Design Value: the role of design in innovation

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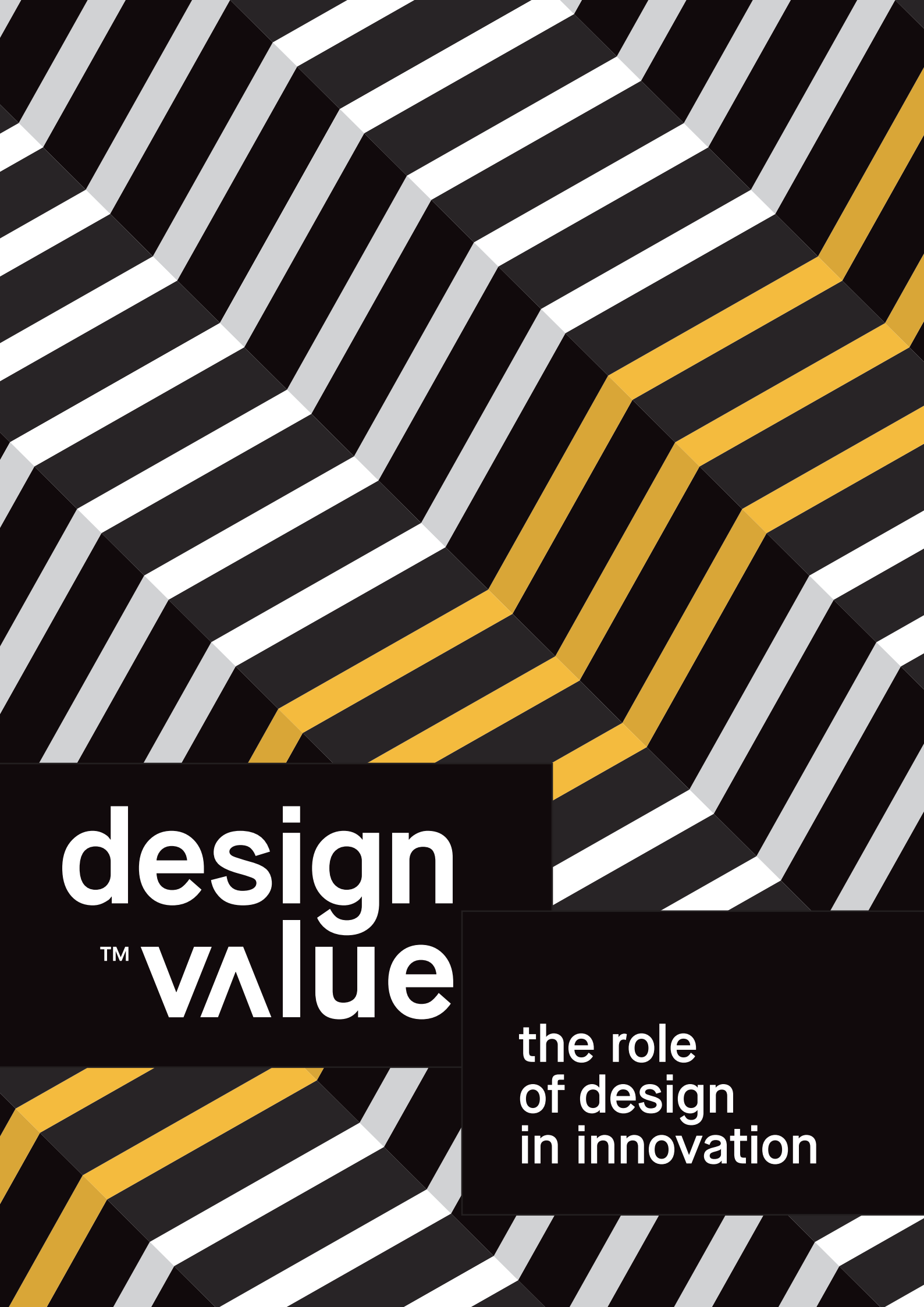
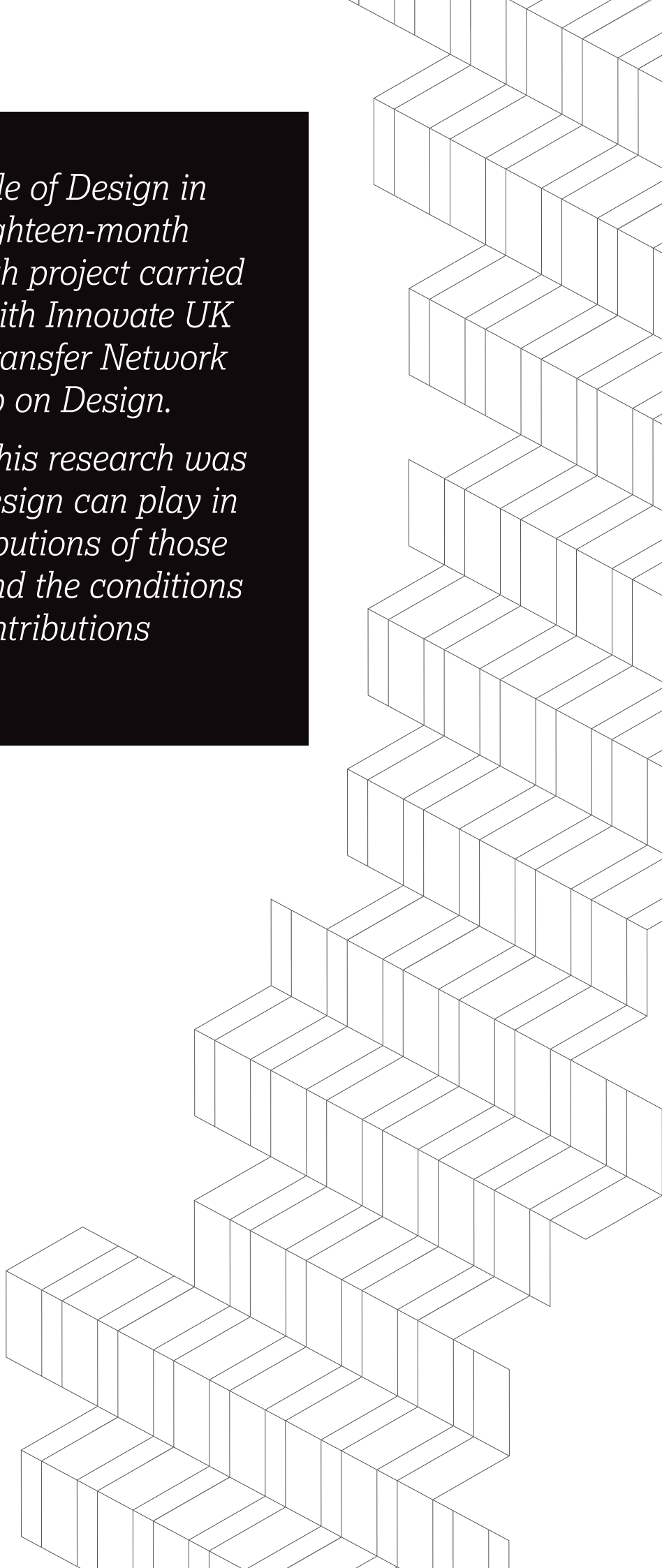

design
value
the role
of design
in innovation

Design Value: The Role of Design in Innovation was an eighteen-month AHRC funded research project carried out in collaboration with Innovate UK and the Knowledge Transfer Network Special Interest Group on Design.

The principal aim of this research was to identify the roles design can play in innovation, the contributions of those roles to innovation, and the conditions under which these contributions actually happen.



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Executive Summary

Design Value was an 18 month AHRC funded-project that aimed to identify the relationship between design and innovation and when design makes a substantial contribution to innovation.

Previous research has been conducted into the definition, use, value and impact of design and this has helped to build confidence in design, and expand the understanding of the roles of design. However, these studies have not generally examined the relationship between design and innovation.

To address this, the study gathered evidence to build a clearer picture, which, while conveying the complexities of the relationship between design and innovation, also identifies how design contributes to innovation.

This project was undertaken in collaboration with Innovate UK, who provided access to UK based firms. These were surveyed using a postal and online questionnaire, and a subset were interviewed. The research utilised qualitative and quantitative methods.

Research Aims

The research aimed to:

- Identify the roles that design can play in innovation and the specific contributions of those roles to certain forms of innovation.
- Identify factors (e.g. leadership, culture, environment) that allow a company to benefit from design's contributions to innovation.
- Outline design's contributions to innovation for other stakeholders (e.g. design consultancies, research councils, funding bodies, government).

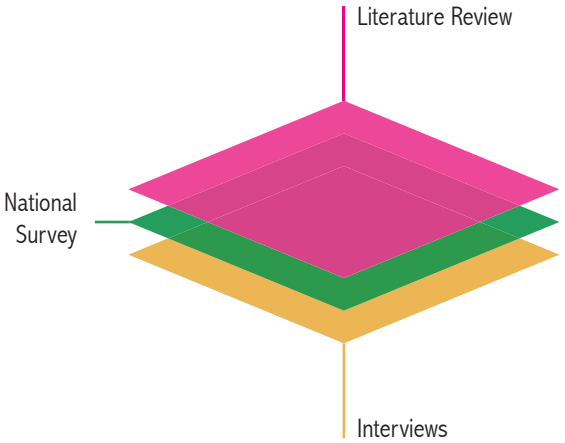
The Study

The research study involved:

i. An extensive review of the literature covering perspectives on the relationship between design and innovation.

ii. A survey of companies who had received support from Innovate UK, with 165 providing complete and usable survey responses.

iii. In-depth interviews with 15 companies with connections to Innovate UK.



Literature Review on Design and Innovation

An extensive review of the literature on the relationship between design and innovation was carried out during the first stage of the project. This review informed the subsequent empirical phases of the project, including the national survey and the interviews.

National Survey

A survey was developed to gather evidence on the specific roles that design plays in innovation and the conditions under which design makes a substantial contribution to innovation. This survey was sent to a large group of UK based companies. The survey had four major sections: 'Products, Services and Technology Readiness', 'Innovation', 'R&D and Design', and 'Protection'.

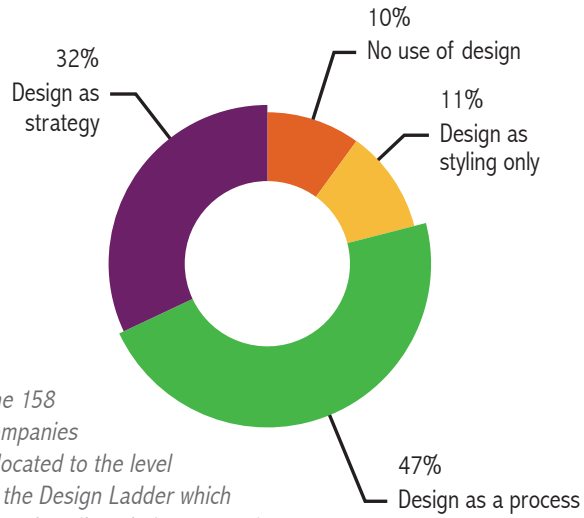
The final version of the survey was discussed and tested with the Knowledge Transfer Network Special Interest Group on Design, Innovate UK and the Design Council. It was officially launched in March 2015.

Interviews

Fifteen semi-structured interviews were carried out with design managers and general managers in different businesses across the UK. Businesses in four Innovate UK sectors were included. These were: urban living, transport, digital economy, and manufacturing. The interviews were undertaken from May to November 2015.

Key Findings

In the analysis carried out on the survey and the interviews, companies were divided according to their position on the "Design Ladder" with 'non-design' and 'design as styling' companies combined into a single category due to the small number of respondents in these two groups.



The 158 companies allocated to the level of the Design Ladder which best describes their company's use of design now.

- The understanding and uses of design varied substantially among companies, and overall most companies perceived design as being multifaceted, not one, easily defined activity.

> *"design is deeply rooted in almost every aspect of everything we do. It's not only the aesthetic but the usefulness and the thought behind how somebody can observe a task or do a chore or just enjoy something for pleasure. So it's really all the thinking that encompasses putting something (together) that we use or take part in."*
>
> **FOUNDER AND CEO, DIGITAL APP START-UP**

- The analysis indicates that design played at least three distinct roles in the companies: *1) It contributes directly to developing innovative products, services, and markets, 2) It is a process that helps to accelerate and de-risk innovation activities, and 3) It is an activity that supports mark*eting of products and services and the building of brands.

- Companies that used design as process or as a strategy considered capabilities in R&D and design to be equally important. The majority of these considered both to be critical to their competitiveness.

- Capabilities in design were found to be among the five most important sources of competitive advantage.

- The companies in the non-design / design as styling group had typically introduced one more innovations during the last three years than those in the other groups, but on average they achieved a lower share of sales from their innovations.

- The roles and the contributions that design makes to innovation are strongly related to the definitions and uses given to design. Those definitions and uses locate design at different points in the innovation process, generating different kind of impacts.

> *"For me design represents a set of ideas and principles, that I can bring to any activity and if I'm not seeing those principles being applied then in my mind we're not going to get a good outcome, we're not going to get a good design, because I've not involved my stakeholders who have got the problem, the issue, or the opportunity, and I'm not involving people who can bring a diverse set of ideas to the table to evaluate and test and explore, so I wont get the innovation."*
>
> **OWNER AND CEO, SOCIAL ENTREPRENEURS AND INNOVATORS ORGANISATION**

- Despite the recognition of the value of design and its importance for innovation, companies typically found it very difficult to measure the return of investments made in design. This was partly due to the conceptual and practical problem of separating design from other activities contributing to innovation.

- The main ways companies have to measure and understand the value created by design in their innovation activities, are the feedback from their clients and the performance of their innovations in the marketplace. If the feedback from clients is positive and the sales of introduced innovations are strong, companies usually see this as a consequence of good use of design.

- In summary, the findings indicate the great majority of the companies, and especially those that use design as process and as strategy, realise significant benefits from engaging in design.

  There are several indications that these companies outperform those that do not engage in design, or that limit their engagement in design to styling. But even among this latter group, a large share report benefits of engaging in design, benefits that stretch beyond those associated with a narrow use of design as styling.

Why Study the value of Design in Innovation?

