

Design funding in firms: a conceptual model of the role of design in industry

James Moultrie, Finbarr Livesey, Cecilia Malvido, Ahmad Beltagui, Kul Pawar, Johann Riedel

Author contact details

Dr James Moultrie: University of Cambridge, Institute for Manufacturing, Department of Engineering, CB2 1RX, UK, 01223 764830, jm329@eng.cam.ac.uk
Finbarr Livesey: University of Cambridge, Institute for Manufacturing, Department of Engineering, CB2 1RX, UK, 01223 748258, tfl20@eng.cam.ac.uk
Cecilia Malvido: University of Cambridge, Institute for Manufacturing, Department of Engineering, CB2 1RX, UK, 01223 664737, cm459@eng.cam.ac.uk
Ahmad Beltagui: Nottingham University Business School, Jubilee Campus, Nottingham, UK, 0115 846 7637, ahmad.beltagui@nottingham.ac.uk
Professor Kul Pawar: Nottingham University Business School, Jubilee Campus, Nottingham, UK, 0115 951 4029, kul.pawar@nottingham.ac.uk
Johann Riedel: Nottingham University Business School, Jubilee Campus, Nottingham, UK, 0115 846 7073, johann.riedel@nottingham.ac.uk

Lead Author Biography: Dr James Moultrie

James Moultrie is a University Lecturer in Innovation and Design Management. His research interests seek to improve the utilisation of design skills and increase design/innovation capability at project, firm and national levels. Specific interests include design management, design strategy and the role of the physical environment on enhancing innovation. James is located within the Institute for Manufacturing (IfM) in the Department of Engineering at Cambridge University. He currently manages a project funded through the AHRC & EPSRC under the Design for the 21st Century Initiative to develop a 'National Design Scoreboard'. This project is in partnership with the Universities of Nottingham, Strathclyde, Cranfield, Loughborough and Dundee. His other current projects include an investigation of Strategic Design, an exploration of Design Trends and a study into the use of Boundary Objects in new product development. Previous projects have included the 'good design practice' project in partnership with Cambridge's Engineering Design Centre and Royal College of Art. His PhD focused on assessing and improving design capabilities in SMEs. James also has experience in managing large research grants as the IfM's Innovative Manufacturing Research Centre coordinator for two years.

James is a Chartered Mechanical Engineer (IMechE) and has ten years experience as a project manager, senior engineer and marketing product manager in the precision instruments sector. In 1999, he gained an MBA (with distinction) and also has an MA in Industrial Design. In 2000, he was awarded a 'Scientific and Technical Academy Award' and an Emmy for work on a range of lenses for professional 35mm cinematography.

International DMI Education Conference

Design Thinking: New Challenges for Designers, Managers and Organizations

14-15 April 2008, ESSEC Business School, Cergy-Pointoise, France

Design funding in firms: a conceptual model of the role of design in industry

James Moultrie, Finbarr Livesey, Cecilia Malvido, Ahmad Beltagui, Kul Pawar, Johann Riedel

ABSTRACT

Design is of increasing importance both in firms, but also to the nation. Previous studies of the value of design have failed to propose a reliable approach to capturing design expenditure. This study proposes a model of design expenditure, developed from literature and exploratory cases. This model will be used as the basis of a survey of spend on design in the UK.

INTRODUCTION

This paper reports on an exploratory study to better understand the role of design in firms. This forms part of a wider project which is seeking to develop a 'National Design Scoreboard' to present the strength of design capability at a national level, and enable comparison with other nations.

The importance of both R&D and Innovation at a national level is well established. Both are perceived to be an essential contributor to future national productivity and economic performance. Measurement of R&D and innovation through national scoreboards has been instrumental in encouraging both firm investment and also in the setting of national targets [DTI 2006, van Drongelen et al 2000, Tether 2006]. The UK R&D scoreboard has specifically enabled the development of clearly articulated national targets for public and private investment in R&D, based around self reported spend on R&D. Thus, firms can compare their position against industry leaders. By aggregating company responses from firms in different nations, it is possible to make an international comparison of expenditure, aggregated for sectors and also regions. The R&D scoreboard has helped raise the importance of R&D investment and has resulted in the establishment of national targets.

