MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

D&D - Design and Development
an alternative or complement to R&D

Bruce Tether

NCSES/CNSTAT Workshop on Advancing Concepts and Models of Innovative Activity and STI Indicator Systems, Washington D.C., May 19-20, 2016

MANCHESTER 1824

The University of Manchester
Alliance Manchester Business School

What killed Ford's Model T?

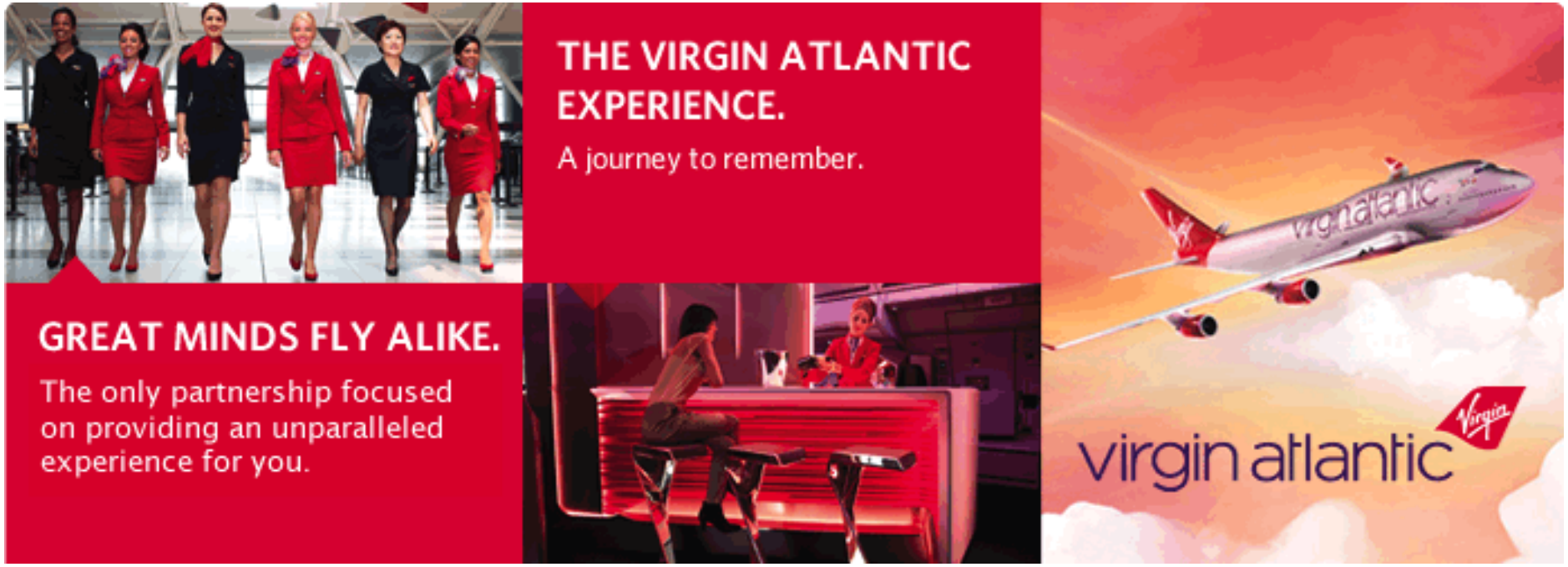
MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

What led to Apple's revival?

"iMac comes out of the box ready to go. Just connect the keyboard and mouse. Connect the power cord to an outlet and the modem cord to a phone jack. Switch on. And begin."

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

How does Virgin Atlantic compete against the majors?



MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

What killed Ford's Model T?

"… there was nothing particularly [technologically] innovative about the Model A [which replaced the Model T]. Its significance lay in the fact that America's most famous industrialist, the inventor of the mass-production assembly line, had to spend $18million on retooling just to keep pace with more artful competition" (Meikle, 2005, p. 104).

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Design Wars

VS

Apple awarded $1bn in damages (now down to $548m) …
… but case going to US Supreme Court in October

N.B, Apple's R&D intensity is surprisingly low at 2.2% (c.f., Samsung, at 6.2%)