Seeking to understand the value of design is not new. Since the late 1970s various strategies and initiatives have been undertaken to promote to managers and academics the importance of recognising the value of design. Peter Gorb for instance in the 1970s initiated teaching and training activities at the postgraduate school of the London Business School and later in the 1980s he created the Design Management Unit to organise and deliver seminars on design and management topics to a wider audience.

In 1982 British Prime Minister Margaret Thatcher organised a seminar on product design and market success, the aim of which was for academics, government and business people to share their experiences of the contributions and positive impact of good design on businesses. The Carter and the Corfield reports released around the same time supported the idea that design and designers could make important contributions to businesses, and highlighted the lack of awareness amongst a large portion of the British industry about the potential of design.

In response to these concerns the Council for National Academic Awards (CNAA), the Department of Trade and Industry (DTI) and the Design Council launched the Design Management Development Project, to evaluate alternative methods for introducing design issues into management curriculums and programs at postgraduate and undergraduate levels, and in-company training schemes developed at GE and GKN. These projects, initiated during the 1980s and early 1990s, opened a discussion and created a first wave of interest in the relationship between design and management. Other initiatives included the research carried out by the Design Innovation Group (DIG) based at UMIST (now part of the University of Manchester) and the Open University. Overall, these initiatives and projects have generated a very interesting 45-year dialogue about the value of design and the role and contributions design can bring to businesses. It provided the foundations for the academic discipline 'Design Management'.

There is now a renewed interest in the area. Recent research has been attempting to put a contemporary angle on the questions regarding the value of design and its contributions to the success of businesses. Some of the topics outlined in the 'Blue Pinstripe' report[1], published in the 1980s, continue to be considered, for example; 'The role of design in business and economic activities', 'The relationship between design and profitability' and 'The concepts underpinning design, the different types of design, and the interrelationships among them', are still very much alive in research and discussion.

1 "Managing Design: An Initiative in Management Education" Council for National Academic Awards, 1984. 67 pages

The renewed interest in the study of the value of design has been partly motivated by the expansion of design as a discipline. This has not been accompanied by a better understanding of the possible contributions design can bring to businesses, nor by tackling the difficulties found in trying to measure those contributions in qualitative and quantitative terms. This lack of evidence means that despite all the work and the research carried out, design still hasn't achieved an unquestioned place in organisations that was aimed at four decades ago.

There are multiple reasons why the role of design in business is still unclear, and especially the relationships that design has with other functions, including marketing, engineering and innovation. For example, in academia and the press there is heavy emphasis on studies addressing companies such as Apple, Braun and Alessi which are among the prominent examples of sucessful design-oriented and design-educated companies. Whilst these examples have played an important role in motivating and catching the attention of scholars and managers, the reality is that few of the insights gained are actually transferable to other organisations.
The knowledge collected about such companies says little about the understanding and uses that small and medium sized companies give to design or how to develop design capabilities in these businesses. Furthermore, many of these examples have focused on the development of specific successful products rather than exploring the structure, connections and organisational characteristics beyond these products. In addition, there has been an adoption of aspects of the design process without understanding the value or the impact of this on outcomes, such as the trend to apply 'design thinking' in management practice. And even more significantly, there is often an automatic association between innovation and design, that has no evidential foundation.

Recent studies on the definitions, uses, value and impact of design, such as The Cox Review of Creativity in Business (Cox, 2005), Leading Business by Design (Design Council, 2013) and €Design – Measuring Design Value (BCD Barcelona Design Centre, 2014), have helped to build confidence in design, and expanded understanding of design's strategic position in industry. While these studies have provided evidence of the competitive power of design, and in some cases, make a close approximation to the monetary value that design creates, the nuances of the relationship between design and innovation i.e. cause and effect, remain unclear. Both in the academic literature and in practice, the specific process by which design enables certain forms of innovation remains vague. Moreover, the conditions under which design can be embedded into companies' culture and help these companies to innovate over the long term are also not well understood.

Indeed, the increasing acceptance of design's strategic value has diluted the discourse on the relationship between design and innovation. This unclear picture of the relationship between design and innovation has led to some possibly erroneous assumptions, such as:

- Design necessarily contributes to innovation.
- The terms design and innovation can be used synonymously without explicit consideration of the relationship and differences between the two.

Challenging this type of thinking, this study gathers evidence to build a clearer picture, which while conveying the complexities of the relationship between design and innovation also identifies the conditions under which design contributes to innovation, the specific forms of innovation, and the forms of these contributions.

Research Aims

The research aimed to:

- Identify the roles that design can play in innovation and the specific contributions of those roles to certain forms of innovation.
- Identify factors (e.g. leadership, culture, environment) that allows a company to benefit from design's contributions to innovation.
- Outline design's contributions to innovation for other stakeholders (e.g. design consultancies, research councils, funding bodies, government).

The Study

The research involved:

i. An extensive review of the literature covering perspectives on the relationship between design and innovation.

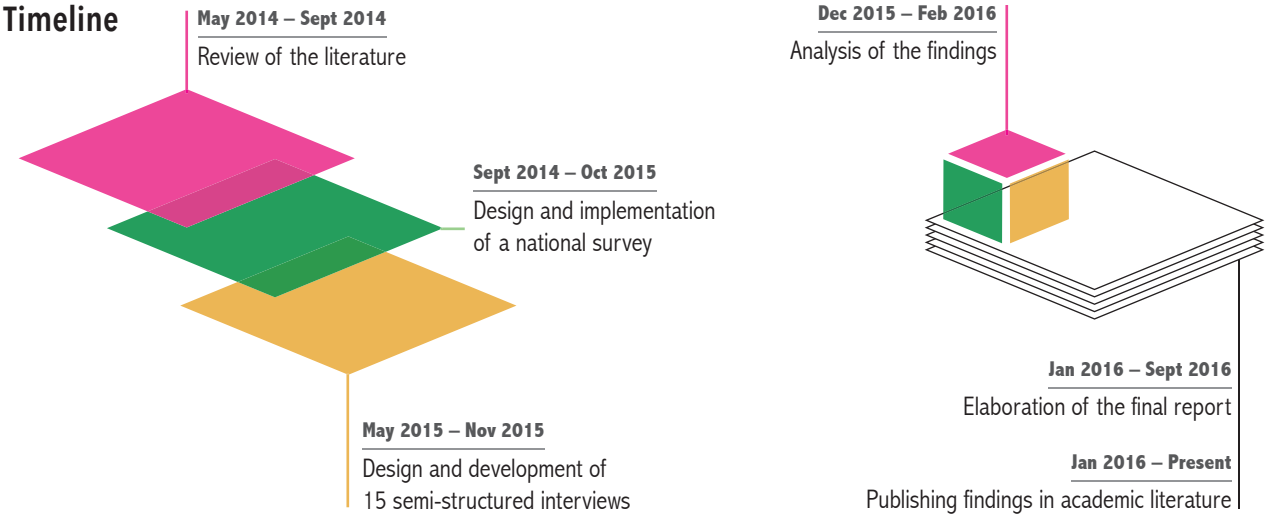
ii. A survey of 300 companies who had received support from Innovate UK. Of the 300, 160 completed the survey in full. Further details about the companies that participated in the survey are included in the final section. Note that as a deliberate choice of selection, all of the companies included in the analysis reported below were engaged in R&D.

iii. In-depth interviews with 15 companies who had worked with Innovate UK.

Part 1 of this report describes the overall findings arising from our analysis of the data.

Part 2 provides detail of the research methods and the general results of the survey.

Timeline



Part 1: Findings

Here we present insights from both the survey of companies and our interviews with companies that illustrate the insights.

In the analysis that follows, we divide the 158 companies according to their positioning on the "Design Ladder", developed by the Danish Design Centre. This identifies four groups of companies according to their commitment to design.

Non Design

10% of participating companies

Design is a negligible part of the product development process and is usually not performed, or if performed is by professionals other than trained designers.

Design as Strategy

32% of participating companies

Design is integral to the strategy of the company. Designers typically work closely with the company's management to contribute a complete or partial renewal of the total business concept.

Design as Styling

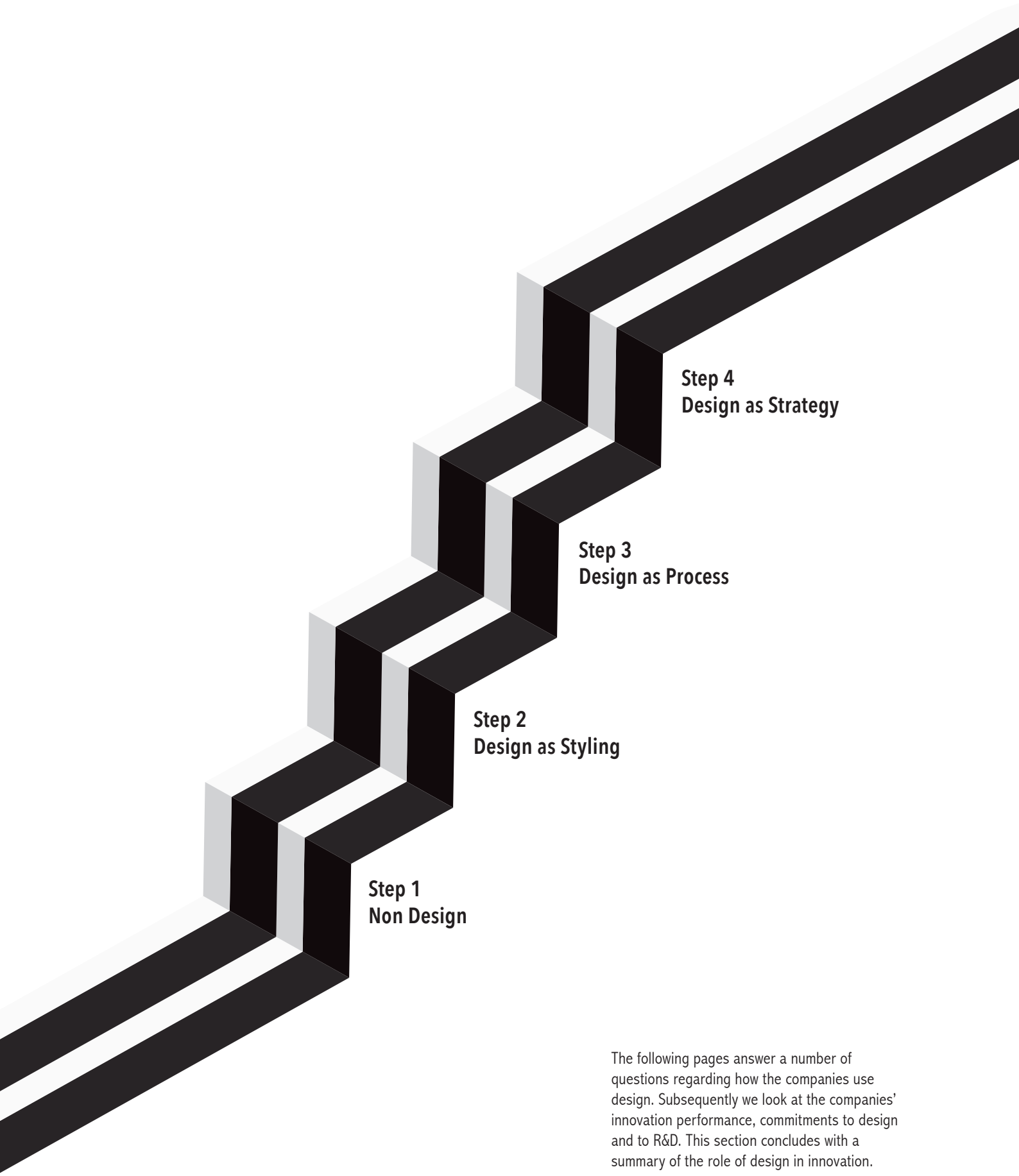
11% of participating companies

Design is only undertaken in relation to the final physical form of the company's products. This can include the work of trained designers, but is often undertaken by other personnel.

Design as Process

47% of participating companies

Design is not a result but a method integrated early into the development process. The production outcome requires contributions from a range of specialists, and will typically include trained designers.



The following pages answer a number of questions regarding how the companies use design. Subsequently we look at the companies' innovation performance, commitments to design and to R&D. This section concludes with a summary of the role of design in innovation.

How companies understand design

Design is…
percentages are those agreeing / agreeing strongly

	Non Design or Design as Styling	Design as Process	Design as Strategy
a creative process	87%	92%	88%
an interface with the user's needs	77%	85%	86%
a means to improve customers' experiences	74%	80%	80%
a problem solving activity	50%	77%	76%
a differentiator	68%	76%	78%
a tangible outcome	61%	76%	70%
a means to create new markets or open new markets	52%	72%	68%
a means to reduce risks	65%	72%	56%
a way of focusing on people's needs	52%	64%	66%
a means to reduce costs	65%	64%	60%
about making sense of things	35%	61%	54%
a decision making process	39%	53%	56%
a styling activity	77%	43%	52%
a means to build a strategy	29%	31%	49%
the creation of artefacts	45%	27%	32%

75% or higher | 50% to 74.9% | Under 50%

- These definitions of design arose during the interviews and illustrate and indicate different perspectives, including placing an emphasis on aesthetics, communications, and functional contributions.

"Design is an interface between our business, our service and our users, and if it's well designed and it's intuitive then people will use it."

FOUNDER, MARKETING AGENCY

"The design that we see here is quite practical, it's taking a requirement from a customer and implementing a function by design."

MANAGING DIRECTOR AND CO-OWNER, ENGINEERING TEST MANUFACTURING COMPANY

Overall, design was most likely to be recognised as a creative process, and interestingly the creation of artefacts was the least widespread understanding of design.

Design is widely seen as an interface between technologies and user's needs.

- Overall, what is striking is that most companies perceive design as being multifaceted; it is not one thing, easily defined. So for instance, companies who used design for styling also recognised it as an interface with user needs.

- This multifaceted perception of design was reflected in the interviews. Some of these statements are also linked to the difficulties companies had in measuring the impact of design.

"Design is deeply rooted in almost every aspect of everything we do. It's not only the aesthetic but the usefulness and the thought behind a task. So it's really all the thinking that encompasses putting something (together)."

FOUNDER AND CEO, DIGITAL APP START-UP

"...design is the process by which we decide what we're doing. It can be strategic, so to design a strategy, to design a response, to design how the business presents itself in any situation, follows a design process."