However, whilst the measurement of R&D and innovation is important, it is not necessarily sufficient [Strategic Direction 2005]. Measurement of R&D spend tends to favour firms with a science and technology bias, and as a result, rewards nations which excel in these industries. Much of the emphasis on national innovation performance is also based on innovation in technology. However, it has been noted that this emphasis ignores the 'hidden innovation' [Nesta 2007] in nations such as the UK, in which services contribute significantly to the economy. Indeed, Power [2005] noted that 'many products and services rely for their profitability and value added not only on their physical or functional aspects but rather on the experience they deliver'. In 1995, recognising this lack of wider recognition of design, Cooper & Press commented that:

"There is much evidence to demonstrate that British industry is less committed to design than many of its competitors. This is one factor that accounts for the decline in Britain's manufacturing industry, and is the consequence of a number of cultural and economic factors. In

the light of major industrial, economic and cultural transformations, an outdated view of design tends to dominate in Britain.” [Cooper & Press 1995]

More recently, there has been a growing worldwide interest in the impact that design has in industrialised economies [Hytonen 2003, Kolmodin & Peli 2005]. There have been a number of independent studies that provide scattered qualitative evidence of the benefits of design [e.g. Sentance & Clark 1997, Hertenstein et al 2005, Gemser 2001]. However, the lack of a common framework underpinning these studies, and variations in the definition of design makes comparison between these studies difficult. Vinodrai et al [2007] commented that ‘given the significant role of design in innovation and the failure of the traditional approach to measuring innovation activity to capture it, it is crucial to ask: How can the role and significance of design in the creation of the economic value be captured and measured?’

This paper is part of a wider project which is seeking to develop a “National Design Scoreboard”. The project aims to present the strength of design capability at a national level to enable comparison with other nations. This paper specifically reports on an exploratory study to establish a method of measuring design spending in firms. The main output is a conceptual framework developed iteratively through insights gained from exploratory cases and extant literature.

BACKGROUND

In the late 1980s, the House of Lords Select Committee for Science and Technology [HOL 1987] reported to the UK government on R&D. They identified that investment in R&D was insufficient and resources should be focused on improving the situation. Their conclusion was that “as a nation, we are investing too little in R&D and the situation is getting worse.” [HOL 1987]. As a result, attention was given to the financial reporting of R&D expenditure and in the late 1980’s, standard accounting procedure SSAP13 was created [Accounting Standards Committee 1989]. Other similar standards were created internationally, all based on definitions established in the Frascati Manual [OECD 2002], initially created in 1963. The Frascati manual provides guidance on measurement of R&D inputs, and “deals exclusively with the measurement of human and financial resources devoted to R&D.” The definitions established in the manual have become established and this agreement means that international comparison is possible [Nixon 1996]. As a direct result of firms reporting design expenditure, the UK government introduced the R&D scoreboard in 1992. This annually produced scoreboard presents a ranked list of firm in terms of R&D expenditure in the UK and abroad [e.g. DTI 2006].

Whilst the standards on capturing R&D spend are now well established, this was not always the case. Early attempts to measure R&D were hindered by its perception as being too creative and unstructured to be measured [van-Drongelen 1997]. Thus, standard management and control techniques were considered inappropriate [Roussel et al 1991]. These issues were overcome because

there was enough recognition of R&D's value to develop a means of measuring it. Design is arguably even more 'creative and unstructured' than R&D. However, there is a growing recognition of the need for design spend to be better understood:

"It is vital that the financing of design activities, particularly product design, is written into corporate, business and operating plans. The achievement of excellence in design requires funds to be allocated from clearly identified budgets well in advance, to cover properly programmed requirements." (BS7000 Pt. 2, p9)

Value of design investment

Since the 1980s, there have been a number of landmark studies that have attempted to determine the benefits of investing in design. Black & Baker [1997] examined 'design orientation' in around 60 small engineering firms, using 'company growth rate' as a measure of success. However, they avoided any explicit measure of design expenditure. Walsh et al [1992] identified a generally positive relationship between design consciousness and success in firms, again, avoiding expenditure as a measure of design consciousness. Julhiet [1995] studied SMEs that invested in industrial design to determine the benefits. However, expenditure on industrial design was not measured, instead, firms were classified by the frequency with which they used design. Hertenstein et al [2001] also set out to establish the "value of design" in study of 51 companies across 4 sectors. In this case, design orientation was judged by an expert and this was compared against measures of financial performance. Finally, Gemser [2001] explored the competitiveness of firms investing in industrial design, in comparison with those that do not invest in design. All of these studies aimed to measure the value of design investment. However, none of these studies captured this investment in financial terms. Hertenstein et al [2001] recognised this problem in achieving a valid financial input measure for design.

