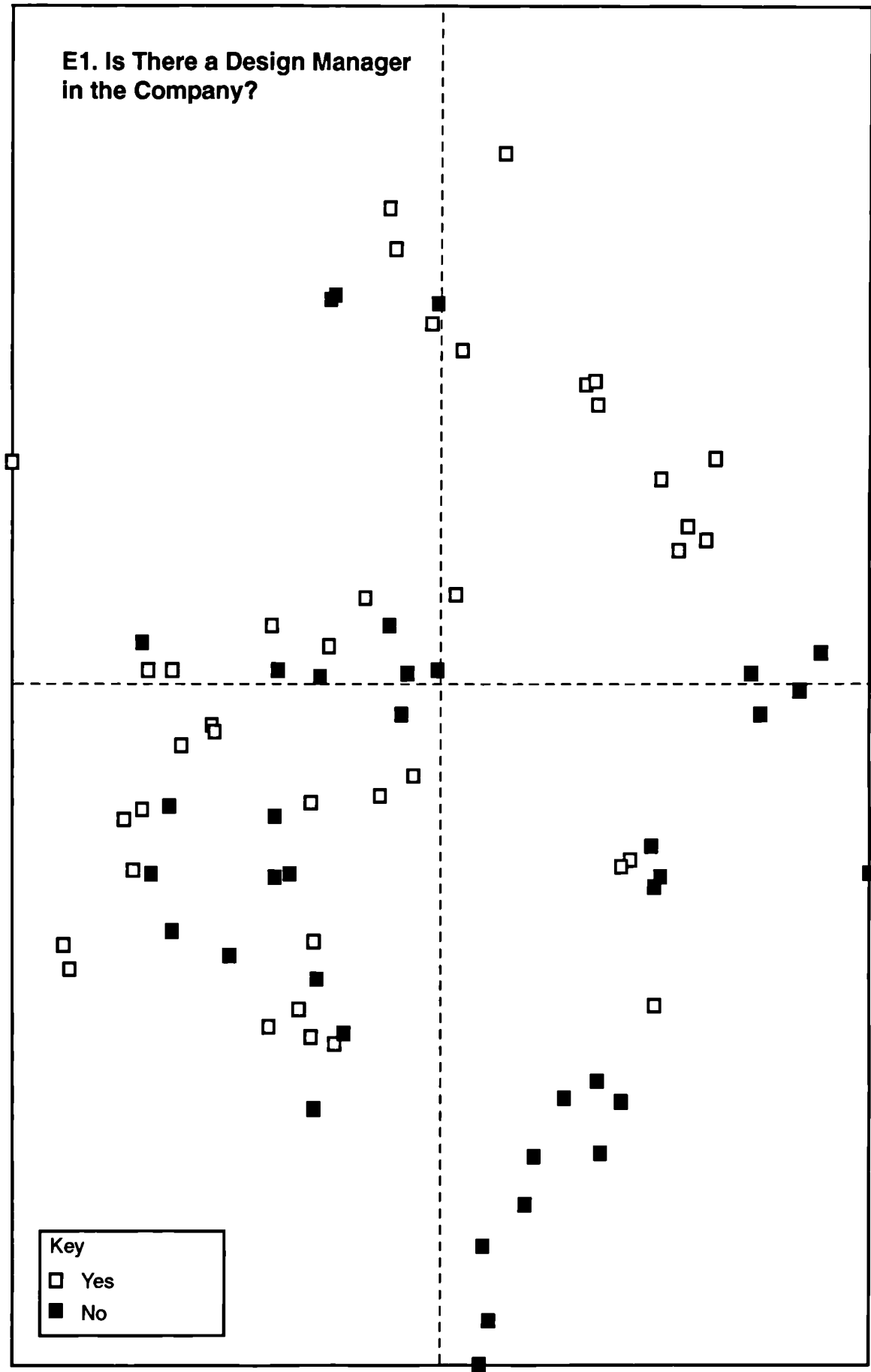
D52. Is Design Financed from Your Job Budget?