MANAGER SUSTAINABLE DEVELOPMENT, AEROSPACE ENGINEERING COMPANY

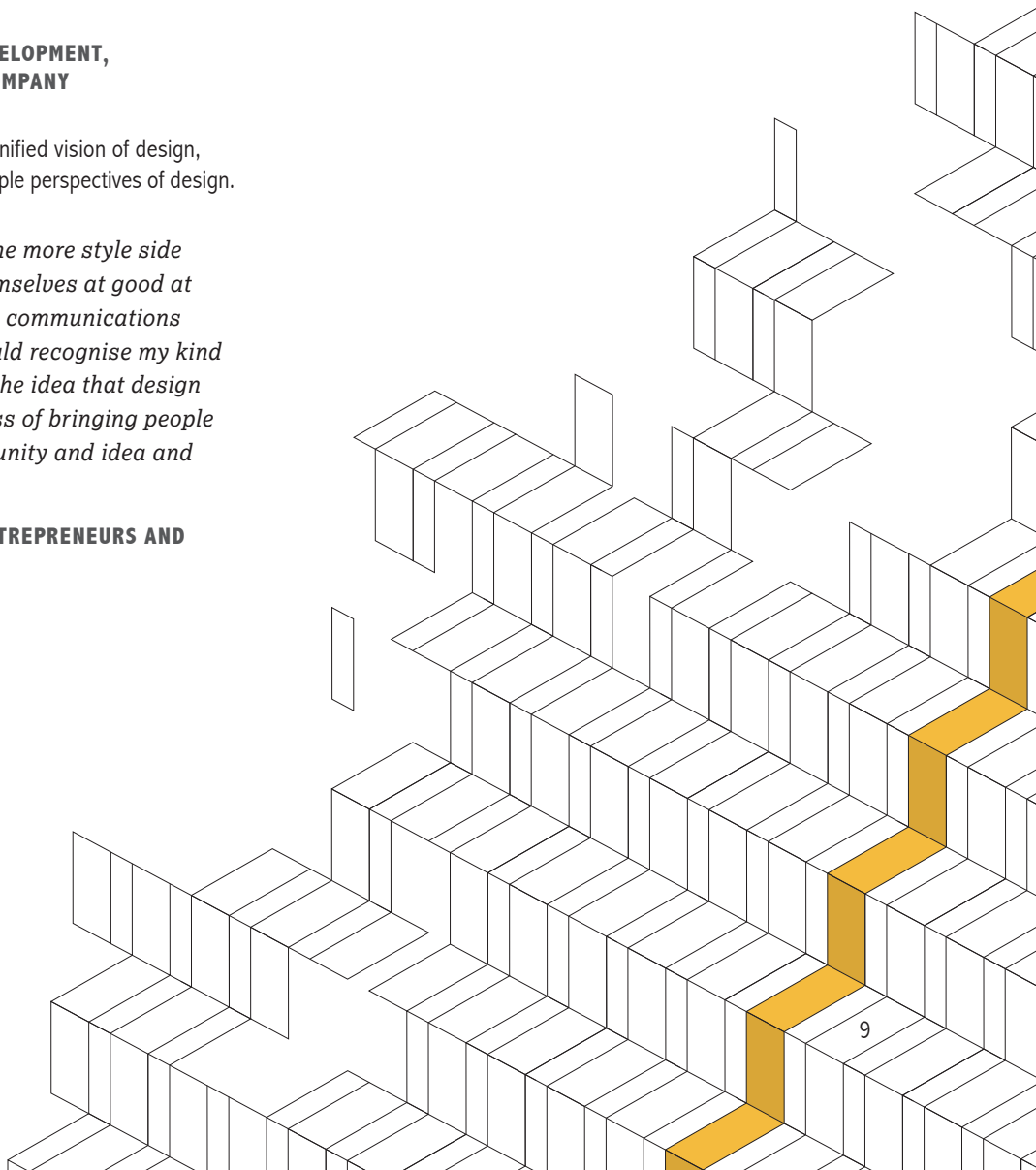
- Many organisations present a unified vision of design, however in some there are multiple perspectives of design.

"We've got people around the more style side and they would regard themselves at good at that, from a marketing and communications perspective. But fewer would recognise my kind of human-centred design, the idea that design is really an iterative process of bringing people together around an opportunity and idea and exploring it jointly."

OWNER AND CEO, SOCIAL ENTREPRENEURS AND INNOVATORS ORGANISATION

Design is most likely to be recognised as a creative process and an interface between technology and user needs.

Most companies perceive design as multifaceted.



How companies use design

Companies use design to...
percentage of companies responding that they used design for these purposes

	Non Design or Design as Styling	Design as Process	Design as Strategy
develop innovative products and services	56%	85%	86%
develop higher quality products / services	72%	83%	86%
differentiate our products and services	72%	73%	86%
move into new markets	53%	65%	84%
provide more added value to customers	47%	81%	80%
make better decisions based on customer/user insight	47%	61%	74%
support the marketing of products/services	76%	59%	74%
build a brand and image	88%	61%	70%
achieve cost reduction	35%	53%	66%
accelerate the innovation process	29%	59%	64%
de-risk the innovation process	24%	60%	56%

75% or higher | 50% to 74.9% | Under 50%

For companies using design in strategy, four out of five use design to develop new products, differentiate existing products and move into new markets.

Analysis of this data shows that design plays at least three distinct roles in the companies:

i. It contributes directly to developing innovative products, services and markets.

ii. It is a process that helps to accelerate and de-risk innovation activities

iii. It is an activity that supports marketing of products and services and the building of a brand.

- For those using design as strategy, at least four fifths also used design to differentiate their products and services, and to move into new markets, linking design to marketing innovation.

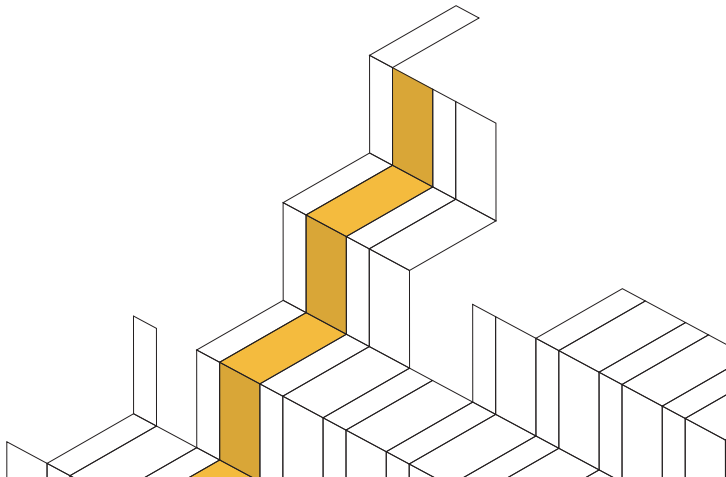
"I don't know how you would innovate on something without using design to execute that innovation."

FOUNDER AND CEO, DIGITAL APP START-UP

"We think the whole process is design. We tend to feel design is stitched into everything."

FOUNDER AND CEO, DIGITAL APP START-UP

- Among those that claimed not to use design, or that used it only for styling, nearly 90% used design to build their brand or image, and three-quarters said it supports the marketing of products and services. Even among this group, more than half also said design contributed to developing innovative and higher quality products, helped to differentiate the companies product and services, and helped them to move into new markets.



The effects of companies investing in design

The companies were asked about the effects, or benefits, of engaging in design. Of those that engaged in design as strategy, 90% agreed that design had contributed to innovation through the development of new products and services. More than three quarters of those using design as process agreed with this, as did over half of those which said they did not use design, or which used it only for styling.

> *"If it's innovative it means it hasn't been done before so you need to do something differently, to do something differently requires design"*
>
> **FOUNDER AND CEO,**
> **SPORT AND MEDICAL EQUIPMENT MANUFACTURER**

- Those companies using design as strategy indicated they gained significantly on all of the outcomes. Companies that used design as styling were significantly less likely to achieve all outcomes and also notably the impact of design on brand awareness and loyalty was also lower among this group than for those using design as process or as strategy

Engaging in design has...
percentages of companies agreeing / agreeing strongly

	Non Design or Design as Styling	Design as Process	Design as Strategy
contributed to the development of new products/services	59%	77%	90%
enabled us to maintain our competitive edge	29%	64%	80%
increased our competitiveness	35%	58%	74%
enabled us to develop new markets	24%	57%	70%
improved awareness, loyalty and recognition of our brand	41%	59%	66%
increased turnover	29%	53%	64%
increased our market share	29%	34%	58%
increased our profits	18%	41%	52%
accelerated or de-risked the innovation process	31%	45%	52%
increased our employment	31%	39%	48%

75% or higher | 50% to 74.9% | Under 50%

Number of impacts

Count of "Agrees"	Non Design or Design as Styling	Design as Process	Design as Strategy
None	25%	12%	4%
One or two	25%	15%	10%
Three to five	25%	20%	22%
Six to ten	25%	53%	64%

Those firms that invest in design as process or as strategy report a significantly higher number of impacts than those that report not using design or using it for styling.

For those companies using design as process or as strategy, design is rarely perceived as failing to make an impact across the board, and is especially regarded as contributing to the development of new products and services, to helping the company maintain its competitive edge, and to increasing competitiveness.

Engaging in design has...
percentages of companies disagreeing / strongly disagreeing

	Non Design or Design as Styling	Design as Process	Design as Strategy
contributed to the development of new products/services	18%	8%	2%
enabled us to maintain our competitive edge	18%	4%	4%
increased our competitiveness	18%	5%	6%
improved awareness, loyalty and recognition of our brand	12%	11%	8%
enabled us to develop new markets	35%	12%	12%
increased turnover	24%	18%	12%
increased our profits	24%	18%	12%
accelerated or de-risked the innovation process	19%	12%	12%
increased our market share	24%	12%	14%
increased our employment	25%	27%	18%

10% or lower | 10% to 25% | Over 25%

The companies' sources of competitive advantage

The table below reports the proportion of companies agreeing that each of these factors were either very important or crucial for their competitive advantage.

Competitive advantage...
percentage of companies identifying as very important / crucial

	Non Design or Design as Styling	Design as Process	Design as Strategy	Incomplete responses
Quality of products and services	97%	95%	90%	88%
Relationships with clients	73%	95%	90%	91%
Specific skills of workforce	65%	82%	84%	76%
Capabilities in R&D	59%	74%	84%	71%
Capabilities in design	42%	67%	70%	70%
After sales services	58%	62%	68%	60%
Sales capabilities	42%	59%	56%	58%
Protected intellectual property	47%	52%	60%	44%
Marketing capabilities	42%	51%	46%	50%
Relationships with suppliers	29%	44%	67%	47%
Pricing of products and services	32%	38%	40%	41%
Distribution channels	39%	36%	53%	35%
Manufacturing capabilities	30%	36%	47%	43%
Location or locations	3%	14%	6%	16%

75% or higher | 50% to 74.9% | Under 50%

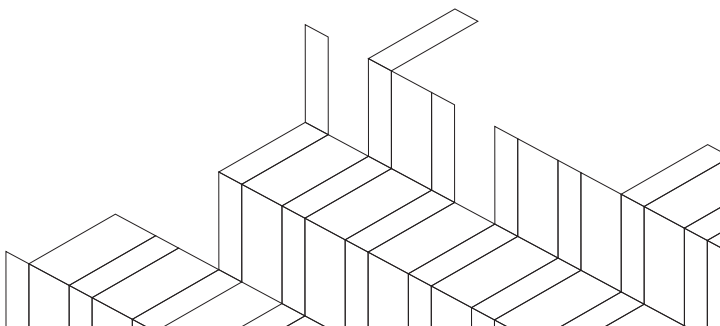
- Quality of products and services, followed by relationships with clients, the specific skills of firms' workforces, and capabilities in R&D were perceived by all groups of companies as the top four contributors to competitive advantage, with design coming in fifth for companies using design as process and strategy.

Above most other factors, including sales capabilities, marketing capabilities, manufacturing capabilities, relationships with suppliers and the pricing of products and services.

Interestingly, in the interviews we found evidence that these sources of competitive advantage do not work alone. Capabilities in design are linked for example to the capacity to produce high quality products.

> *"You can have the best factory in the world but if your design was rubbish you are still going to produce rubbish so it's really thinking about it very holistically from end to end. "*
>
> **BUSINESS STRATEGY MANAGER, ENGINEERING AND EQUIPMENT MANUFACTURING COMPANY**

- Companies that used design for styling ranked it seventh and were more likely to rank it alongside sales and marketing capabilities.
- We can also compare the relative importance of R&D and design capabilities as reported by the companies. This shows that among the companies using design as process and as strategy the majority considered capabilities in R&D and design to be equally important (and the great majority of these considered both of these capabilities to be very important or crucial to their competitiveness), while around 30% considered R&D capabilities as being more important, and about 10% considering design capabilities to be more important.



This relationship between R&D and design goes beyond their level of importance as sources of competitive advantage. In one of the interviews design was clearly defined as part of the R&D process, while in others this link was less defined.