In 1997, Sentance and Clark [1997] conducted a unique survey of around 800 firms, a sample they felt represented approximately a fifth of the UK's manufacturing industries. Their survey aimed to enable an estimation of expenditure of design at a national level. They captured expenditure as a percentage of turnover, where respondents were provided with a range of banded options. Design services in this study included: Market research; Product development and improvement; Appearance design; Technical design; Process/systems design; Engineering design; and Graphic and brand design. As a result, they estimated that UK manufacturers invest around £10bn on product development and design. Interestingly, this compares with an estimated spend of £7m on R&D during the same year. However, limitations in this study include both the categorisation of 'types' of design and the choice of banded estimates as a basis for further scaling. The first limitation is particularly pertinent, as for example, what is the relationship between technical design, process design and engineering design?

Challenges in defining design

'Design' is notoriously difficult to define. It is applied to an extraordinarily wide range of activity including at one extreme something that could also be called 'engineering' and at another something that could be called 'art' [Lawson 2006]. It is a word loaded with preconceptions about the nature of design and designers. Definitions vary from the highly abstract notions of improving the human condition, through to precise articulations of specific disciplines. Margolin [2002] suggested that design is "no less than the conception and planning of the artificial world". It is often used to suggest that an object may have been created with loftier intentions than a non-designer equivalent [Raizman 2003]. At worst, design is associated with the superficial and the shallow. Broad definitions of design, whilst in essence correct, are not helpful in pragmatic terms, and are difficult to apply to understand design in practice [Margolin 1989].

Narrower definitions of design focus on either the act of designing or the outputs as a result of this act. The act of designing is most often viewed either as a process or a problem solving activity [Archer 1965]. This process can either be a prescriptive sequence of activities or alternatively, a descriptive summary of an iterative, cognitive process of exploration [Cross 1998]. Lawson [2006] cites Gregory's definition from 1966, where he comments that "the process of design is the same whether it deals with the design of a new oil refinery ... or the writing of Dante's Divine Comedy". The outputs from this process are typically classified as either plans/instructions for subsequent production or as the types of artefacts that ultimately ensue [Dym 1994 p15].

This difficulty in attributing a concise definition is problematic. It is an issue in industry, where false preconceptions render mistrust and misuse of design skills. It is problematic in research, where a lack of precision renders difficulty in interpreting potentially profound insights. However, it is particularly problematic when considering design expenditure in firms. To capture expenditure, a degree of definitional clarity is required to enable financial managers, who typically have little understanding of the subtler definitions of design, may collect data in a consistent way.

Design as a part of R&D, product development and innovation

When considered from a firm's perspective, many definitions treat design as a component of R&D, innovation or new product development. However, as Tarasewich [1996] noted product design does not depend on R&D and R&D does not always lead to new products. Bruce & Beasant [1992] suggested that design is the "purposive application of creativity to all the activities necessary to bring ideas into use either as product (service) or process innovations." This view of design is reflected within the UK Community Innovation Survey [2000], where firms reported expenditure on 'all design functions' (including industrial design, product design, process design, service design and specifications for production or delivery). Thus, design is most often viewed as a subset of R&D.

Drawing on the Frascati definitions, Tether [2006] makes the following distinctions between R&D and Design and Development:

- **Research:** Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts. It may or may not be directed towards a specific practical application or objective.
- **Design and Development:** Systematic creative or experimental work, carried out on an occasional or regular basis, that draws on knowledge from research and/or experience, that is directed to producing products (including materials and services), to installing new processes and systems, or to improving substantially those already produced or installed.

It is also possible to distinguish between design that is technically focused and design which has its basis in the arts or in considerations of user experience [Cooper and Press, 1995]. Dym [from Herbert Simon 1994 p15] suggests that this difference can be characterised by an artefacts 'inner and outer' characteristics, where the inner reflects engineering design and the outer reflects industrial design. However, it is also claimed that the industrial designer fulfils a wider role than the aesthetic and ergonomic aspects of products and can be viewed as the champions of user experiences, and especially those experiences related to physical products [Farr 1966]. Thus, design and development can be further subdivided:

- **Technical design:** Resolution of technical issues in the creation of products and services. This might include engineering skills such as mechanical engineering, electrical engineering and software design. It might also include the design of production processes and technologies necessary to deliver services.
- **User focused design:** Design relating to the experience of the customer and user in the creation of products and services. This might include product aesthetics, ergonomics, interfaces with software and the experience of the overall service. BS7000 distinguishes here between the visual identity of products and research into customer attitudes and needs.