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

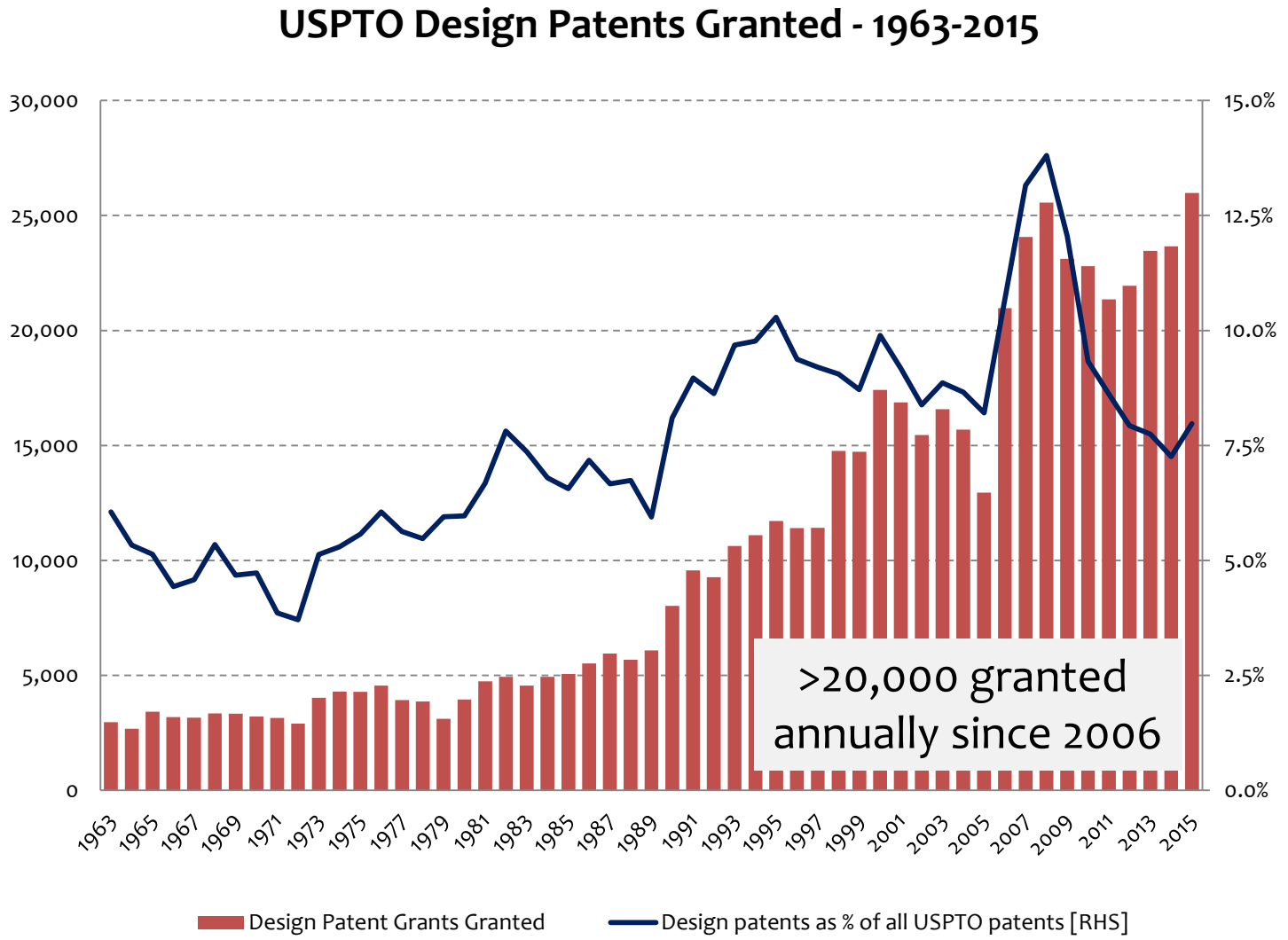
What is Design? – Outward Appearance

Traditional View – design is (determining) the outward appearance of products.
Often only done after all the engineering decisions have been made

Designers feel this is like putting lipstick on a pig … it's still a pig!

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

US Design Patents intended to protect design as appearance



MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Top US Design Patent Owners

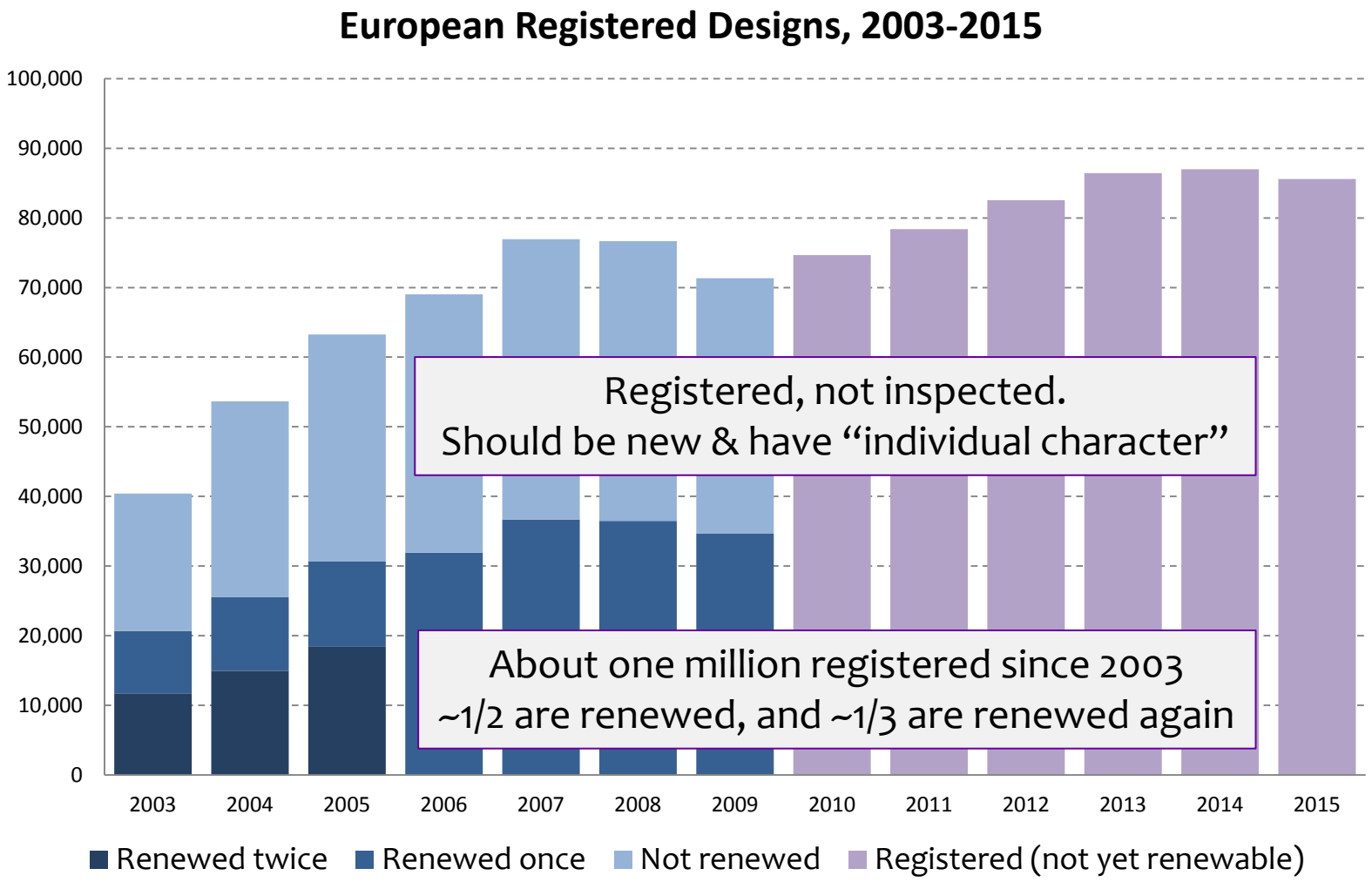
Top US Design Owners by Design Patents Granted, 2011-2015[4]