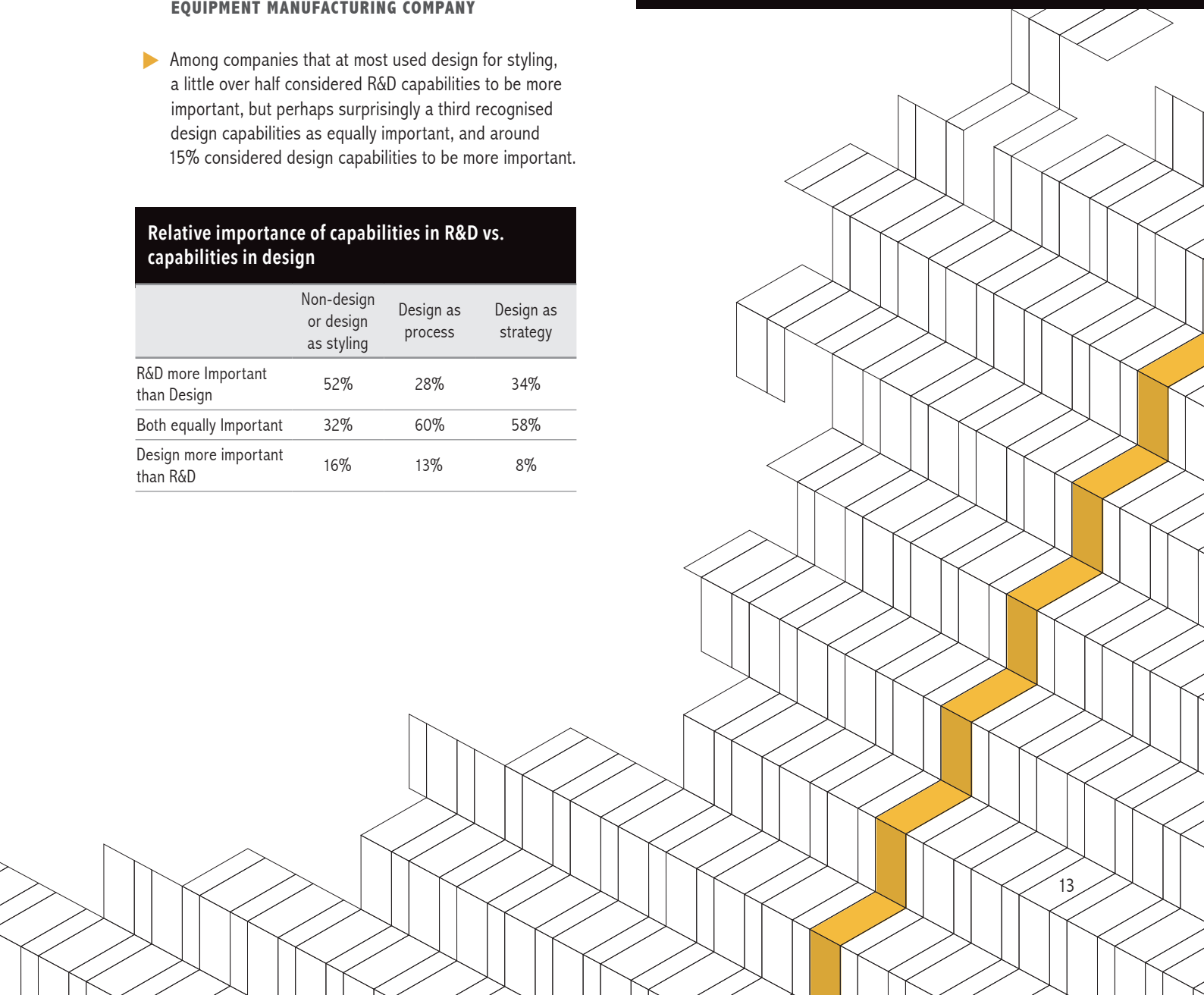
> *"For us, we see design as part of that whole R&D process and we think much more holistically about that whole process, it's about voice of the customer, it's about voice of the regulator, it's about the voice of the business. If we're going to start a new product development programme it's got to meet all those requirements and it will be monitored very carefully against that."*
>
> **BUSINESS STRATEGY MANAGER, ENGINEERING AND EQUIPMENT MANUFACTURING COMPANY**

- Among companies that at most used design for styling, a little over half considered R&D capabilities to be more important, but perhaps surprisingly a third recognised design capabilities as equally important, and around 15% considered design capabilities to be more important.

Relative importance of capabilities in R&D vs. capabilities in design

	Non-design or design as styling	Design as process	Design as strategy
R&D more Important than Design	52%	28%	34%
Both equally Important	32%	60%	58%
Design more important than R&D	16%	13%	8%

Companies that used design as process or strategy, considered capabilities in R&D and design to be equally important. The majority of these companies considered both to be critical to their competitiveness.



The companies' innovation performance

- By selection, all of the companies included in this analysis were engaged in R&D, and the vast majority were also oriented to competing at least partially through the development of high quality products and services. It is unsurprising, therefore, that the companies participating in the survey reported very high rates of innovation, with nearly all having introduced at least one new or significantly changed product or services over the last three years

The innovation performance of the three groups of companies is similar, but it is notable that the companies in the non-design / design as styling group that achieved on average the lowest share of sales from their innovations: 20% of total turnover, compared with 25% among the design as process group, and 30% among the design as strategy group.

New products, innovations and sales performance

	Non Design or Design as Styling	Design as Process	Design as Strategy
Introduced a new or significantly changed product or service	88%	92%	86%
Of these, proportion introducing new to the market innovations	90%	90%	86%
Median number of innovations introduced	4	3	3
Median share of total sales due to innovations	20%	25%	30%
Introduced marketing innovations	30%	28%	38%
Introduced process innovations	45%	65%	52%
Introduced organisational innovations	50%	49%	44%

- During the interviews companies described how design not only contributes to the development of new products or processes but also to the dynamics of the innovation process.

"For me design represents a set of ideas, principles, that I can bring to any activity and if I'm not seeing those principles being applied then I'm thinking 'we're not going to get a good outcome here, we're not going to get a good design' because if I'm not involving my stakeholders who have actually got a problem, an issue, or an opportunity, I'm not involving a group of people who can bring a diverse set of ideas to the table to evaluate and test and explore, you just don't get the innovation."

OWNER AND CEO, SOCIAL ENTREPRENEURS AND INNOVATORS ORGANISATION

- The firms were asked to compare their own innovation performance with those of their competitors. This was done over six criteria, reported in the table bellow. It is interesting here that the design as process companies and the design as strategy companies tended to report slightly better performance relative to their competitors than those that at most used design as styling

How does your innovation performance compare with competitors on...

proportion reporting "good" or "excellent" (other answers are "OK", "poor", or "very poor"

	Non Design or Design as Styling	Design as Process	Design as Strategy
speed of innovation process	59%	62%	65%
effective use of resources for innovation	52%	59%	57%
profitability of innovations	28%	41%	52%
return on innovation related investments	41%	41%	50%
sales of innovative products/ services	38%	35%	41%
market share achieved by innovations	32%	33%	43%

Over 50% | 33% to 50% | Under 33%

We also asked the companies about the novelty of the innovations they had introduced. The table below shows the proportions agreeing, or agreeing strongly, with these statements. Again, this shows that those engaged in design as process or as strategy tended to introduce more radical innovations than those that, at most, engaged in design as styling.

Approaches to innovation...

	Non Design or Design as Styling	Design as Process	Design as Strategy
We have introduced one or more breakthrough innovations	72%	79%	86%
Our innovations have not only involved minor changes	64%	81%	84%
Our innovations have significantly advanced the price/performance frontier	57%	70%	81%
We have introduced one or more innovations based on a revolutionary change	54%	56%	58%

75% or higher | 50% to 74.9% | Under 50%

We also asked about the companies' motivation for engaging in innovation. The motivations do not appear to differ between the groups. For all three, the most widely reported motivation was to win new business, including entering new markets, followed by differentiating the company's offer from that of competitors. Enhancing the company's image or reputation and its financial performance were the next most widely recognised motivations. Also notable is that design contributed directly to three of the top four motivations.

Motivations for innovation...
proportion agreeing this is a motivation

	Non Design or Design as Styling	Design as Process	Design as Strategy
win new business, including entering new markets	100%	97%	98%
differentiate our offer from that of competitors	84%	93%	90%
improve our financial performance	88%	87%	86%
enhance image or reputation	81%	85%	88%
retain existing customers or clients	72%	65%	70%
improve our business efficiency	55%	50%	65%
create internal excitement / motivate workforce	50%	55%	63%

75% or higher | 50% to 74.9% | Under 50%

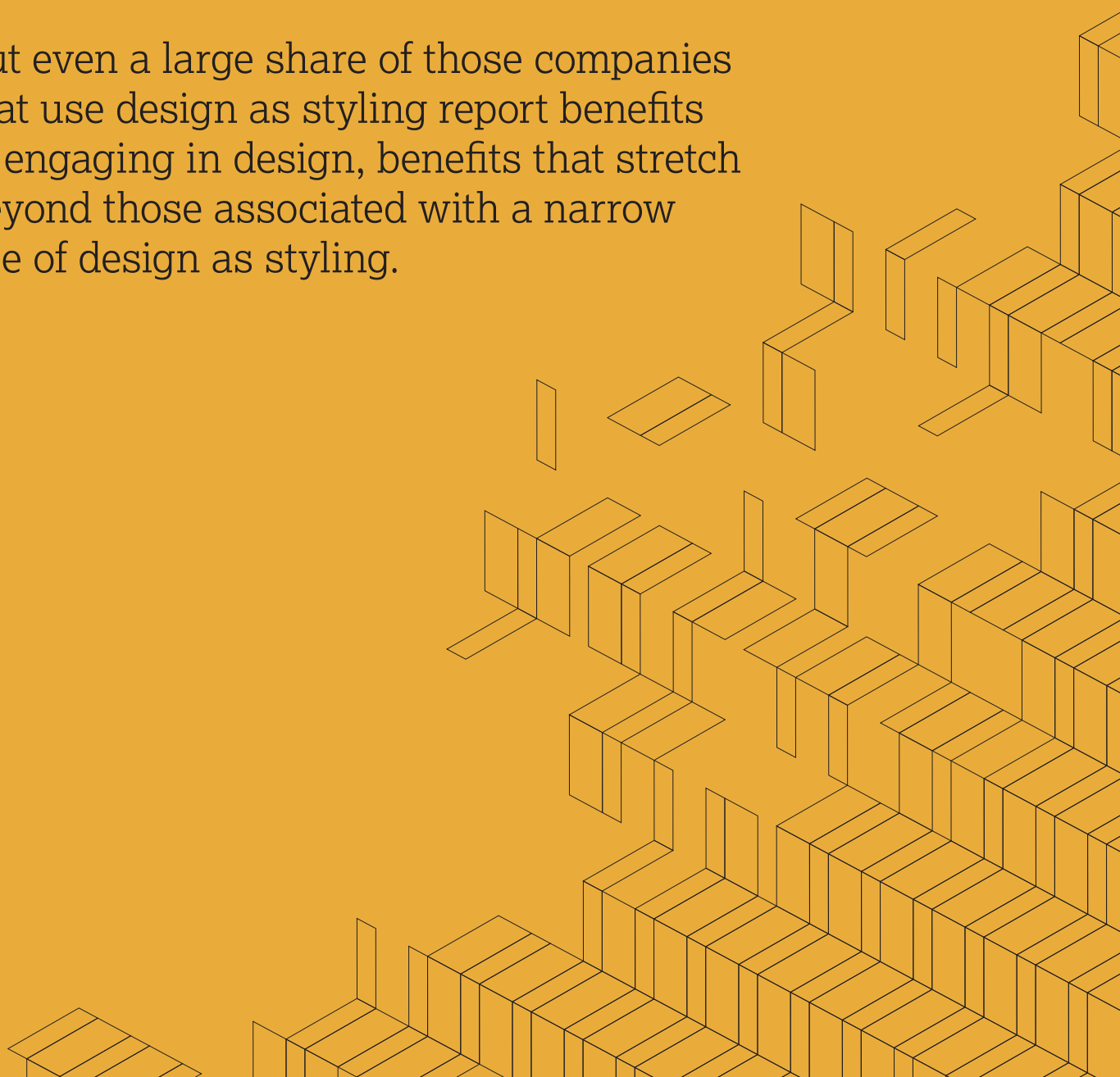
Firms who used design as styling achieved the lowest market share by innovations.

Benefits to engaging in design

- In summary, these findings indicate that the great majority of the companies, and especially those that use design as process and as strategy, realise significant benefits from engaging in design.

- There are several indications that these companies outperform those that do not engage in design, or that limit their engagement in design to styling.

- But even a large share of those companies that use design as styling report benefits of engaging in design, benefits that stretch beyond those associated with a narrow use of design as styling.



The companies' commitments to design and R&D

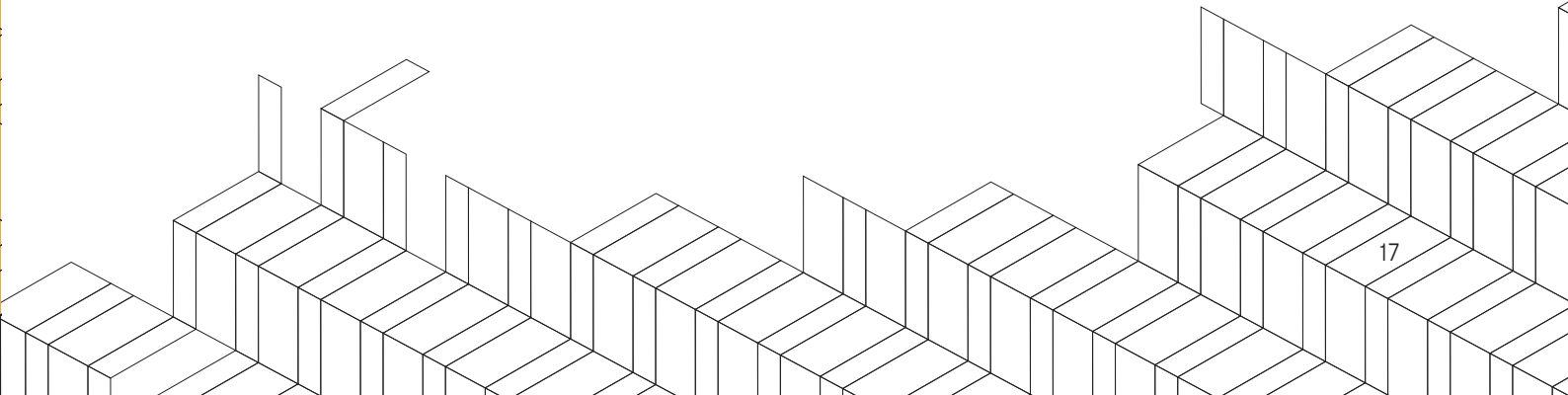
- The companies were asked if they invested in design in the last year, and most of those that used design as process and as strategy indicated that they had done so, but only about a quarter stated that they had a specific budget for design.
- About a third of those using design as process or as strategy had a design department, compared with 18% of those not using design, or using it for styling.
- Over half of companies using design process and strategy, and a third of non-design/design as styling companies employed people trained in design.
- Overall, the companies responding to the survey had high R&D intensities, spending on average between 14% and 24% of their turnover on R&D, and had between 40% and 50% of their workforces being engaged in R&D on average. But the median share of people employed with a specific training in design was much lower, at zero among the non-design / design as styling group, 1% among the design as process group, and 7% among the design as strategy group.