Design as a part of marketing and other business functions

Design also plays a role in other aspects of the business, specifically in communications and branding activities. These aspects of design are relevant in all firms, including those which do not frequently engage in the development of new products and services. Kotler and Rath [1984] noted the role of design in optimising customer satisfaction, through their connection with products, environments, information and corporate identity. In the British Standard guide to managing design [BS7000 p2, p9], distinction is made between two aspects of design, that are not specifically related to product or service development:

- **Corporate identity and culture:** physical, operational and human features and values that give the organisation its unique personality
- **Promotion & customer support:** advertising, promotional literature, packaging, instructions, manuals, presentations, showroom environments, displays in stores, appearance courtesy and knowledge of staff, professionalism of delivery, help-lines, web-help, service workshops etc

This distinction is interesting, in that the former category applies at a corporate level, whilst the latter can be considered for individual product/service lines. Gorb [1990] similarly makes a distinction between design as product design (including fashion), environmental design (buildings, interiors and landscapes), information design (graphic and multimedia) and corporate identity design.

A model for capturing design spend

It is clearly possible to determine any number of classification schemes, each of which are valid, given the context and the purpose of that classification. Based on insights from literature, a preliminary conceptual model is proposed (figure 1).

Design spend in the firm			
Design in the creation of products and services		Design in the communication, promotion and delivery of products and services and in the creation and communication of the identity of the business	
Design relating to the technical/ engineering aspects of creating products and services	Design of the user experience in the creation of products and services	Design as part of promotion, communication, branding, and distribution of products and services	Design as a part of developing promoting, and communicating the corporate identity

Figure 1: A preliminary conceptual model of design spend

METHODS

Whilst there are established methods for measuring R&D investment, there is no equivalent for design, despite evidence of its importance [Vinodrai et al 2007]. Ambiguities in the definitions and role of design have contributed to this lack of understanding. This research aims to fill this gap, to develop a means by which design funding in firms can be established.

This study builds on existing literature and empirical data to propose a conceptual model to guide the estimation of design funding in firms. A series of six pilot case studies have been conducted with senior managers. The case studies were selected to span a wide range of organisational size and sector, as illustrated in figure 2.

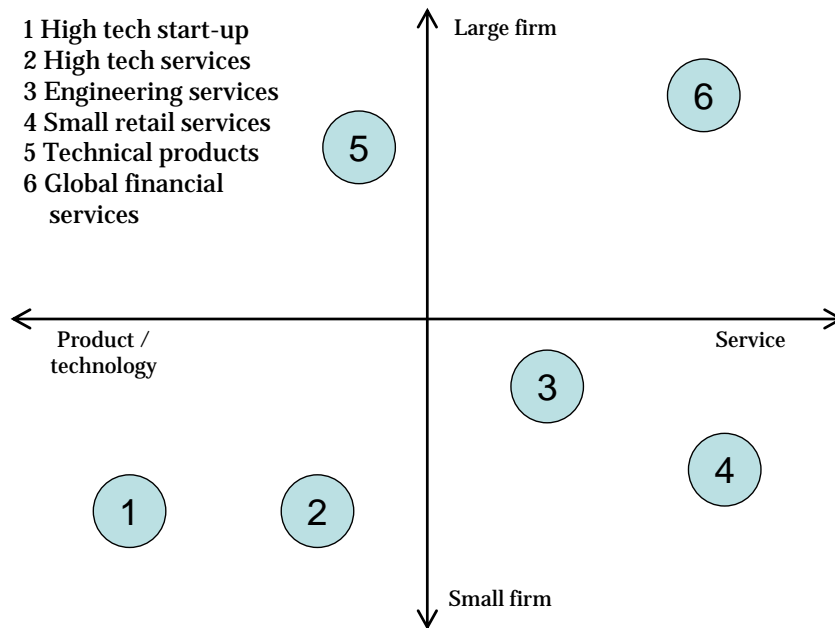


Figure 2: Company cases

In each case, respondents were first asked to describe in their own words the role of design in the firm. Following this initial discussion, participants were presented with a pilot ‘survey instrument’, to help explore design spend. The survey instrument served two purposes. Firstly, it enabled the proposed conceptual model to be explored. Secondly, it enabled discussion on the challenges in collecting financial information relating to this classification. Participants were asked to comment on the viability of producing financial estimates based on consideration of departmental budgets, resources engaged in design and activities that could be considered as design. All interviews were recorded and transcribed to identify consistent themes and emerging patterns. A summary of cases is presented in figure 2.

CASES

Case 1: High tech start up

This high tech start up firm was spun-out from the University of Cambridge, in 2003/4. Their core technology is an ‘innovative gas spectrometry’ device, that enables the detection of chemicals, in very small quantities – essentially, it is an electronic ‘nose’.

As a start up firm, the business was involved in the Design Council’s Designing Demand campaign which brought design skills to small, technology based firms. This input helped them to develop potential applications for this radical technology, to generate investor interest and to define their corporate identity. As a result, the firm is highly supportive of design within the business. They have two members of staff with ‘design’ (industrial design) backgrounds. They view design as a core part of their business strategy.