Company	# of design patents granted
Samsung Electronics Co., Ltd.	3,485
Microsoft Corporation	1,540
LG Electronics Inc.	1,343
Nike, Inc.	923
Apple, Inc.	819
Proctor + Gamble Company	807

N.B., the next owner, Honda Motor Co., had 503 design patents granted in the period.

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

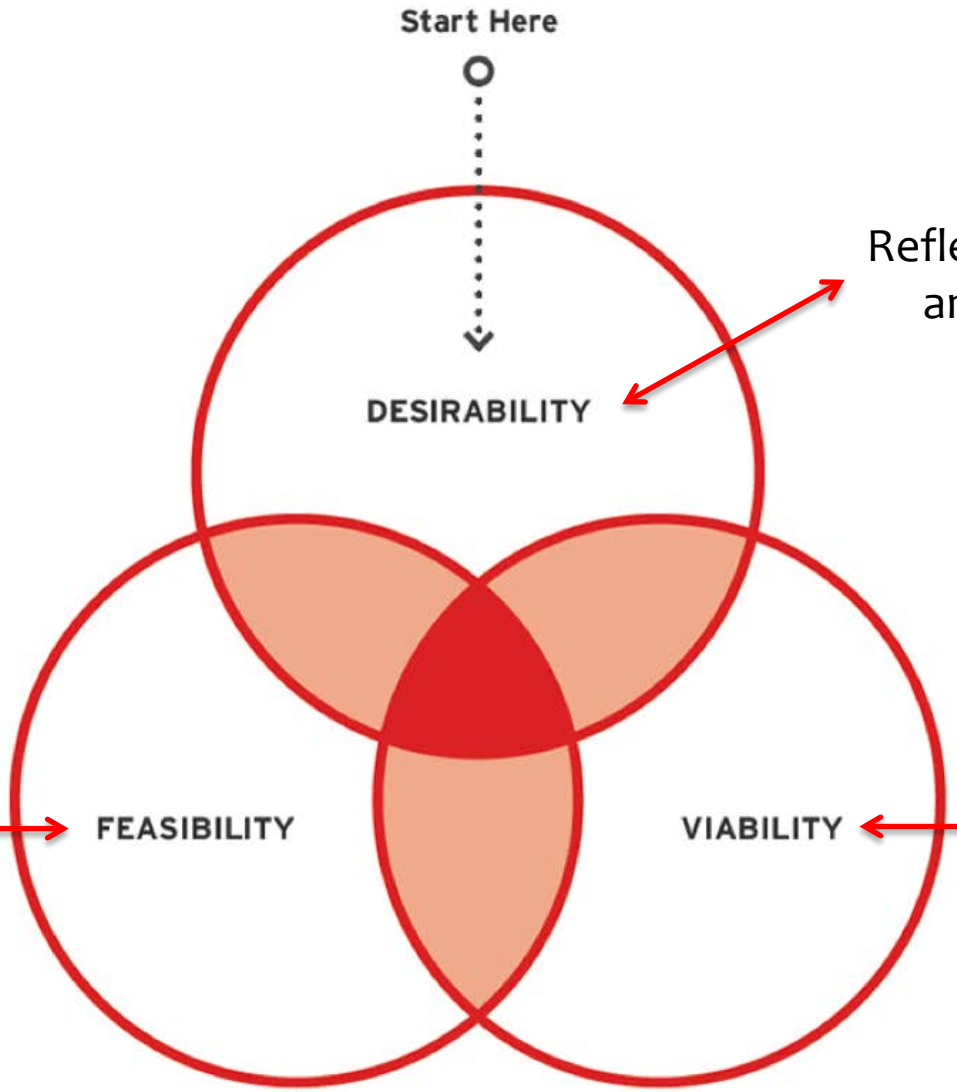
European Registered (and unregistered) Designs protect designs as appearance



MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

What is Design? – Creativity & Integration

Modern View



Reflects Social, Emotional and Functional Value

Technically possible?