Engagement in Design Activities and Commitments to Design and R&D

	Non-Design or Design as Styling	Design as Process	Design as Strategy
Business invests in design	33%	73%	82%
Business invests in design with a specific budget	24%	24%	28%
Business has a design department	18%	33%	30%
Business commissions design externally	30%	41%	66%
Business employs people trained in design	32%	51%	62%
Median R&D expenditure / turnover	14%	24%	20%
Median R&D workers as share of workforce	40%	47%	50%
Median Design expenditure / turnover	0%	1.8%	2.2%
Median share of employees trained in design	0%	<1%	7%
Median spending on design relative to spending on R&D*	0%	12%	18%

* Among those investing in R&D (and excluding those not reporting non-zero-investments in design).

Seven in ten companies using design as strategy plan to increase investments substantially.



The companies' changing commitments to design

Most companies make fairly modest investments in design relative to their investments in R&D. But an interesting aspect of the companies behaviours towards design is shown by the extent to which their attitude to, and commitments to design have changed over time. Among those now in the non-design / design as styling group, a minority previously had stronger commitments to design, whereas among those in the design as process group a quarter previously did not use design or used it only for styling. Those currently in the design as strategy group also include large proportions that have increased their commitment, with over a third being in the no-design/design as styling group three years ago, and another quarter then being in the design as process group.

Grouping three years ago

Present Group …	Non Design or Design as Styling	Design as Process	Design as Strategy	All
Non-design / design as styling	83%	13%	4%	100%
Design as process	26%	65%	9%	100%
Design as strategy	36%	25%	39%	100%

- The companies were asked about their plans for investing in design in the future. A few companies plan to reduce their investment in design, and the majority of those in the non-design/design as styling group plan to maintain their level of commitment. Meanwhile among the design as process group, two thirds plan to increase their commitment to design, with a third of planning to increase their commitment substantially. Among the design as strategy group, nearly seven in ten plan to increase their investment in design, with more than half of these planning to increase it substantially.

Planned change to commitment to design

	Decrease	Maintain	Increase
Non-design / design as styling	0%	63%	38%
Design as process	3%	32%	65%
Design as strategy	6%	26%	68%

These findings indicate that most of these companies are satisfied with the return on investment they obtain from investing in design, and consider that that return would be enhanced with an increased commitment.

"I think design will become more central to what we're doing. I think one possibility is that we become largely a design company for electronics, whereas at the moment we're doing technology development, production, design and some other things."

CHIEF OPERATING OFFICER, PRINTED ELECTRONICS COMPANY

Among the design as process and design as strategy companies that provided a figure for their investments in design (including no investment), the median expenditure on design equated to 12% and 18% of spending on R&D respectively.

Difficulties in measuring the return of investments in design

The interviews highlighted that, despite the positive evidence of the importance of design and the contributions it makes to innovation, companies tend to find it very difficult to measure the value of design and the return of investments in design in monetary terms.

Only one company had a specific processes to evaluate the investments done in design in relation to the KPIs of the company.

> *"Design is the process and without it nothing really happens. There are KPIs and there's 'lessons learnt', there always has to be a business case in order to carry a design through to production."*
>
> **MANAGER SUSTAINABLE DEVELOPMENT, AEROSPACE COMPANY**

Different reasons for being unable to measure the return on investment in design, included difficulties separating the contributions of design from other elements creating value in the development process, not recognising design activities explicitly, and not knowing how to perform this kind of measurement.

> *"To be honest that's really hard, The question arose here: do we evaluate the return on the investment we put into design? But we don't really recognise it as a distinct discipline that we add to a mix. So, no, we don't assess it."*
>
> **OWNER AND CEO, SOCIAL ENTREPRENEURS AND INNOVATORS ORGANISATION**

> *"It would be hard to split off design because it would be almost inconceivable to take anything to market which hadn't had design in it."*
>
> **CEO, VIDEO MONITORING TECHNOLOGY COMPANY**

However, and despite the difficulties in measuring the return on investments in design, various companies explained non-monetary ways to evaluate the impact of design and its success, most of them linked with sales performance and feedback from their customers.

> *"When this does get released, and the jury says 'that's crap and I don't want to use it,' and we didn't do a very good job of designing that. Hopefully that won't be the case, hopefully people will then take this, embrace it and feel like 'ok this is something that impacts our life."*
>
> **FOUNDER AND CEO, DIGITAL APP START-UP**

> *"I guess for us it's pretty simple; if it gets us closer to our vision for where we want the company to go so that it is delivering a solution for the customers. And so if a design in any part of the business gets us closer to that then it's moved us forward."*
>
> **FOUNDER AND CEO, SPORT AND MEDICAL EQUIPMENT MANUFACTURER**

Design is too integral for the return on investment in design to be easily measured.

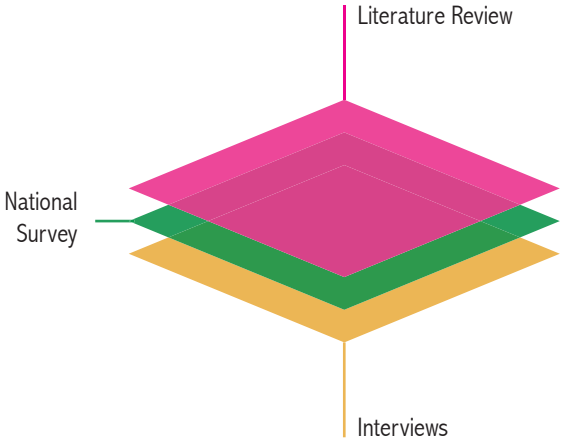
Summary: The role of design in innovation

All companies used design in some capacity, but those that used it for process and strategy made impact on all types of innovation. Furthermore:

- The definitions and uses given to design vary widely from one company to another, and can also vary inside one organisation. We found during the interviews that in small companies a positive perception about design from the person leading the organisation defines in large measure the understanding and use of design in the company. In large companies this personal perception has less influence as the definition and use of design respond to an institutional culture and history beyond the influence of one person.
- Although styling is still one of the uses given to design, in this study 'Design as a creative process' and 'design as an interface with users needs' were the two highest uses applied to design.
- Capabilities in design is among the five most important sources of competitive advantage alongside quality of products and services, and relationship with clients, but ahead of capabilities in manufacturing. This result reaffirms the importance of design as a means to create value and supports the growing interest in design across Europe during the last decade.
- We found that those roles and the contribution design can make to innovation are strongly related to the definitions and uses given to design. These tend to locate design at different points in the innovation process, generating as a consequence different kinds of impacts. Companies that use design for styling activities usually see its impact at the end of their innovation processes as a means to differentiate their offers, while companies that define and use design as a tool to build relationships and to articulate ideas usually locate design roles at the beginning of the process. Another interesting finding that deserves further investigation is that it seems that for a large group of companies design is actually the 'R' in their 'Research & Development' activities.
- Despite the recognition of the value of design and its importance for innovation, companies found very difficult to measure the return of investments made on design. This difficulty of putting a monetary value to the impact produced by design is partly due to conceptual and practical problem of separating design from other activities contributing to innovation. Compared with other activities like marketing or distribution, knowing what particular proportion of the benefits achieved during an innovation project is due to design seems very unlikely.
- We found companies have alternative ways to measure or attach value to the use of design in their innovation activities. These include the feedback from their clients and the performance of their innovations in the marketplace.

- All companies used design in some capacity, but those that used it for process and strategy made impact on all types of innovation.
- When feedback from clients and sales of innovation are good, companies usually see this as a consequence of good design.
- In small companies a positive perception about design by the CEO defines the understanding and use of design in the company.
- Capabilities in design is among the five most important sources of competitive advantage.
- For a large group of companies design is actually the ‘R’ in their ‘Research & Development’ activities.

Part 2: How the research was conducted



Literature Review on Design and Innovation

An extensive review of the literature on the relationship between design and innovation was carried out during the first stage of the research. This review was done in two parts. The first part followed a protocol driven search using the Social Science Citation Index in the categories of 'business' and 'management' and was then complemented with an additional exploration in a group of design journals used by design academy but not listed in SSCI. The terms used in this search were chosen to specifically represent ways to express possible contributions of design to innovation. The set of terms included: 'design for innovation, 'design to innovation' and 'design in innovation'.

This protocol driven search resulted in 117 papers that were screened to evaluate their relevance for the review. The screening identified a set of 90 papers. This dataset was then complemented with additional references found in the second part of the review, which followed a 'snowball' approach and which was undertaken to include papers omitted by the initial search. This complementary exploration added 33 references. 19 of which came from the group of design journals considered in the first part of the review and 14 more from other sources including articles, research and government reports, cited as relevant in the literature.

An analysis of the final set of references was undertaken by extracting and documenting information cited on possible contributions from design to innovation and the conditions under which those contributions arise. Further filtering was undertaken to separate out the most relevant references. This review informed the empirical data collection, including the national survey of firms and the semi-structured interviews of selected firms.

National Survey

A survey was developed in order to gather evidence required to understand the specific roles design plays in innovation and the conditions under which design is likely to make a substantial contribution to innovation. This survey was sent to a large group of UK based companies.

The survey had four major sections: 'Products, Services and Technology Readiness', 'Innovation', 'R&D and Design', and 'Protection'. The first section investigated the types of products and services companies' produce and their relationship to their total income. It also asks the companies to assess the 'Technology Readiness Levels' they operate at, in which market they are active, how they seek to satisfy their customer's needs, and to rank the level of importance of different assets in relation to the company's competitive advantage. In the second part the companies are asked about their innovation activities, the types of innovations they have introduced in the last three years and the impact of these on sales, the level of radicalness of these innovations and the barriers to innovation. It also asked about the types of collaborations firms had engaged in to develop their innovations.

The third part of the survey explored the company's commitment to R&D, the different understanding and uses of design, investments in design, the level at which the company uses design (related to the levels presented in the Danish Design Ladder), the reasons they have for using design and finally the barriers they usually face when using design. The final part of the survey asked the companies about their use of patents and registered designs to protect their designs and innovations, how effective these are, and why they use them.

The survey was designed, developed and refined (based on the literature review) from September 2014 to March 2015 in an iterative process involving all members of the research team. The final version of the survey was discussed and tested with members of the Knowledge Transfer Network Special Interest Group on Design, Innovate UK and the Design Council. This final version was endorsed by Innovate UK in March 2015 and was produced in a paper and an online format. It was officially launched on 25th March 2015. Data gathering for the survey was undertaken between March 2015 and October 2015 in close collaboration with Innovate UK.

Evolution of the Survey

AUG 2014 – SEP 2014
Versions 1 – 3

SEP 2014 – OCT 2014
Versions 4 – 7

OCT 2014 – NOV 2014
Versions 8 – 12

NOV 2014 – DEC 2014
Versions 13 – 16

JAN 2015 – MAR 2015
Versions 17 – 23

Interviews

Fifteen semi-structured interviews, each lasting approximately about an hour and a half were carried out with design managers and general managers in fifteen different businesses across the UK. The businesses involved in these interviews were contacted in collaboration with Innovate UK. The businesses were active in four Innovate UK sectors: urban living, transport, digital economy, and manufacturing. The interviews were undertaken from May to November 2015 by one or two members of the research team visiting the premises of the businesses. Each interview was recorded and then transcribed for analysis.

The semi structured interviews were based on a number of prepared questions some of which built on the questions used in the survey whilst emphasising the need to gain more in-depth evidence on the use of design in relation to innovation activities. After transcription, a qualitative approach of coding and clustering was adopted to carry out the analysis. This process was undertaken by members of the research team and the findings were then collected, compared and discussed. Finally, a set of themes was generated from this analysis.

Who participated in the survey?

The majority of respondents were company directors, including owners, chairpersons, chief executives and managing directors.

	Non Design or Design as Styling	Design as Process	Design as Strategy	All
Business owner, Chairman, CEO, MD	40%	38%	58%	44%
Other director or vice president	20%	37%	19%	28%
Others (mainly managers, some specialists)	40%	25%	22%	27%
All	100%	100%	100%	100%

Almost half of the companies participating in the survey were micro companies, with fewer than 10 employees, while only one in eight was a large companies with 200 or more employees.

	Non Design or Design as Styling	Design as Process	Design as Strategy	All
1 to 9 employees	52%	42%	58%	49%
10 to 199 employees	41%	39%	35%	38%
200+ employees	7%	19%	8%	13%
All	100%	100%	100%	100%

Furthermore, three quarters of the companies were independent entities, with a quarter being subsidiaries of other businesses.

	Non Design or Design as Styling	Design as Process	Design as Strategy	All
Independents	67%	77%	74%	74%
Subsidiaries	33%	23%	26%	26%
All	100%	100%	100%	100%

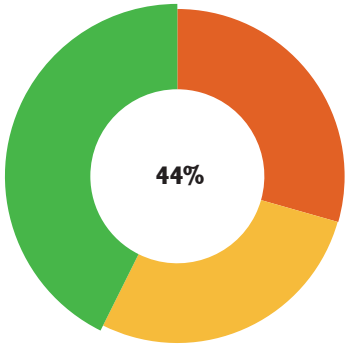
The companies were active in a variety of industries, with a strong orientation to technology-based sectors.

	Non Design or Design as Styling	Design as Process	Design as Strategy	All
High Tech Manufacturing	21%	26%	18%	23%
Other Manufacturing	21%	24%	16%	21%
Health and Medical Technologies	4%	13%	24%	14%
Energy and Environmental	4%	10%	16%	10%
Software, IT and Telecoms	21%	15%	16%	16%
Business Services	18%	10%	8%	11%
Other not elsewhere classified	11%	1%	3%	4%
All	100%	100%	100%	100%

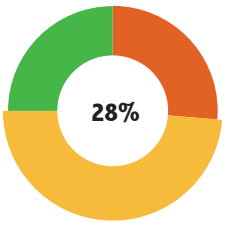
The majority of the companies were growth oriented, with over half seeking to grow substantially over the next few years. Only 2% sought to remain the same size, and 1% aimed to become smaller.