D53. Is Design Financed from a Central Budget?

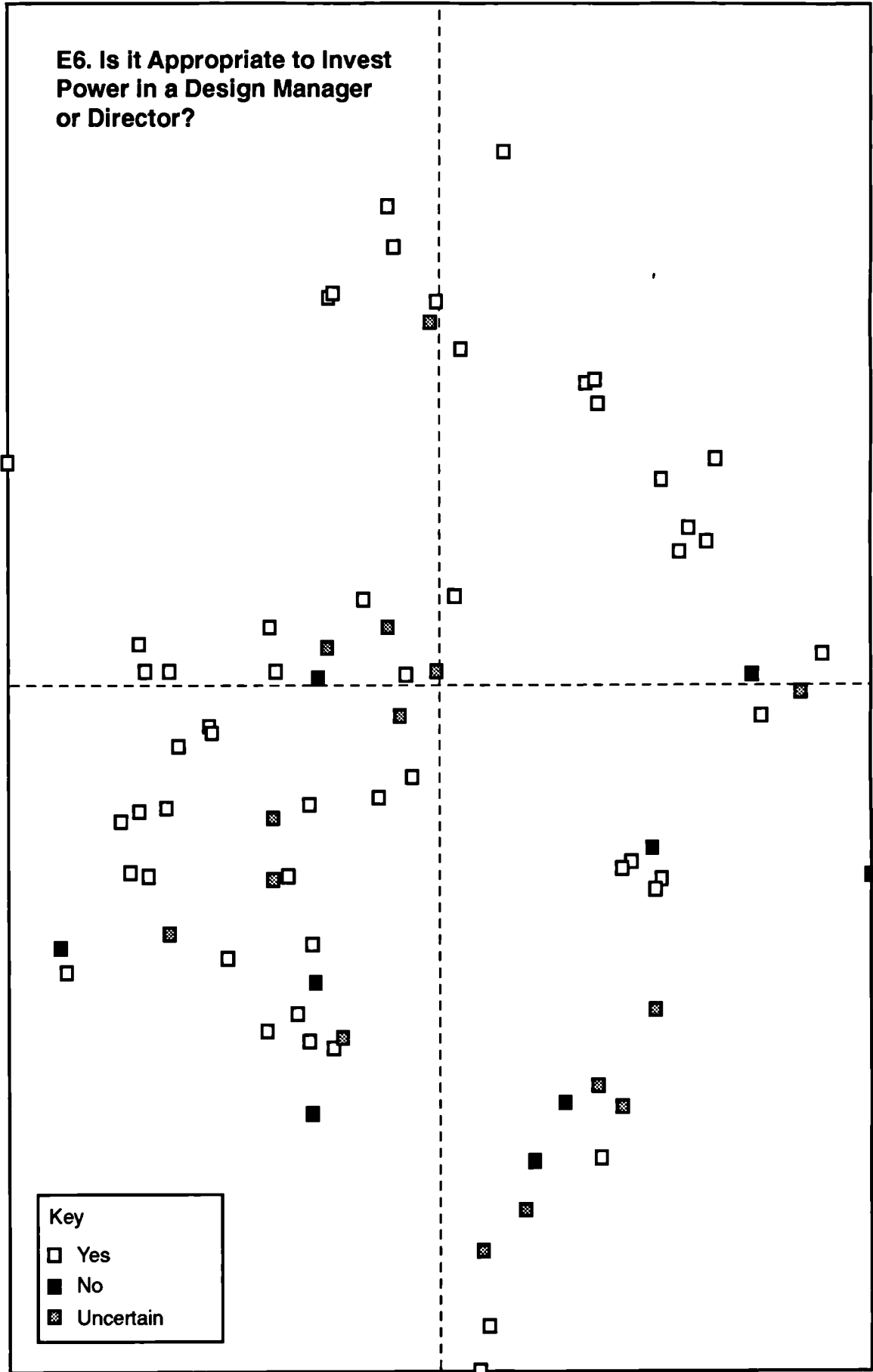