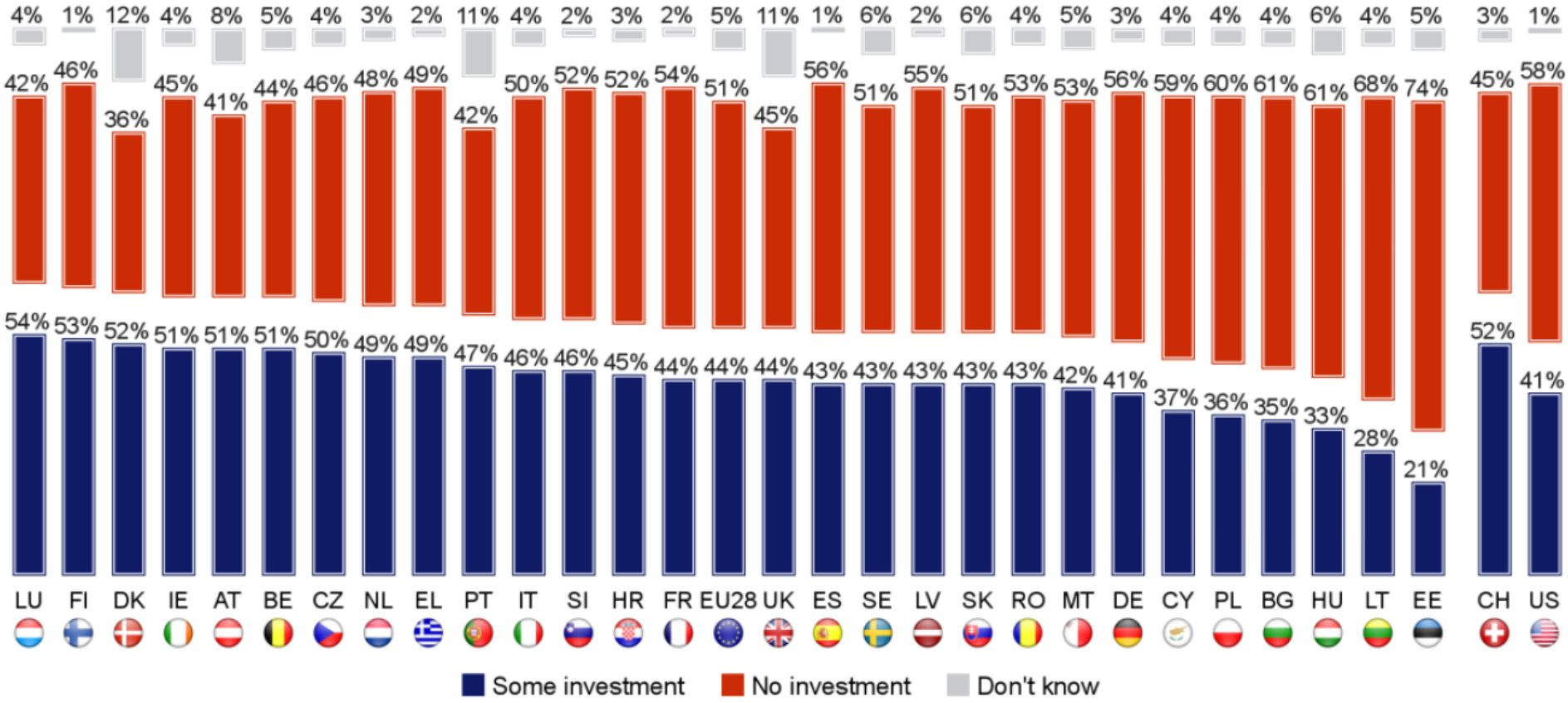
Business Model

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Extent of Engagement in Design? (Innobarometer, 2015)

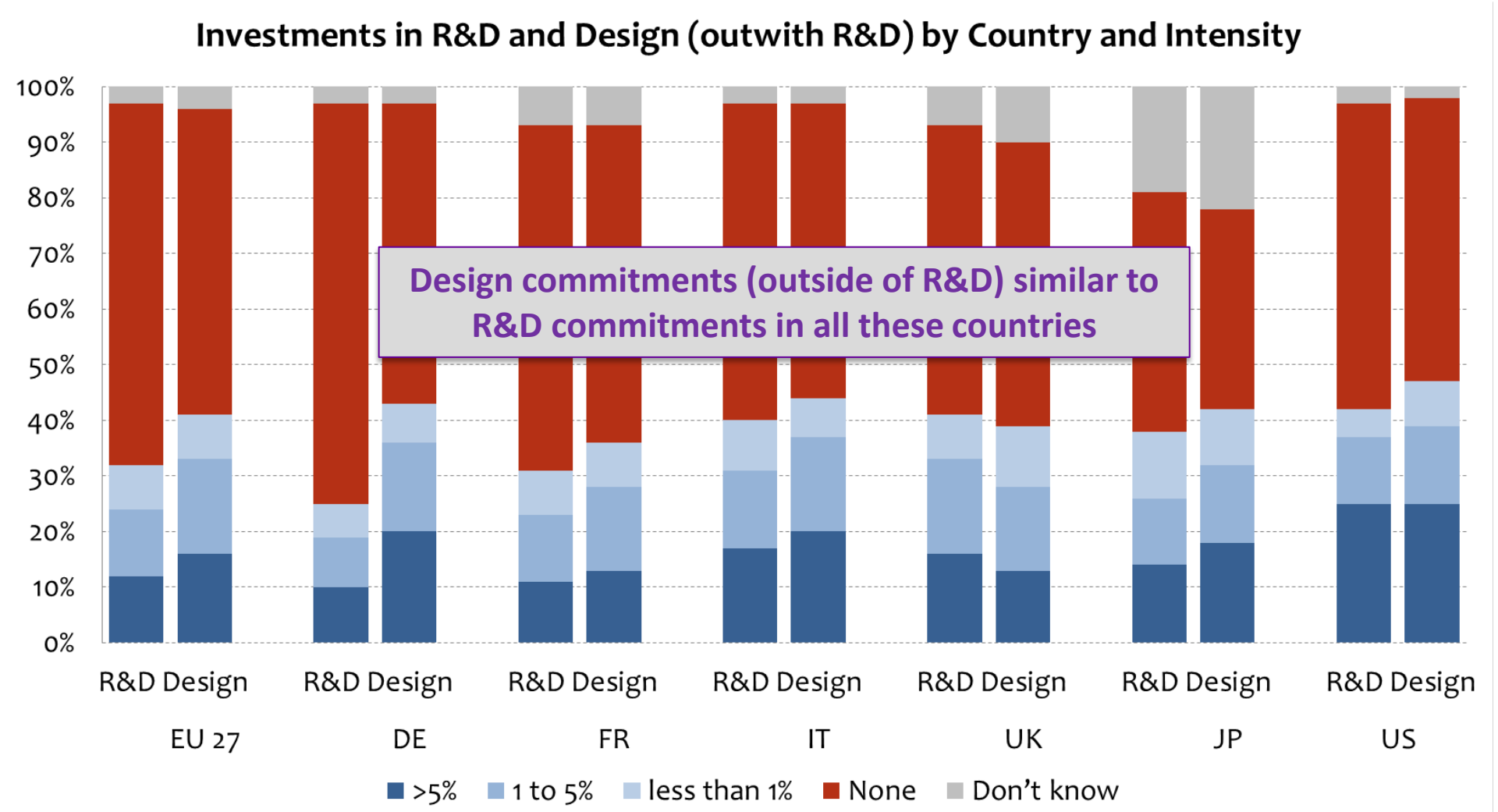
Q4B.5. Since January 2012, what percentage of its total turnover has your company invested in each of the following activities?