As a business, they do not currently measure design expenditure as a distinct item. They do capture R&D expenditure, as a necessity for R&D tax credits. However, they recognise that design is an important part of the business and that the R&D values do not do justice to this other spend.

- **Technical design and user focused design:** They found it difficult in practice to make a clear distinction between the engineering focused design activities and those more associated with look, feel and user interface. In their view, these activities are intimately intertwined. Their workforce is dominated by design engineers, operating in both electronic, mechanical, software and also chip design. However, they recognised that this does not reflect the breadth of design that they are engaged in.
- **Corporate identity:** The design of their corporate identity was an early, one-off expenditure. They continue to invest in the design of their website and business promotions.
- **Promotion & customer support:** They do relatively little advertising and promotion, although they attend trade shows and exhibitions.

The distinction between design in product development / research and design in the other aspects of the business appears sensible. However, they acknowledged that they found it difficult to distinguish between the different design disciplines in product development. In-house spend on design could be obtained by considering the number of people directly engaged in design. The outsourced spend can be estimated summing design contracts or purchase orders. However, they cautioned that they sometimes outsource a “whole job” – including the production of tooling or components. This might also be true for the outsourcing of graphics, where the contractor also does the printing. They felt it would be simpler to collect ‘orders of magnitude’ – rather than absolute values – e.g. “software design at 20% of R&D spend.”

Case 2: High tech services

Company 2 has a turnover of around £1m and employs 22 people. They spend roughly £300K on R&D and claim R&D tax credits. They describe themselves as a ‘proximity marketing provider’, delivering content to mobile telephones. For example, as a person passes a display board, their mobile phone detects content and downloads it. This might be videos, music, information, or vouchers etc.

Design is considered holistically to be everything relating to the “planning and delivery of product solutions to different customers”. For example, a recent project for a historical agency involved the creation of a hand held guide system for use in museums. This PDA based guide enabled the end user to point at different objects and download relevant information. This complex customer solution required around 33 weeks of development, with software design taking roughly one third of the time.

- **Technical design:** They employ around 2.5 to 3 full time equivalents members of staff who are involved in technical aspects of design. There is also some external input – one person who

provides around 2 days per month. Spend here was estimated at around 8% of turnover, all in-house

- **User focused design:** The user experience for all new customers is designed. Out of a total workforce of 22 people, it was felt that around half have some involvement in ‘design’. But, of those, perhaps only two could be considered as designers by traditional definitions. Design effort is biased towards the analytical aspects of software design, with external partners producing the content, its presentation on screen and the user interface. Spend here was estimated at around 18% of turnover with the majority in house.
- **Corporate identity:** The business is trademarked internationally, at a cost of around £2-3K per country. There is also some activity around the design of the brand ... “if you design a brand [you need] time to think through the focus, principles etc. It feels like you are just sitting around drinking coffee – but it is important”. The website is also designed externally. Spend here was estimated at around 25% of turnover, with 5% of this outsourced
- **Promotion & customer support:** There is less emphasis on advertising and media and a maximum focus on the technology. For promotions – they use an external PR agency (who is also a shareholder), who provides newsletters and cases etc. This PR however is not viewed as design, as their expertise is more about their knowledge of publishing and their contacts.

Capturing design expenditure was viewed as being very difficult. The definitions proposed were considered helpful, but greater precision was required in order to make reliable estimates. Spend externally was relatively easy to estimate. However, estimates of spend internally reflected their very wide perspective on what could be considered as design.

Case 3: Engineering services

Company 3 was formed in 1985, producing bespoke fabrications for heavy industry. The firm views itself mainly as a manufacturing business, with design as an overhead. For most contracts, customers do not actually pay for any ‘design’, even though most projects contain a design element. Thus, actual design work is treated as an overhead on the total cost to the customer.

- **Technical design:** Currently, the design team consists of two full time CAD engineers. Additionally there are other intermittent users of CAD from other parts of the company. There is regular investment in both computer hardware and software, at around £600-800 per year. It was considered that it would be useful to distinguish between mechanical design (design for manufacture) and electronic design.
- **User focused design:** The design process seeks to involve all stakeholders. Everyone, “down to the installation engineers” helps to ensure that the customer gets what they want.” However,

there is no explicit involvement of specialist design skills focused on user interfaces, aesthetics or the user experience of the products designed.

- **Corporate identity and culture:** There is little other focus on corporate identity and the branding of the overall business.
- **Promotion & customer support:** The firm is not actively promoting itself although their web site aims to attract new customers. Brochures and exhibition stands are not a significant cost since advertising is used very little, except as a 'reminder' for old customers.