**E1. Is There a Design Manager
in the Company?**

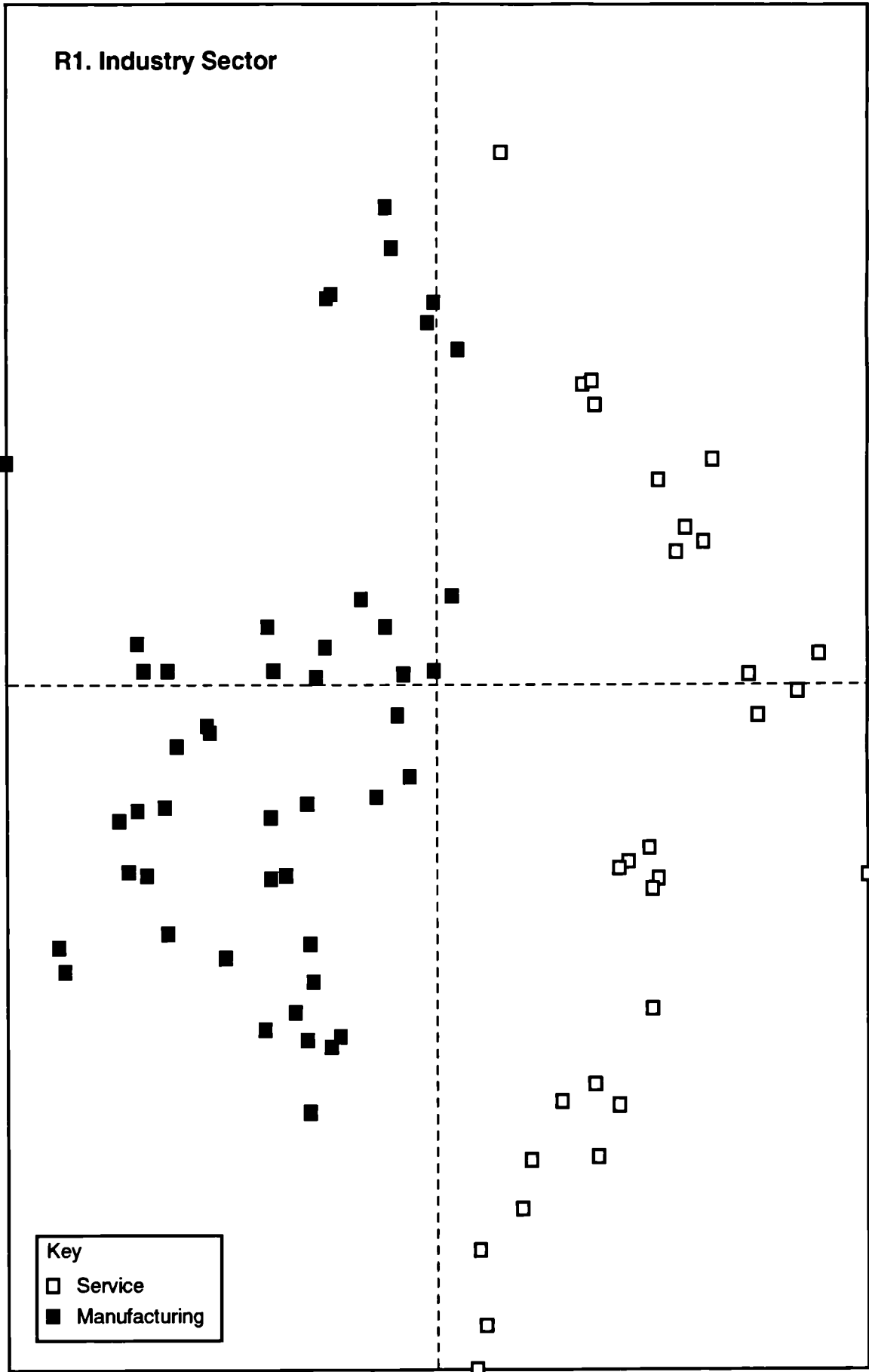


Key
□ Yes
■ No