Design of products and services



MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

R&D and Design Commitments (Innobarometer, 2015)



The University of Manchester
Alliance Manchester Business School

Roles and Positioning of Design

THE DESIGN LADDER

The Design Ladder is a tool for rating a company's use of design. The Design Ladder was developed by the Danish Design Centre in 2001 to illustrate that companies' use of design may take on a variety of forms. The Design Ladder consists of four steps.

STEP 1
NON-DESIGN

Design is an invisible part of, e.g., product development, and the task is not handled by trained designers. The solution is driven by the involved participants' ideas about good function and aesthetic. The users' perspective plays little or no role in the process.

STEP 2
DESIGN AS FORM-GIVING

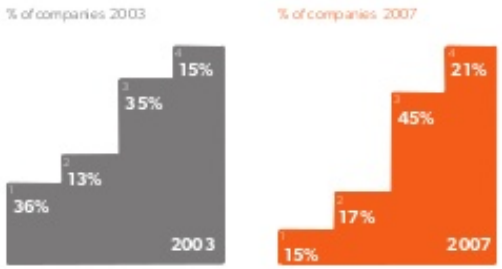
Design is viewed exclusively as the final form-giving stage, whether in relation to product development or graphic design. Many designers use the term 'styling' about this process. The task may be carried out by professional designers but is typically handled by people with other professional backgrounds.

STEP 3
DESIGN AS PROCESS

Design is not a result but an approach that is integrated at an early stage in the development process. The solution is driven by the problem and the users and requires the involvement of a wide variety of skills and capacities, for example process technicians, materials technicians, marketing experts and administrative staff.

STEP 4
DESIGN AS STRATEGY

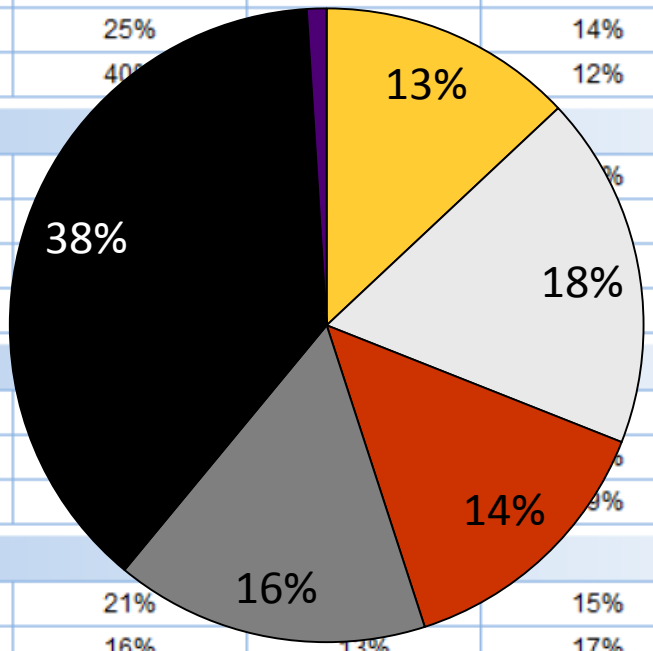
The designer works with the company's owners/management to rethink the business concept completely or in part. Here, the key focus is on the design process in relation to the company's business visions and its desired business areas and future role in the value chain.



Q1 Which of the following statements best describes the activities of your company with regard to design?