Design can be said to play a part in many of the company's activities, but is not easily visible and is "swallowed up in overheads". It was suggested that this is because customers do not appreciate the value of design and will not pay for it. Design is recognised as offering a competitive edge over rivals but it is not a principal function. Capturing expenditure on design was thus viewed as difficult, but also potentially useful. An initial estimate of £150,000 was made for design work conducted in one financial year.

Case 4: Small retail services

Company 4 is a small, family run business, with around 18 employees and approximately £1.3m turnover. They provide tiling to the building trade and end users. The company was established in 1980 by a husband and wife with backgrounds in interior design. In their core business (the construction industry) it is necessary to compete on price alone. There are also other trade customers, such as architects, property developers and interior designers, who are generally more design conscious. The management sees the company as "selling ideas and creativity", rather than tangible products. Design is considered to be an important way to differentiate the company from its competitors and to allow them to move away from price sensitive customers and focus on greater value adding operations. Thus, they are currently seeking to develop the service aspect of their business.

- **User focused design:** There are three recent design graduates on staff, who will be given further interior design training. Additionally all staff were sent on an interior design course administered by Nottingham Trent University. However, the job title and function of these new design graduates is as sales staff. A project is ongoing to change the nature of the company and the way it is viewed by customers. A big part of this is to design the retail space to reflect the idea of selling more than just a simple product.
- **Identity, promotion & customer support:** Activities here included the redesign of the shop itself as well as the design of promotional materials.

The company considered it difficult to isolate design spend in terms of resources, as in this small company, most employees are responsible for a number of different tasks. Thus, apportioning spend

reliably to design tasks was difficult. In total, 11 members of staff were listed as having design involvement with a cost of around £10,000. Of this, the split is roughly even between development (6 staff) and non-development (5 staff). The estimated total design spend was around £61,500. Of this, approximately one third was in-house with the remainder being outsourced. In-house costs were estimated using the percentage of time spent on design for each staff member involved in design.

The firm considered it useful to make a distinction between the design of products/services and other aspects of design that are more customer facing. They also noted that other design activities take place that are more focused on the business itself, including the design of the workplace and the design of business processes.

Case 5: Technical products

Company 5 is a developer of Computer Aided Design software which began as a University spin-out in 1977. It is now a successful multinational business with 438 employees and turnover of £26.7 million. It has subsidiaries in North America, Europe and Asia. Its software is used by more than 15,000 organisations in over 80 countries.

- **Technical design:** The firm's major developmental activity is incremental improvements made to its software. An estimated 25% of work is devoted to the creation of bespoke solutions for customers, utilising and improving the functionality of standard products. The main design function is the software development department which has approximately 90 members. Design activities also include the development of tutorials and learning materials.
- **User focused design:** 3 of the 90 software engineers are considered to be 'designers', working on user interface design. Most of the remaining work is technical and mathematical. Focus groups and market research is also conducted as the starting point for the development of user interfaces. There is also design work in the creation of product packaging. The firm is technically led, and places little emphasis on aesthetics. Graphical work, such as designing visual icons in the software, is often assigned to students.
- **Corporate identity and culture:** There is no overall management of design, but there are directors in product development and marketing who are involved in these activities.
- **Promotion & customer support:** The design of exhibition stands and displays are normally outsourced.

Since almost all work done is in house, then the main costs are staff related. The following staff were described as being involved in design: 3 engineering designers; 3 user interface designers; 6 printed media designers; 3 multi-media communications designers; 3 printed communications designers; and 1 "fashion and textiles" designers. This does not include the many the software developers, who the company would prefer to regard as working in R&D. The initial estimate for

design expenditure was £750,000. This was later revised to around £1.5m following discussions on the wider role of design. This could still be considered a conservative estimate since some of the software development department are also involved in design.

Capturing design expenditure in-house was relatively simple, as staff costs dominate. However, as this is a large spend, there was some debate around whether overheads should be included. Also, not all members of staff are engaged in design full time, so consideration might be given to estimating this per full time equivalent, pro-rata.

The firm currently accounts for R&D expenditure, although the figures submitted for tax credits differ to those in annual accounts. The difference is due to work such as beta testing, which is not refunded by tax credits. The firm noted that it is “laudable to measure design spend” but this would probably not be done unless there was instruction on the matter from the government. Design is not more important than R&D but is seen as complementary.