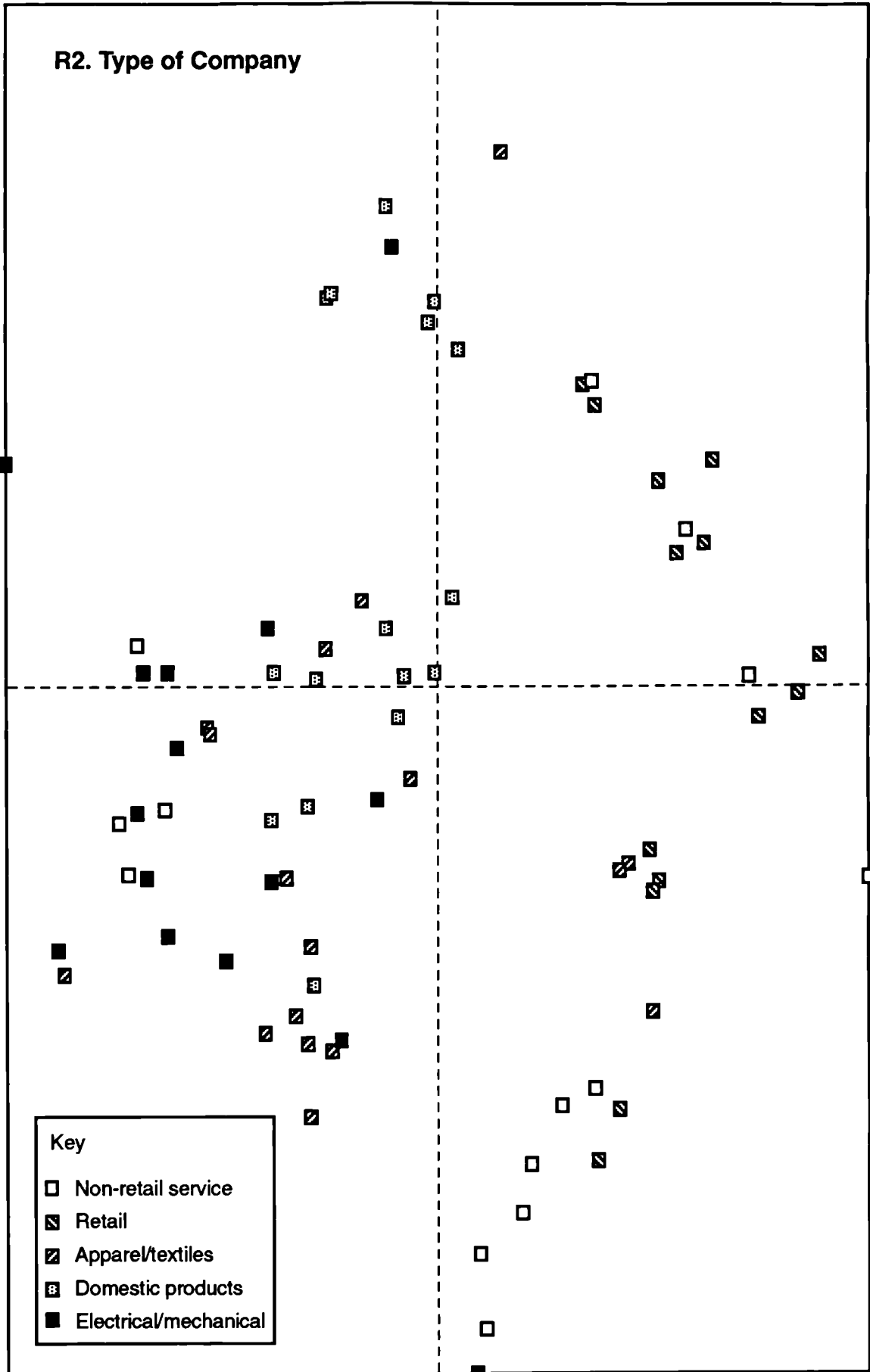
E6. Is it Appropriate to Invest Power in a Design Manager or Director?