Innobarometer, 2015

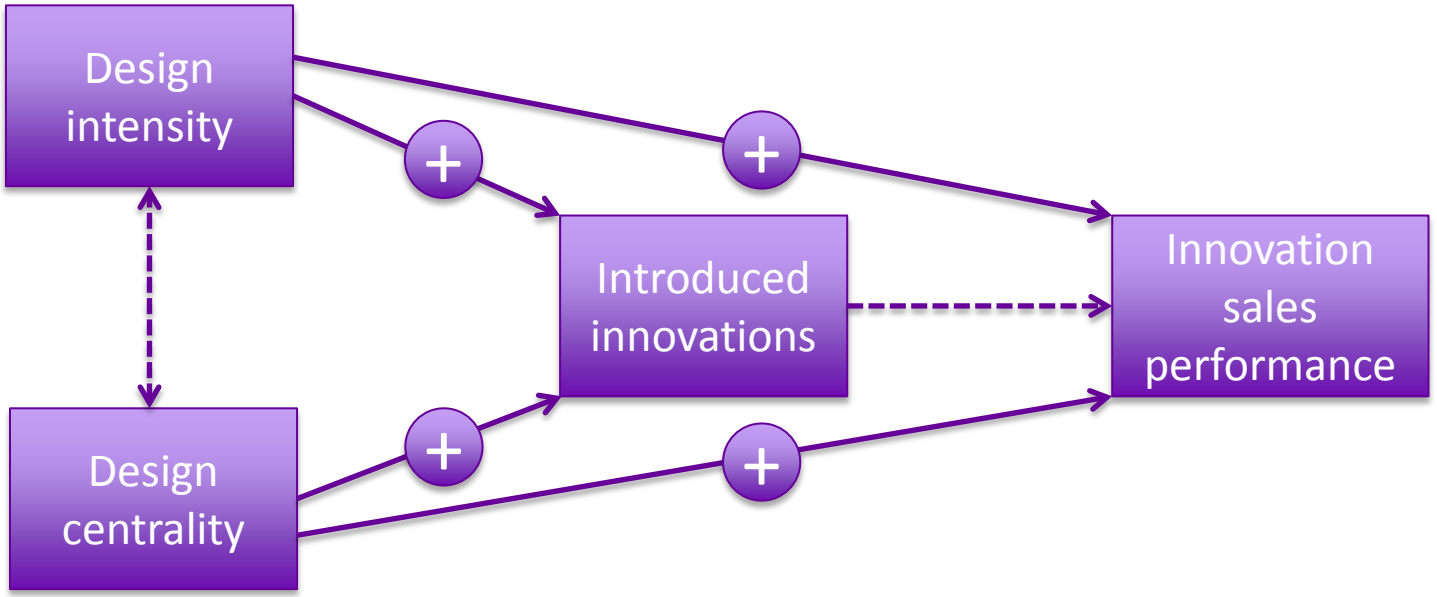
	Design is a central element in the company's strategy	Design is an integral, but not central element of development work in the company	Design is used as last finish, enhancing the appearance and attractiveness of the final product	The company does not work systematically with design	Design is not used in the company	Don't know
EU28	13%	18%	14%	16%	38%	1%
Company size						
1 - 9 employees	12%	17%	14%	16%	40%	1%
10 - 49 employees	12%	22%	13%	19%	33%	1%
50 - 249 employees	23%	25%		14%	28%	2%
250+ employees	19%	40		12%	17%	1%
Sectors grouped (NACE)						
Manufacturing (C)	15%			%	33%	1%
Retail (G)	12%				39%	2%
Services (H/I/J/K/L/M/N/R)	15%				36%	1%
Industry (D/E/F)	7%				45%	1%
Company age						
Before 2009	12%				40%	1%
Between 2009 and 2014	13%				33%	2%
After 2014	16%			9%	27%	4%
Company's turnover since 2012						
Risen by 5% or more	17%	21%		15%	30%	1%
Remained approximately the same	10%	16%	13%	17%	42%	2%
Fallen by 5% or more	11%	16%	12%	17%	43%	1%



- A Central Element
- Integral, not Central
- Used as last finish
- Used, but not systematically
- Not used
- Don't know

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Modelling
Design and Innovation (Performance)

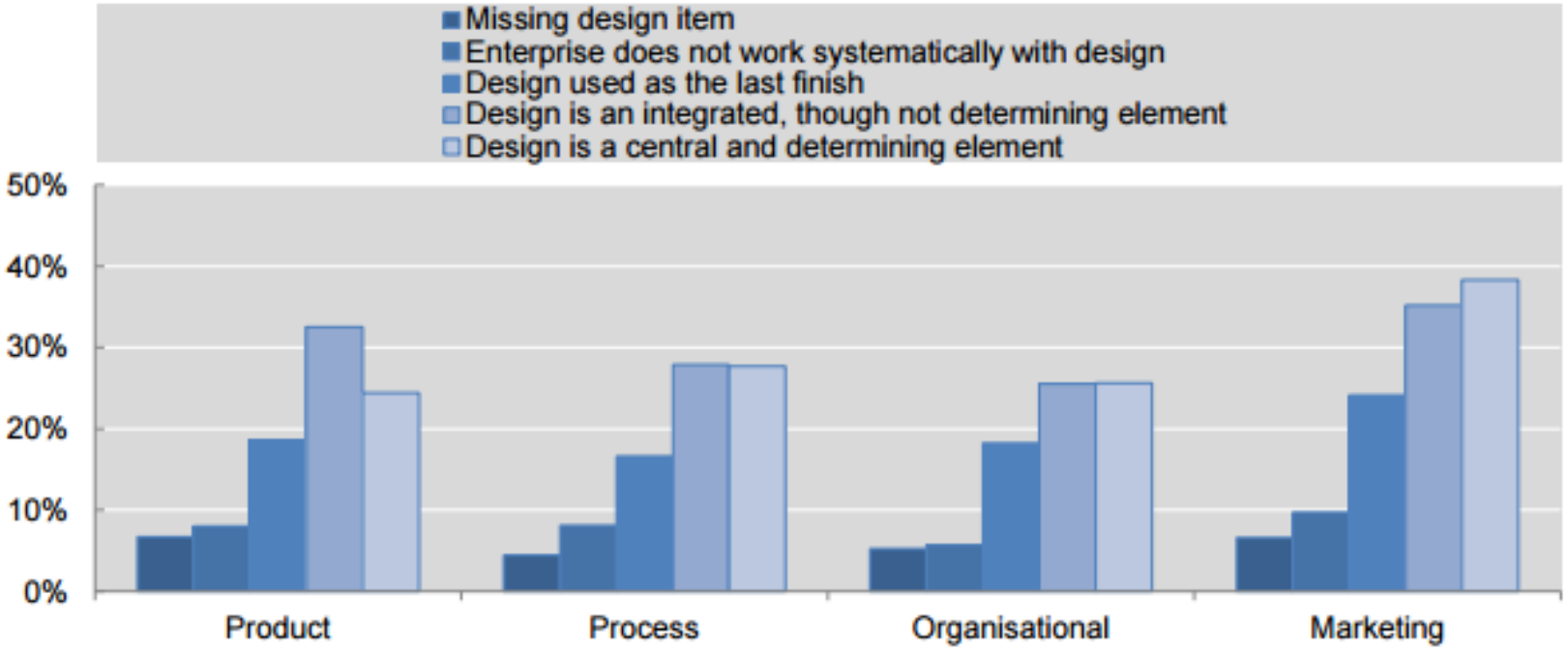


Controlling for investments in R&D, software, branding, machinery, sector, size, age, country

The University of Manchester
Alliance Manchester Business School

Design Commitment & Innovations (OECD study based on Danish CIS 2010 data)

Figure 11. Impact of levels of design use on the probability of introducing an innovation, 2010