Case 6: Global financial services

Company 6 is a global organisation which provides information, analytical and marketing services to help customers manage the risks and rewards of commercial and financial decisions. Clients come from sectors which include financial services, retail, telecommunications, utilities, media, insurance, automotive, leisure, e-commerce, manufacturing, property and government. The firm employs around 15,500 people in 36 countries, with sales in excess of £1.9 billion. It is just outside of the top 100 in the R&D scoreboard and also appears in the Value Added scoreboard.

- **Technical design:** The firm is engaged in the design of software and information systems which process data. This is all work which is not directly visible to customers, who receive the end product in the form of reports. Customers are unlikely to be concerned with the design of the software providing they are convinced of the reliability of the information.
- **Identity, Promotion & customer support:** an aspect of design that is viewed as important to the company is marketing and communications, both internally and externally to build the brand image.
- **Business facing design:** The design their premises aimed to create an effective work environment, for example incorporating large glass areas to maximise natural light. The design of this building plays an important role in representing the organisation to the outside world.

It was estimated that 60% of work done by the facilities department could be classified as design. This goes beyond furniture or interior design as it also addresses the technological needs of staff. This work is seen as a means of retaining staff and attracting new employees. In an industry where employees may be more important to the organisation than equipment, this is a key issue. Thus, a major design spend would be in the work conducted by architects.

Although they are listed in the R&D scoreboard, the full scale of their development work is not captured under the Frascati definitions. There was a suggestion that the organisation would wish to record spending as design rather than R&D. Whereas manufacturing companies, with established R&D measures may not see value in switching,

CONCLUSIONS

From literature, a case has been made for the potential need for a means of capturing design spend. An initial conceptual model was proposed. The exploratory cases enabled further development of this model and also illuminated the difficulty of capturing design spend.

Design can be shown to contribute to the business in three distinct areas. The first and perhaps most commonly recognised mode is in the creation of products and services. Design here contributes to both the technical and the experiential aspects of those products and services. The second relates to way in which products and services are marketed and commercialised. However, a distinction can be made between promotion at a product level and the identity of the business as a whole. In smaller firms, this distinction may be less apparent, especially where the product range is small. Finally, it is possible for design to make a substantial contribution within the business. This might be through improved business processes, or the design of the workplace to improve efficiency. This revised classification of design within the firm is summarised in figure 3.

Capturing data on design spend is far from straight forward, as it is not typically identified within management accounts and, unlike R&D, is distributed throughout the organisation. As a result, there is typically no single person who has an overview of design spend. Thus, data must be collected from various budget holders.

Design within the business		Design in the creation of products and services		Design in the communication, promotion and delivery of products and services and in the creation and communication of the identity of the business	
Design of the organisation, operating environments, workplaces	Design of business processes and systems	Design relating to the technical/ engineering aspects of creating products and services	Design of the user experience in the creation of products and services	Design as part of promotion, communication, branding, and distribution of products and services	Design as a part of developing promoting, and communicating the corporate identity

Figure 3: revised conceptual model of design spend

Product based firms initially viewed the technical aspects of design as the most prominent. But, they were not sure how to separate R&D and design. By distinguishing between design in the creation of products and design in the commercialisation of them, firms were better able to consider the breadth of design activities.

Some firms initially responded that they had no (or at least very little) spend on design. After further prompting, they realised that there were many places where design decisions were being taken, often by 'non-designers'. Capturing this spend is potentially problematic. For example, any member of staff producing a 'creative' output makes design decisions. This might be in the choice of colour of company work-wear or in the selection of fonts on a company report. There is a clear difference between ad-hoc decisions made on a daily basis and those made by skilled professionals. However, these ad-hoc decisions can have significant affect on customers and staff, and to ignore them would potentially downplay the potential impact of design in the firm.

Pragmatically, it is impossible to capture all design spend, as design is not a homogenous commodity. The skill and competence of the designer is also important. In capturing design spend, it is not possible to distinguish between 'good spend' and 'bad spend'. However, some guidelines must be given.

Although this study does not aim to propose a definitive definition of design, it does aim to present a working model for use in capturing design spend in firms. A conceptual model of design in firms is proposed that will provide the foundation for a wider industrial survey.

ACKNOWLEDGEMENTS

The work reported in this paper forms one part of the continuing effort to produce a National Design Scoreboard. This project is supported through the AHRC and EPSRC under the Design for the 21st Century Initiative. We are also grateful to project supporters at the Design Council and other National bodies, who have provided assistance to the project team.