	Non Design or Design as Styling	Design as Process	Design as Strategy	All
Become smaller	4%	2%	0%	1%
Stay the same size	7%	2%	0%	2%
Grow moderately	36%	44%	40%	41%
Grow substantially	54%	53%	60%	55%
All	100%	100%	100%	100%

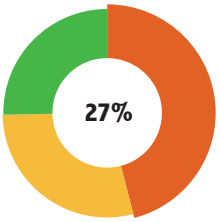
Respondent role



Business owners, Chairpersons, CEOs, MDs

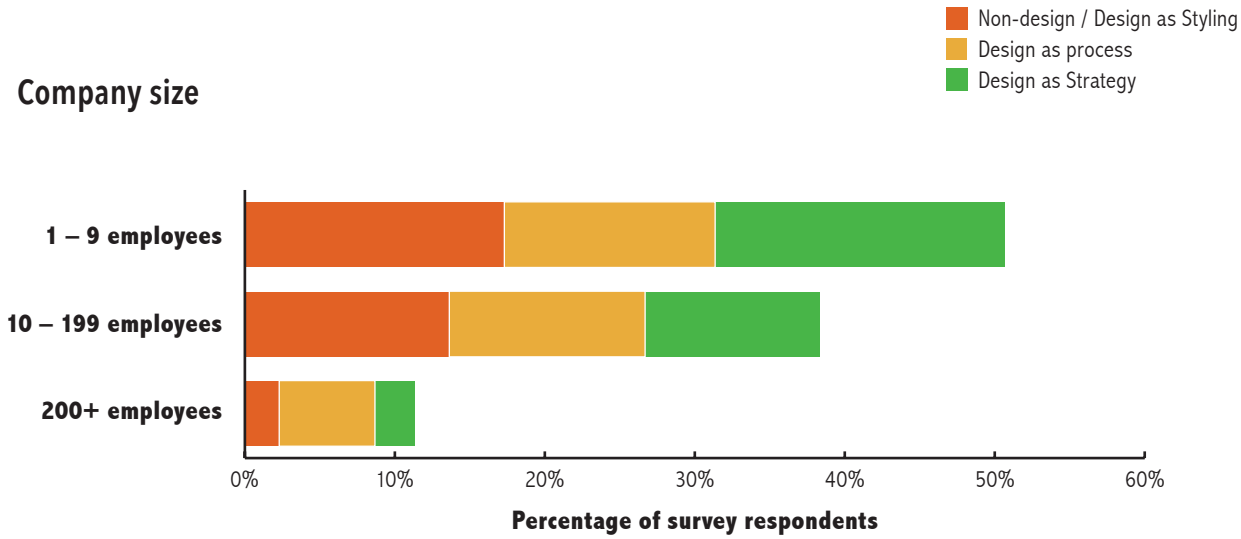


Other directors or vice presidents

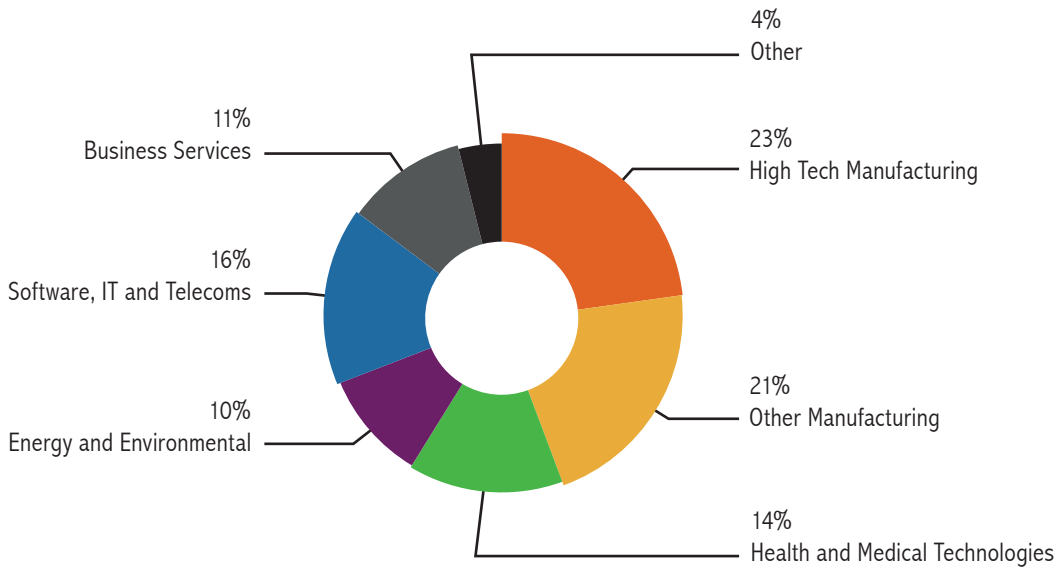


Others (mainly managers, some specialists)

Company size



Industry

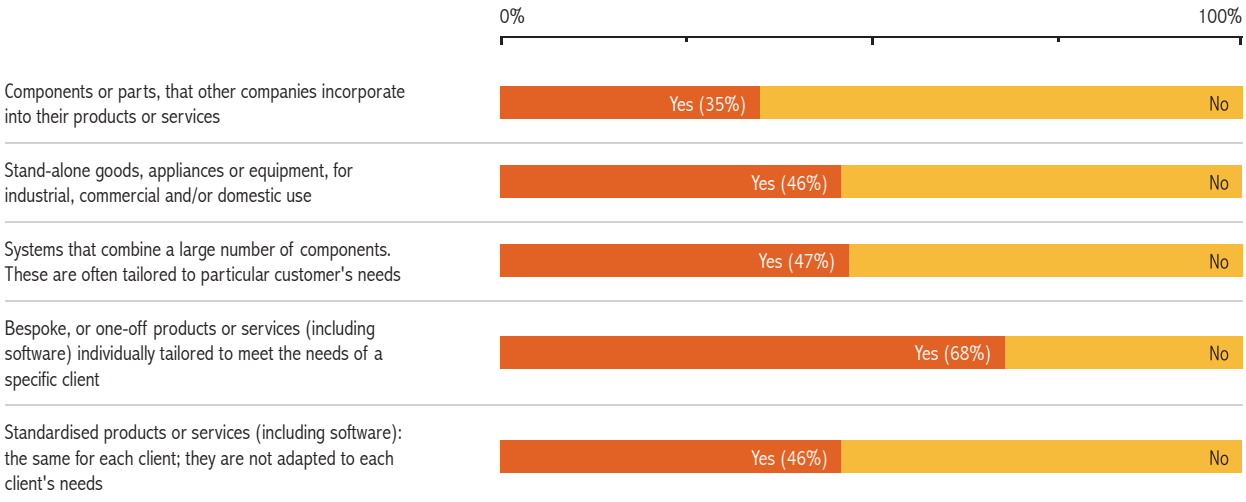


General Results National Survey

The results reported below relate to 165 responses which were from companies that were engaged in R&D.

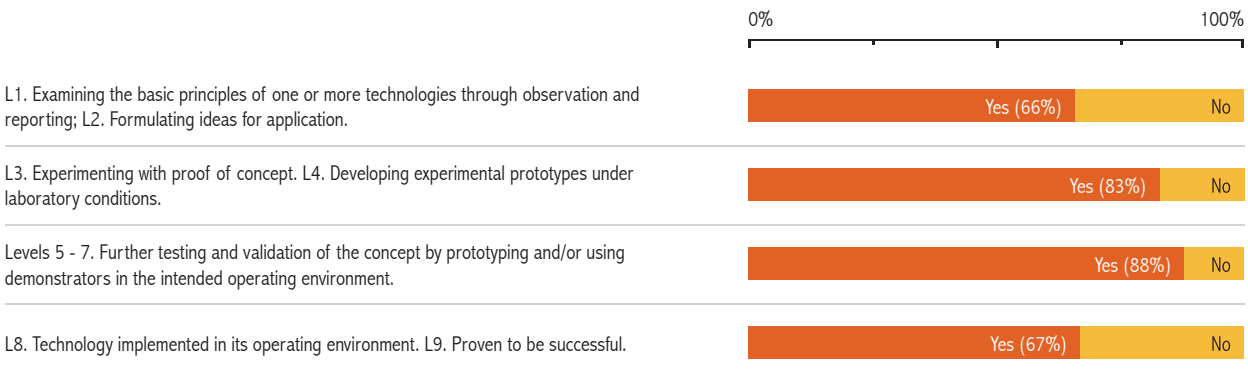
SECTION I: PRODUCTS, SERVICES AND TECHNOLOGY READINESS

The types of products and services that the surveyed businesses produce



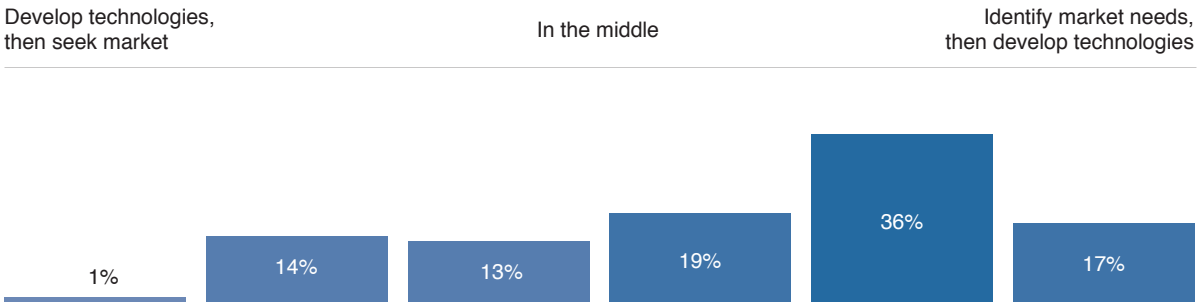
Technology Readiness Levels

Businesses can be categorized by the maturity of their technologies and by their closeness to market.
The graph illustrates at which of these technology readiness levels the businesses in the study were active.

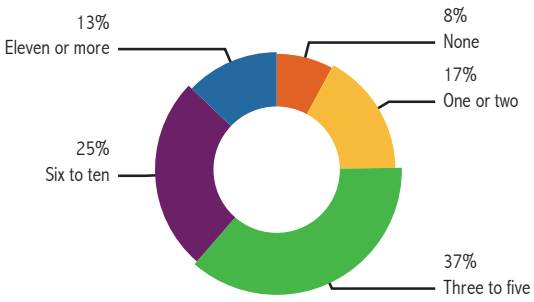


Technology or market led

Some companies develop technologies and then seek markets for them; others identify market needs firdt and then source the technologies. Businesses follow different approaches along this spectrum.

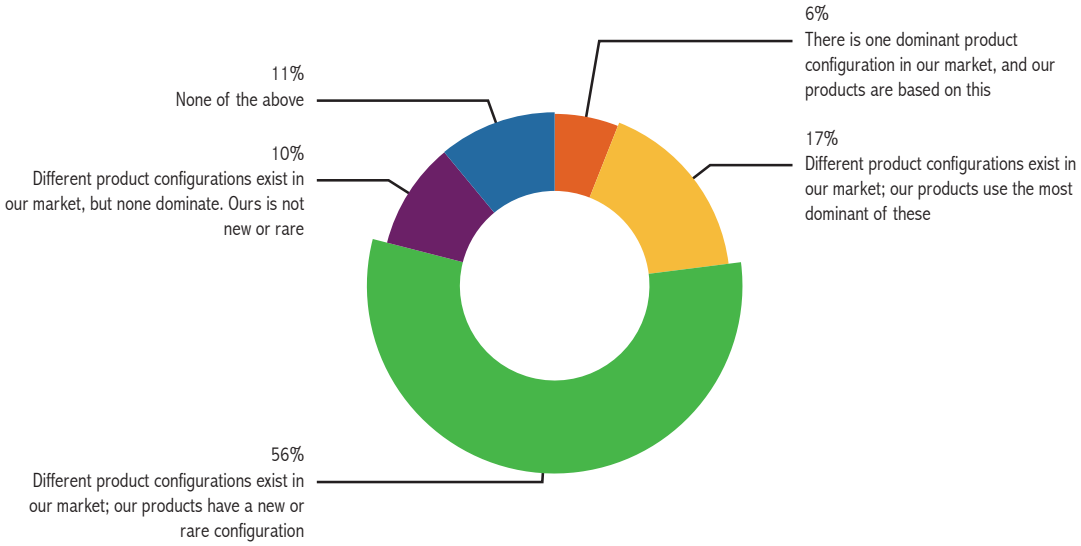


Numbers of competitors in their markets



Product and Service Configurations

The existence of a dominant product configuration in the market defines several characteristics of how businesses in that market innovate. This is what businesses said about the presence of dominant designs in their markets.

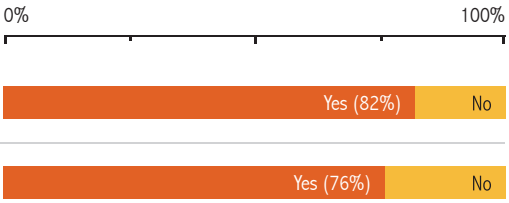


Competitive Advantage

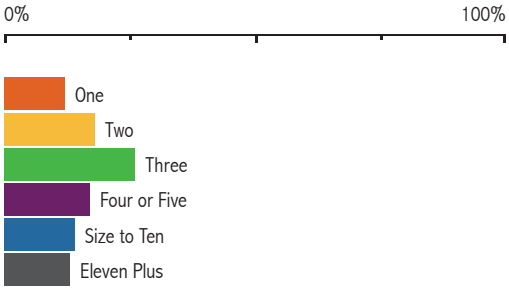
Competitive advantages are difficult to imitate and help businesses to differentiate themselves from their competitors. The importance of common assets and capabilities that can contribute to competitive advantage were evaluated as follows.