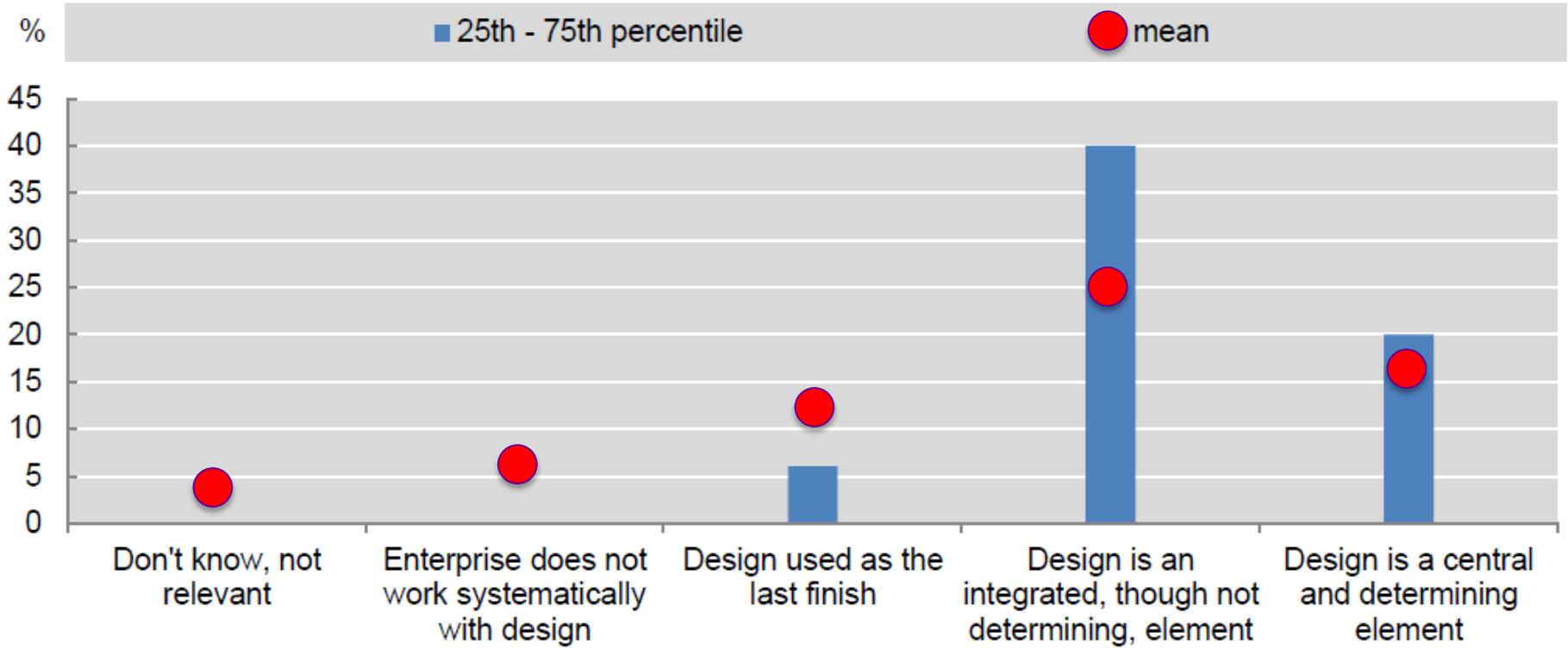


Source: OECD and Statistics Denmark, based on CIS2010 results for Denmark.
Note: Marginal effects obtained from probit model estimations, controlling for size and sector. Baseline="don't know/not relevant". All coefficients are significant at 5% level.

The University of Manchester
Alliance Manchester Business School

Design Commitment & Innovations (OECD study based on Danish CIS 2010 data)

Figure 12. Share of turnover from new or improved products, by level of design engagement, 2010



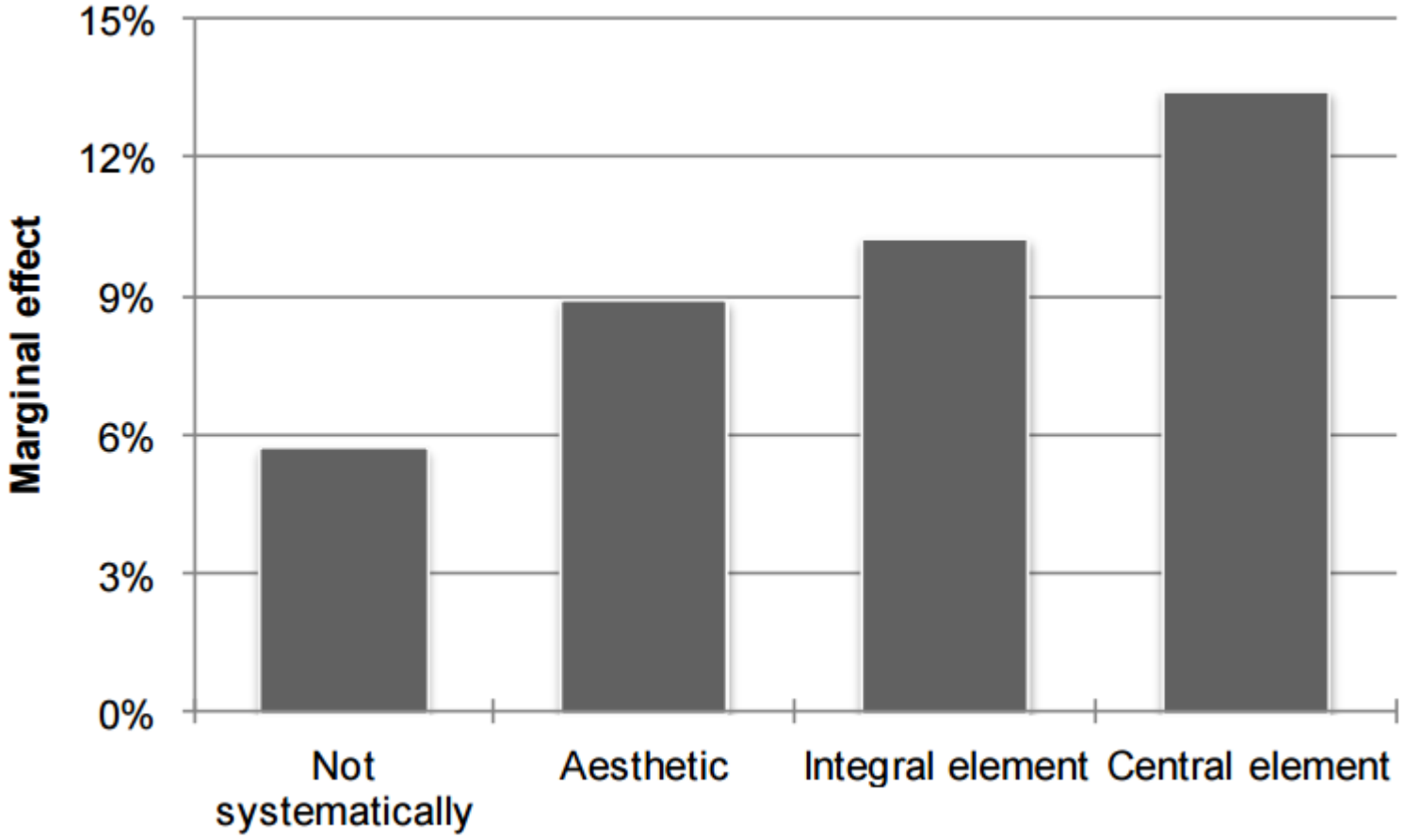
Source: OECD and Statistics Denmark, based on CIS2010 results for Denmark.