REFERENCES

- Accounting Standards Committee (1989) Statement of Standard Accounting Practice 13: Accounting for research and development. London: The institute of chartered accountants in England and Wales
- Archer L B, (1965), Systematic method for designers, HMSO for Council of Industrial Design
- Black, CD & Baker, MJ (1987) Success through design. Design Studies, Vol.8, No.4 pp.207-216.
- Bruce, M & Bessant, J (2002) Design in Business: Strategic Innovation Through Design, New York: Financial Times/Prentice Hall.
- BS 7000-10:1995, design management systems — part 2, London: British Standards Institute
- Cooper R, Press M, (1995), The design agenda: a guide to successful design management, Wiley, Chichester
- DTI (2006) The R&D Scoreboard 2006: The top 800 UK & 1250 global companies by R&D investment. London: DTI,

- Dym C, (1994), *Engineering Design: a synthesis of views*, Cambridge University Press, UK
- Farr M, (1966), *Design management*, Hutchison Press, London
- Gemser, G & Leenders, MAA (2001) How integrating industrial design in the product development process impacts on company performance. *Journal of Product Innovation Management*, Vol.18, No.1 pp.28-38.
- Gorb P, (1990), *Design Management, Architecture, Design and Technology Press*, London
- Hertenstein J H, Platt M B, Brown D R, (2001), Valuing design: enhancing corporate performance through design effectiveness, *Design Management Journal*, Vol. 12 No. 3 pp.10-19.
- Hertenstein, JH, Platt M B & Veryzer, R W (2005) The Impact of Industrial Design Effectiveness on Corporate Financial Performance. *Journal of Product Innovation Management*, Vol.22, No.1 pp.3-21.
- HOL/SCST (1987) *Fiscal Incentives for R&D Spending (House of Lords Select Committee on Science and Technology)*. London: HMSO,
- Hytonen J, Heikkinen H, (2003), *Design policy and promotion programmes in selected countries and regions, Survey by Designium The New Centre for Innovation in Design, University of Art and Design, Helsinki*
- Juilhet G B, (1995), *French SMEs and design, research by order of Ministere de l'industrie, Paris, October*
- Kerssens-van-Drongelen, IC & Cooke, A (1997) Design principles for the development of measurement systems for research and development processes. *R&D Management*, Vol.27, No.4 pp.345-357.
- Kolmodin A, Pelli A, (2005), *Design for innovation and growth: a promising competitive concept in the future?*, ITPS: Swedish Institute for Growth Policy Studies
- Lawson, B (2006) *How Designers Think: The Design Process Demystified*, Oxford Elsevier.
- Margolin V, (1989), *Design discourse: history theory criticism*, University of Chicago Press
- Margolin V, (2002), *the politics of the artificial: essays on design and design studies*, University of Chicago Press, USA
- NESTA (2007) *Hidden Innovation: How innovation happens in six 'low innovation' sectors*. London: National Endowment for Science Technology and the Arts
- Nixon, B (1996) Research and development alliances and accounting. *R&D Management*, Vol.26, No.2 pp.169-175.
- OECD (2002) *Frascati Manual: Proposed standard practice for surveys on research and experimental development. The measurement of scientific and technical activities series*. Paris: OECD,
- Power D, (2005), *International competitiveness and experience industries*, Nordic Innovation Centre, collaboration between ISA, Visanu-National programme for development of innovation systems and clusters
- Raizman, (2003), *History of Modern Design: Graphics and Products since the industrial revolution*, Lawrence King Publishing. P11-12)
- Roussel, PA, Saad, KN & Erickson, TJ (1991) *Third generation R&D, managing the link to corporate strategy*, Boston, MA: Harvard Business School Press.
- Roy R, Potter S, (1993), The commercial impacts of investment in design, *Design Studies*, Vol. 14 no. 2, pp. 171-193
- Sentance, A & Clark, J (1997) *The contribution of design to the UK economy. Design Council Research Workshop 1997*. London, UK: The Design Council,

Strategic Direction (2005) Continuing concerns over European R&D: ongoing decline in R&D could seriously affect Europe's manufacturing future. Strategic Direction, Vol.21, No.4 pp.33-35.

Tarasewich P, (1996), Design for success, IM, March/April, p28-32

Tether, BS (2006) Design in Innovation: Coming out from the Shadow of R&D, An Analysis of the UK Innovation Survey of 2005. Manchester: Manchester Business School, University of Manchester,

HOL/SCST, The House of Lords Select Committee on Science & Technology, Session 1986-7, page 54, para. 6.91

Vinodrai T, Meric S, Gertler S, Lambert R, (2007), Science Technology and Innovation Indicators in a changing world: responding for policy needs, Lessons from the UK and Canada, pt. 3 ch. 5 , OECD

Walsh V, Roy R, Bruce M, Potter S, (1992), Winning by design: technology, product design and international competitiveness, Blackwell Business, Oxford