SECTION II: INNOVATION

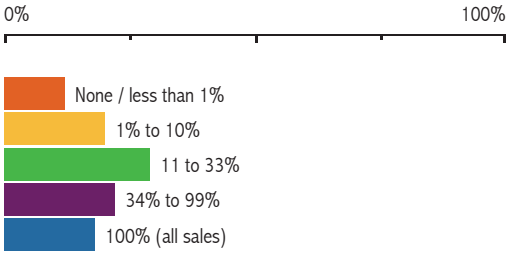
Introduction of new products or services over the last three years



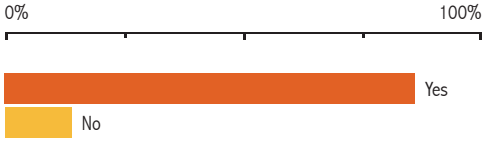
Number of product or service innovations introduced over the last three years



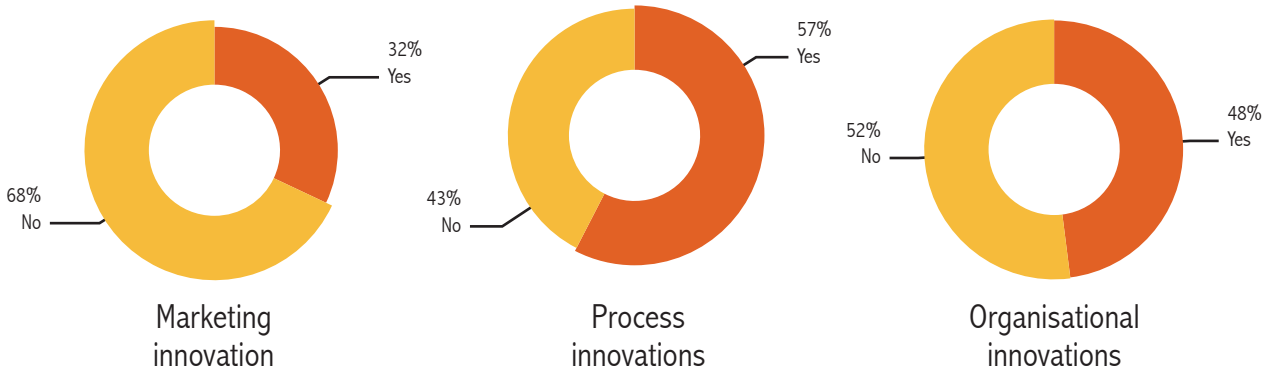
Percentage of sales in 2014 related to the product or service innovations introduced over the three previous years



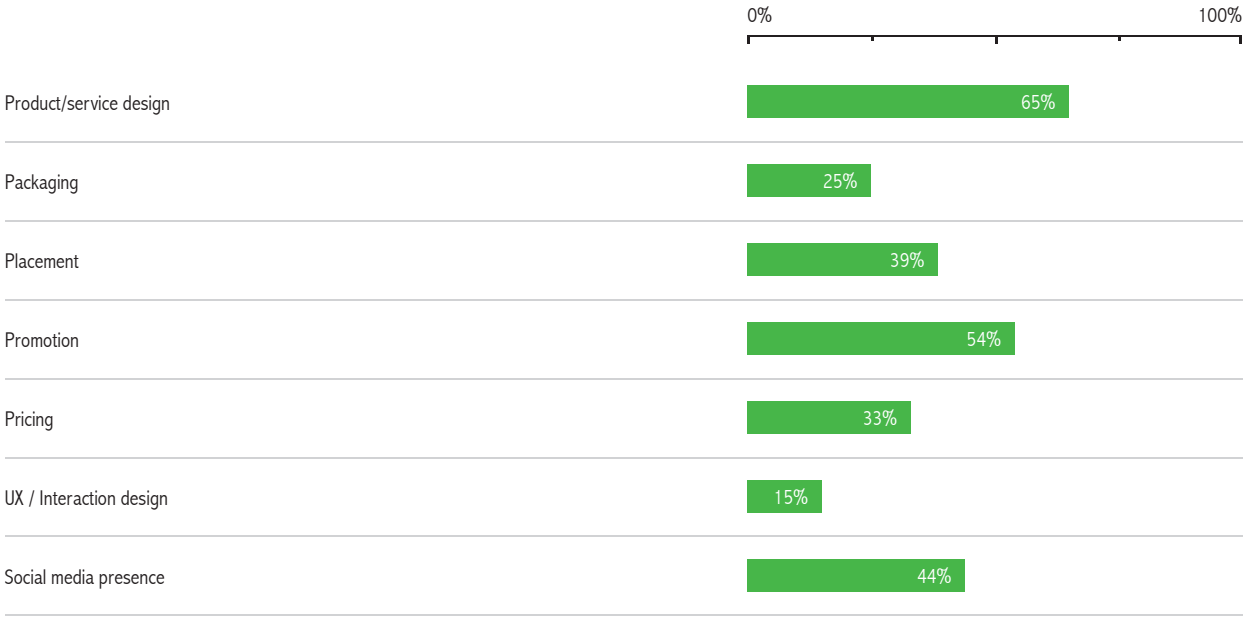
Level of novelty in the product or service innovations introduced to the market



Introduction of marketing, process, and organisational innovations over the last three years



Areas in which businesses have introduced marketing innovations

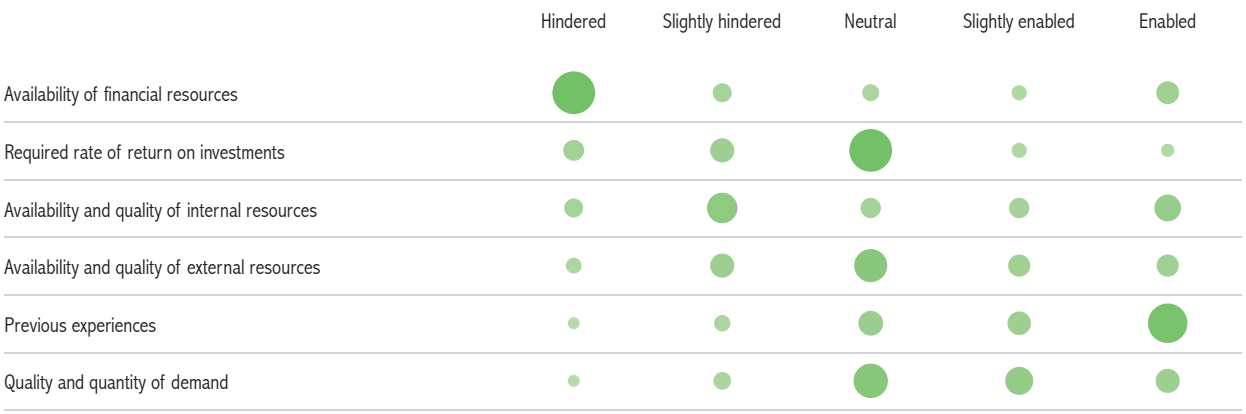


Motivations for innovation

Business collaboration

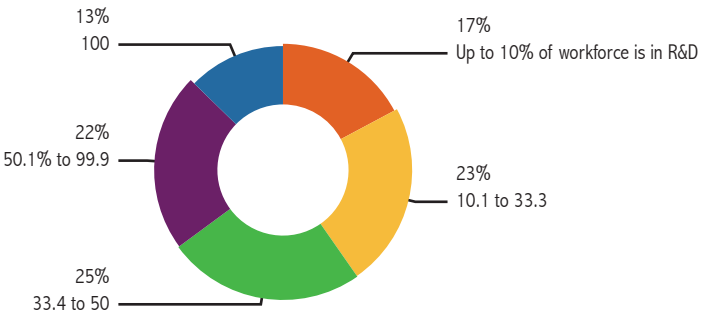
Businesses often collaborate formally and/or informally with other businesses and organisations to innovate. These are the most common collaborations businesses participating in the study engaged in.

Factors that hindered or enabled innovation

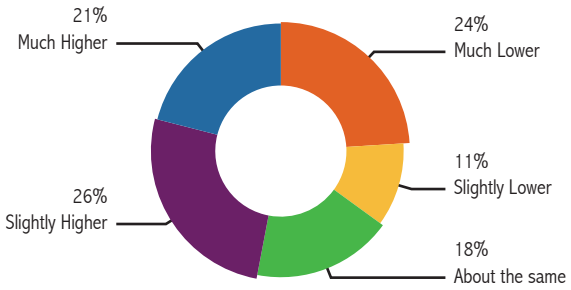


SECTION III: R&D AND DESIGN

Percentage of staff engaged in R&D



Investment in R&D in relation to the investments in R&D of their main competitors



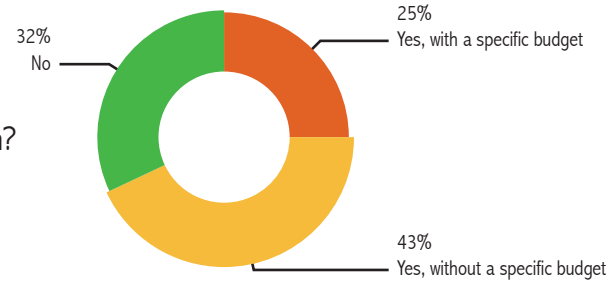
The meaning of design

Design can have different meanings and be used in various ways. This graphic shows how the companies in the study understand design.

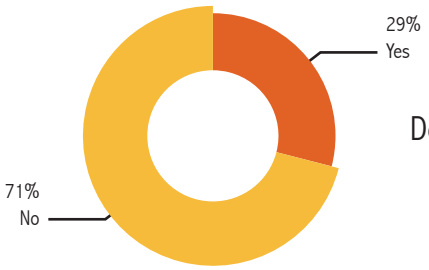
	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
means to build strategy						
problem-solving						
focusing on people						
Styling						
creation of artefacts						
making sense						
creative process						
new markets						
interface with user's needs						
Differentiator						
decision making process						
means to improve consumers experience						
tangible outcome						
means to reduce costs						
means to reduce risks						

Commitment to design: investments, presence in the organisational structure, and people engaged in design

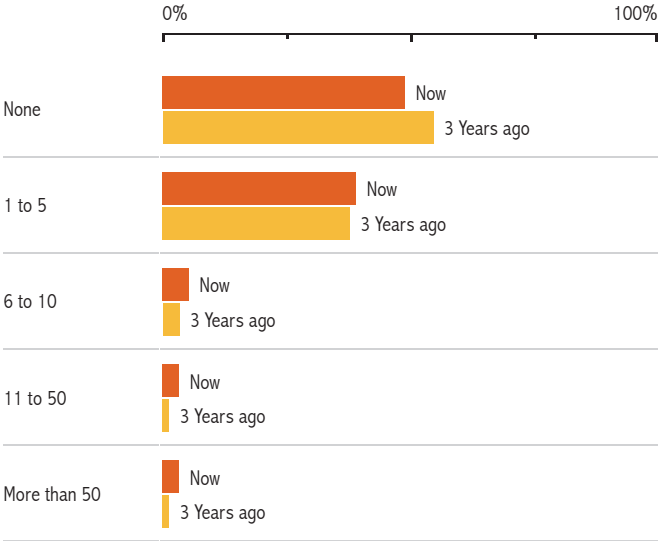
Does your company invest in design?



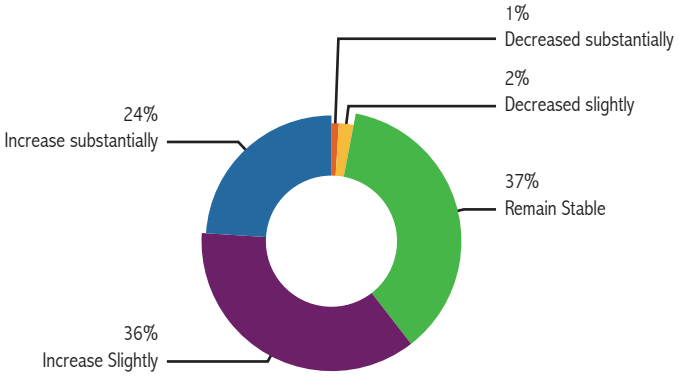
Does your company have a design department?



How many people with specific training in design does your company currently employ now and 3 years ago?



What are your expectations of change in the investments businesses make in design?

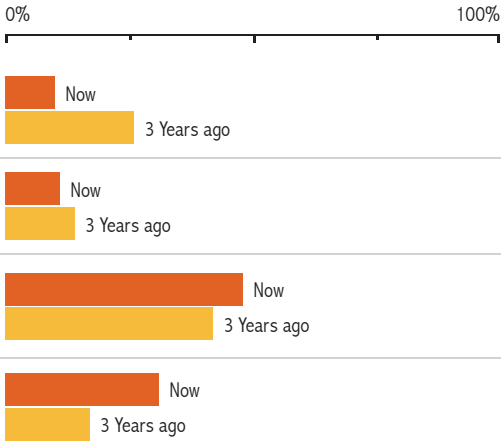


Use of external design

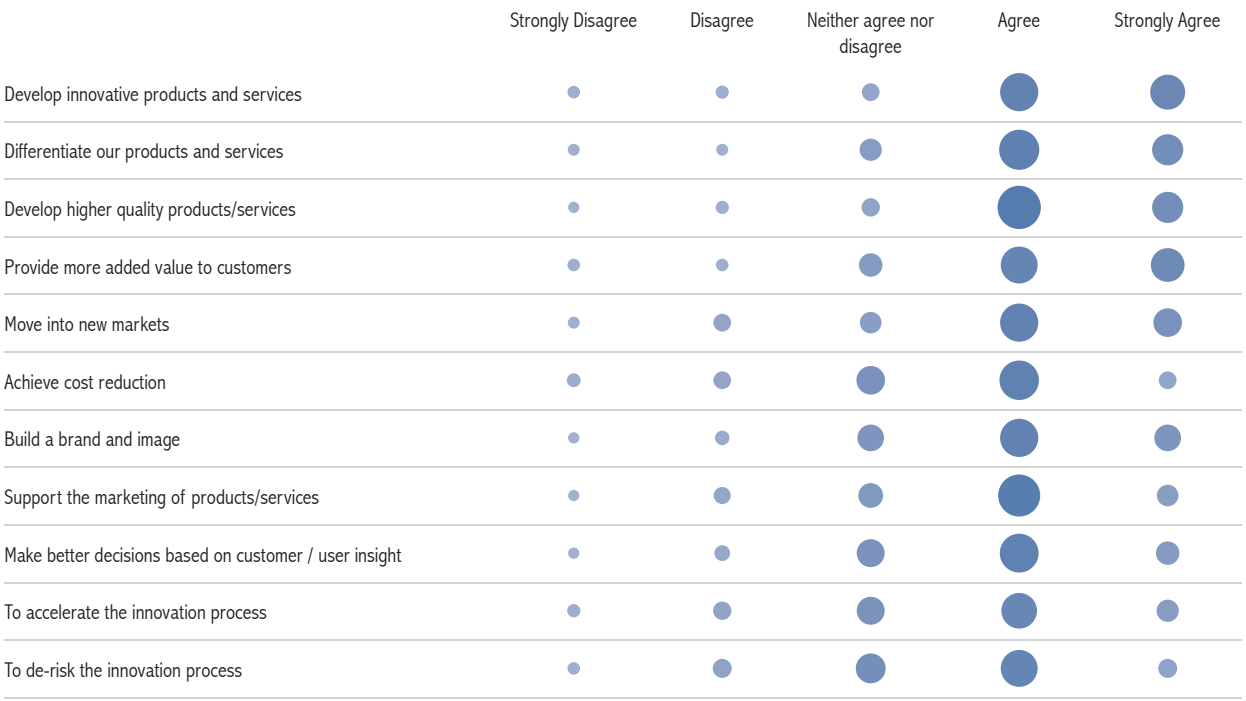
Some businesses design in-house and commission it to external designers and agencies. This is the proportion of businesses involved in the study that commission design externally.