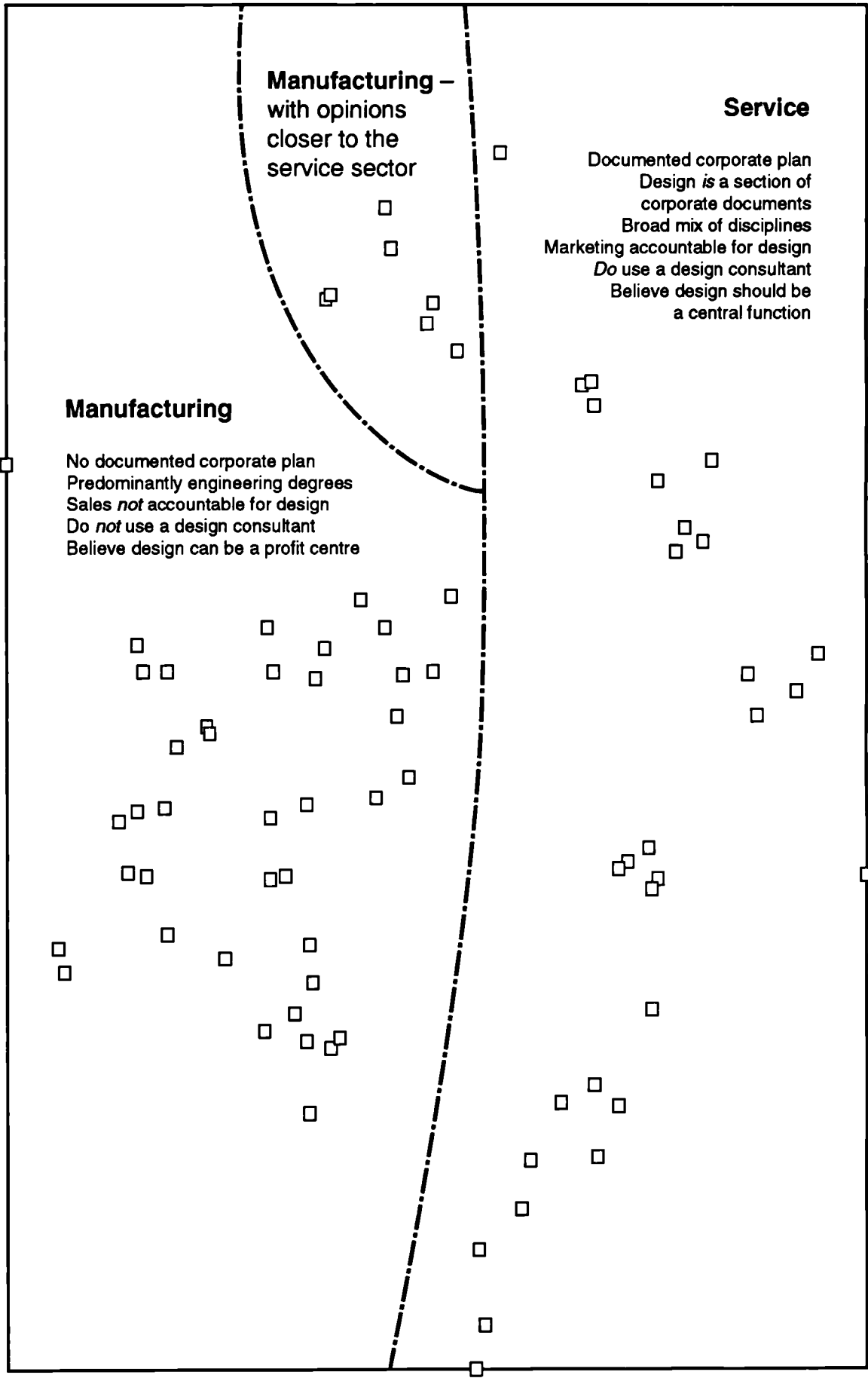


R1. Industry Sector

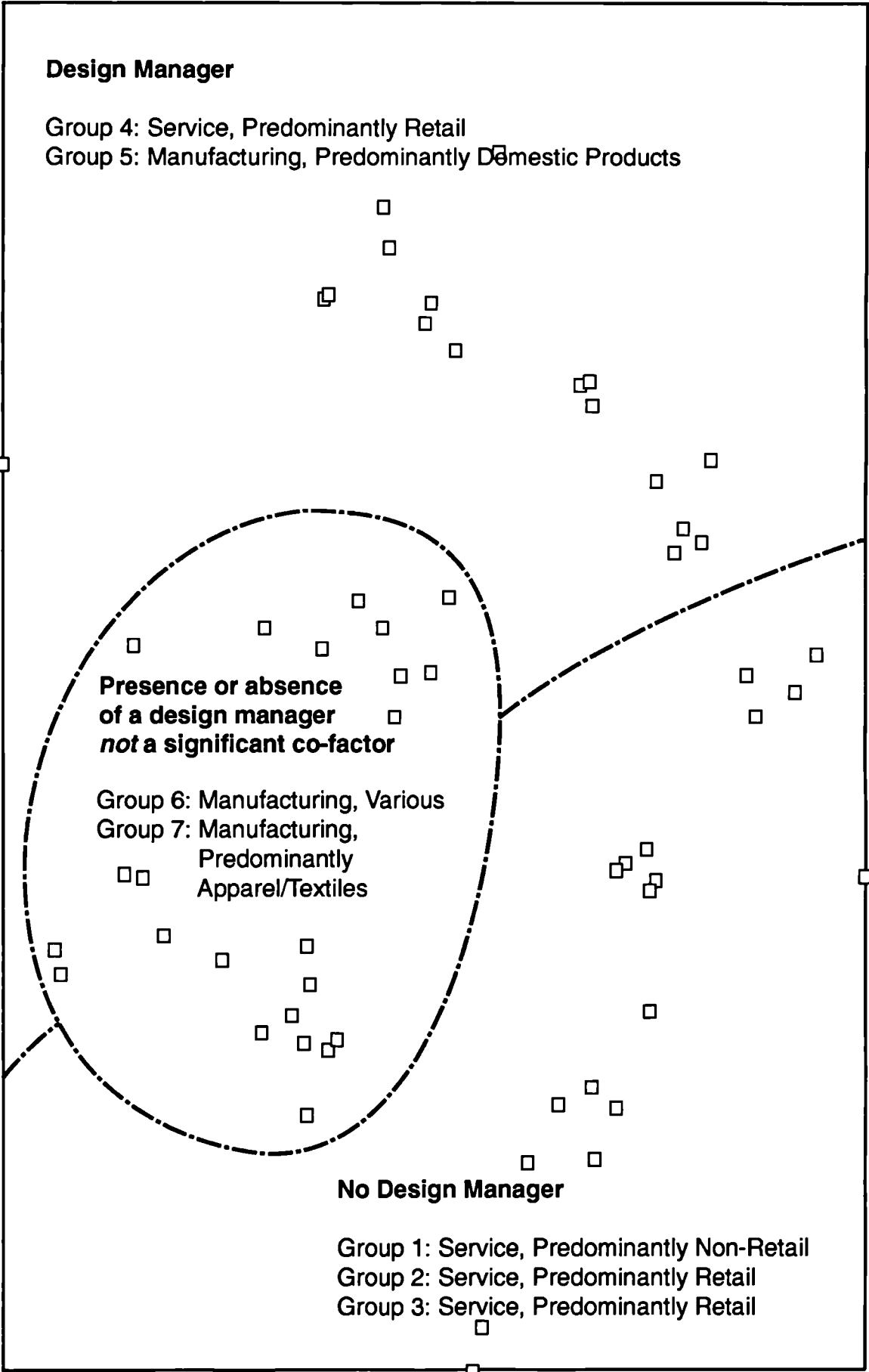


R2. Type of Company

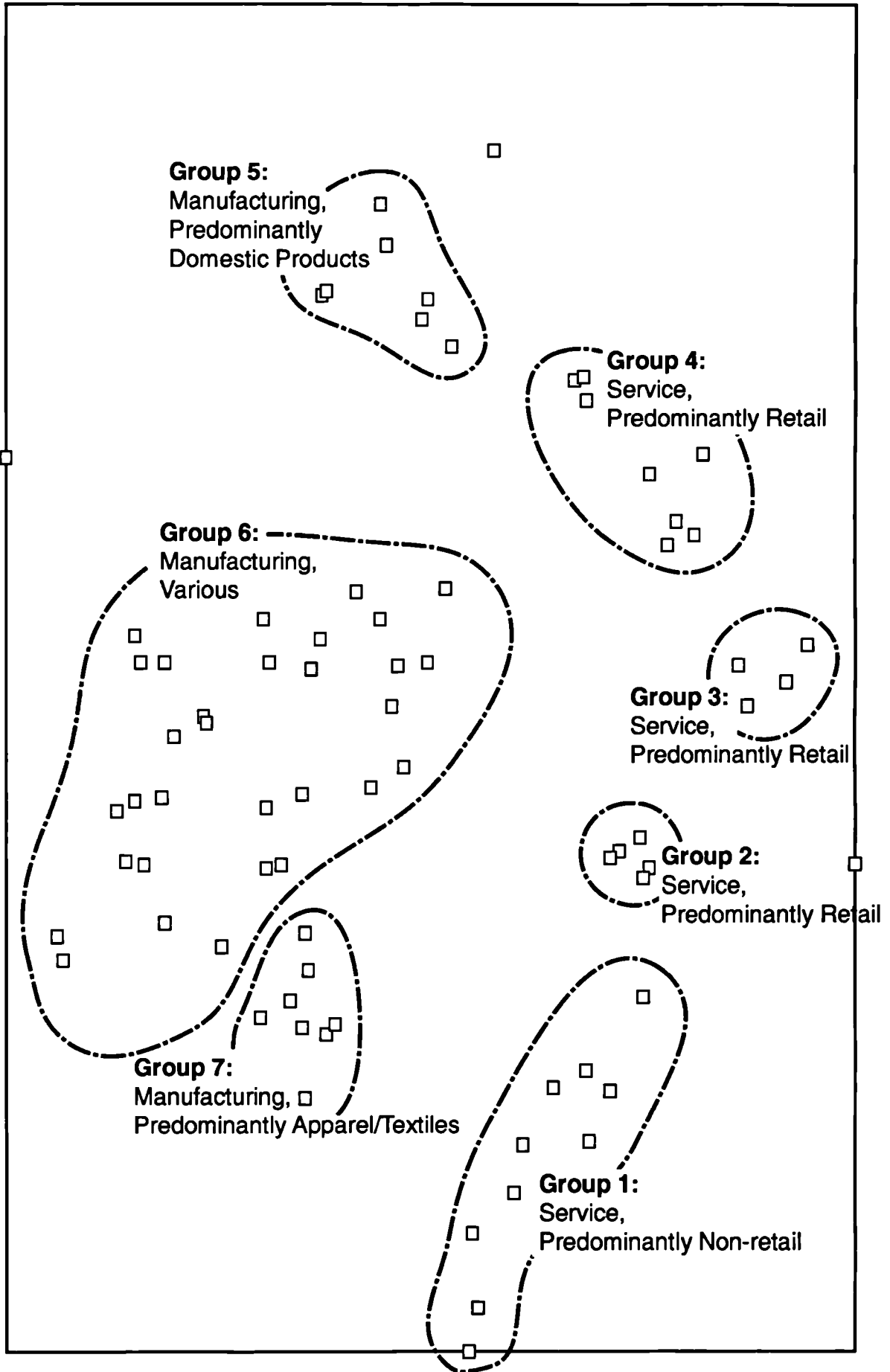




The manufacturing/service division



The design manager/non-design manager division



The seven company groupings

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