Design Maturity

The Danish Design Centre developed a scale to measure the maturity in the use of design. The following graphic shows the assessment businesses did of their position in this scale, currently and three years ago.



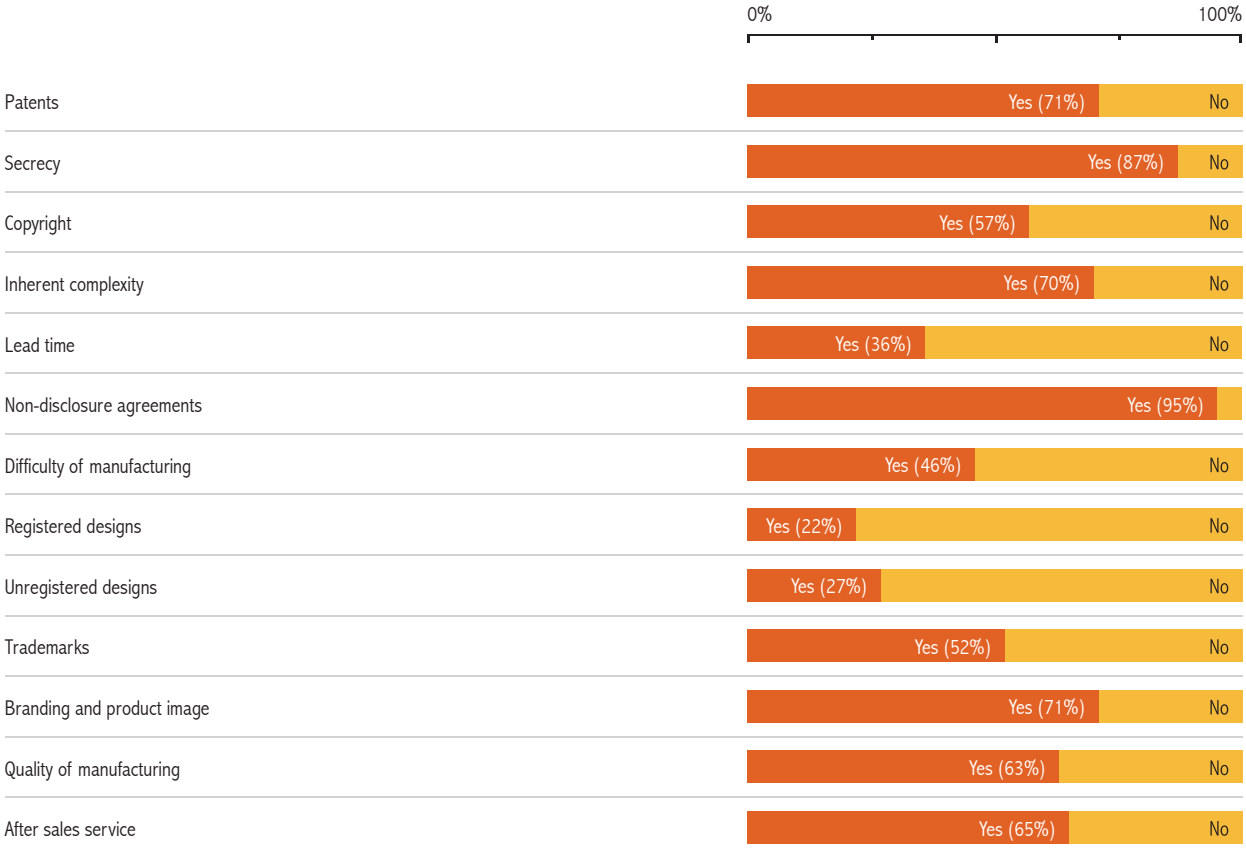
Reasons to use design



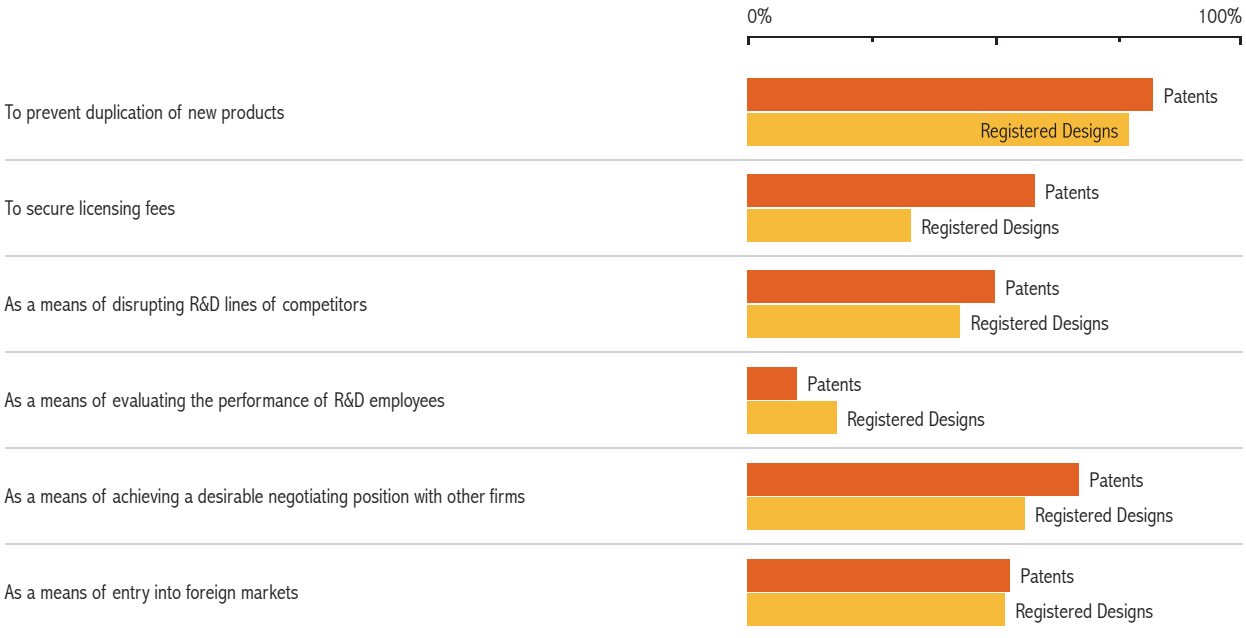
Contributions from engaging design

SECTION IV: PROTECTION

Use of IP instruments to protect technology, designs, products, and services



Reasons to use patents and registered designs



The Authors

Professor Rachel Cooper OBE

Distinguished Professor: Design Management and Policy
Director of ImaginationLancaster, Lancaster University
Chair of Lancaster Institute for the Contemporary Arts

Rachel Cooper OBE is Distinguished Professor of Design Management and Policy at Lancaster University. She is a Director of ImaginationLancaster, an open and exploratory design-led research centre conducting applied and theoretical research into people, products, places and their interactions, and Chair of Lancaster institute for the Contemporary Arts. She is also Visiting Professor of the Royal College of Art. Professor Cooper's research interests cover: design thinking; design management; design policy; and across all sectors of industry, a specific interest in design for wellbeing and socially responsible design. She has published extensively on these topics.

Dr Ricardo J Hernandez

Lecturer in Design and Innovation
ImaginationLancaster, Lancaster University

Dr Ricardo J Hernandez is Lecturer in Design and Innovation at ImaginationLancaster, where he teaches in the design undergraduate and masters' programmes. He also supervises PhD students in areas related to sustainable design, and design and innovation.

Ricardo holds an MSc and a MRes in Industrial Engineering and completed his PhD in Design of Sustainable Product-Service Systems (PSS) at Loughborough University. His main research interests include the development of tools and methods to integrate sustainable principles in the early stages of the design process, the design of sustainable systems of production and consumption, the study of the relationship between design and innovation, and the exploration of new prototyping technologies for the design process. His research has been published in The International Journal of Sustainable Engineering, Sustainability, The Handbook of Sustainable Design, and IEEE Transactions on Engineering Management.

Dr Emma Murphy

Senior Lecturer and Programme Leader: Design Innovation
Glasgow School of Art

Dr Emma Murphy is a Senior Lecturer and Programme Leader across GSA's Design Innovation Programme Suite, and supervises PhD students in the areas of design management and design education. Her research interests are based around the convergence of design, management and policy, including design research methods and methodology, business models, design procurement and commissioning, and managing creativity and innovation. She is a Committee Member of the European Academy of Design.

Prior to joining GSA, Emma was a Lecturer and Researcher at ImaginationLancaster, a creative design research lab within Lancaster University. Emma also spent almost a decade as Head of Marketing and Business Development at international design consultancy, Graven, working with organisations such as BBC Scotland, Missoni, Standard Life and Architecture and Design Scotland.

Professor Bruce Tether

Professor of Innovation Management and Strategy
Alliance Manchester Business School (AMBS)
University of Manchester

Bruce Tether is Professor of Innovation Management and Strategy at Alliance Manchester Business School (AMBS) within the University of Manchester. He is also affiliated to the Manchester Institute of Innovation Research, one of the largest research centres focused on innovation in Europe. Prior to this he was for four years Professor of Design and Innovation at Imperial College Business School, where he led the design-innovation research team and directed research at Design London - a joint venture between Imperial College and the Royal College of Art (RCA). He has taught on the MBA and Masters programs at both Manchester and Imperial. Bruce's research interests concern managing innovation, especially in service based businesses, and through creativity and design. He also researches the competitiveness of project-based service firms such as engineering consultancies and architecture practices.

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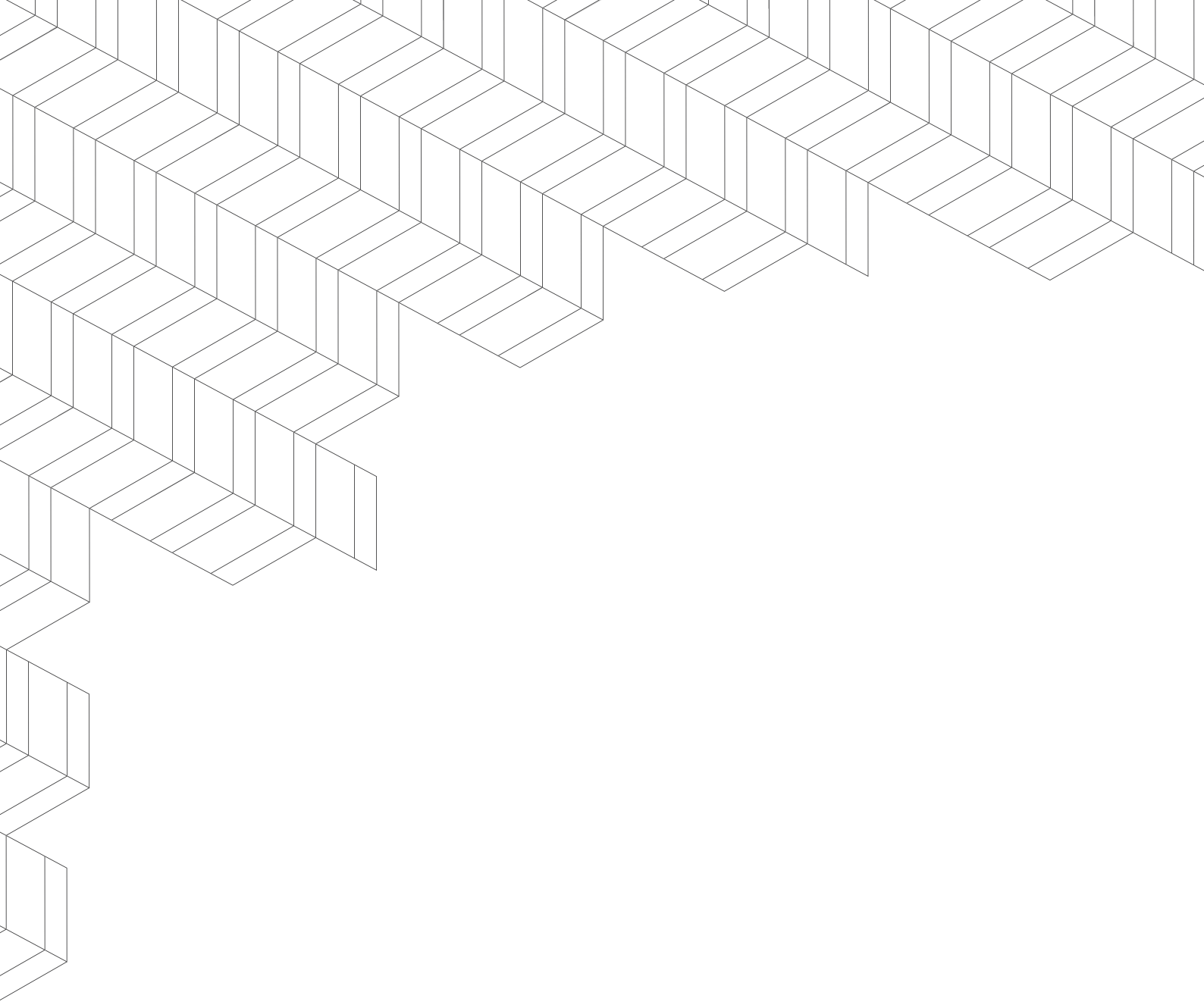

Design Value was an 18 month AHRC funded project aiming to identify the specific conditions under which design is likely to make a substantial contribution to certain forms of innovation.

Much research has been conducted around the definition, use, value and impact of design, which has helped to build confidence in design, and expand understanding of the role of design. However, such studies are not totally clear in articulating design's specific contribution to innovation. In fact, one may argue that the increasing acceptance of design's strategic value has diluted the discourse that focuses on the relationship between design and innovation, and has to some extent, led to assumptions that design's ability to contribute to innovation is a given. Therefore, this research is based on the premise that design creates value, and the impact is clear but not necessarily understood. In this context, this research gathered evidence to build a clearer picture, which while conveying the complexities of the relationship between design and innovation, also identifies the specific conditions under which design contributes to innovation, the forms of innovation and the forms of these contributions.

This project was undertaken in collaboration with Innovate UK.

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