Note: Based on population of enterprises responding to the questions on design.

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Design Commitment & Innovations
(Montresor & Vezzani, Innobarometer 2015 study)

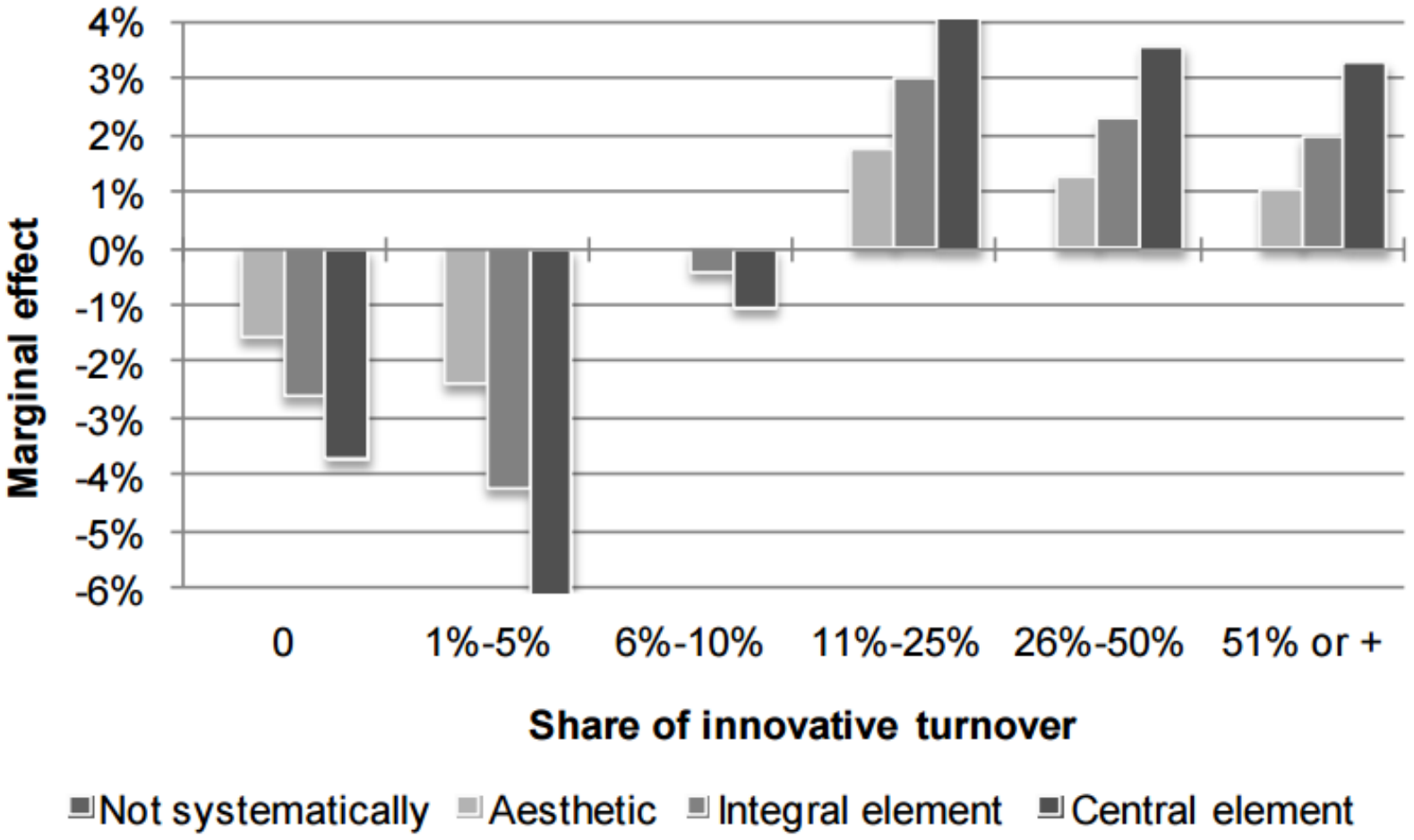
Marginal effects on the probability of introducing product/service innovations



MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

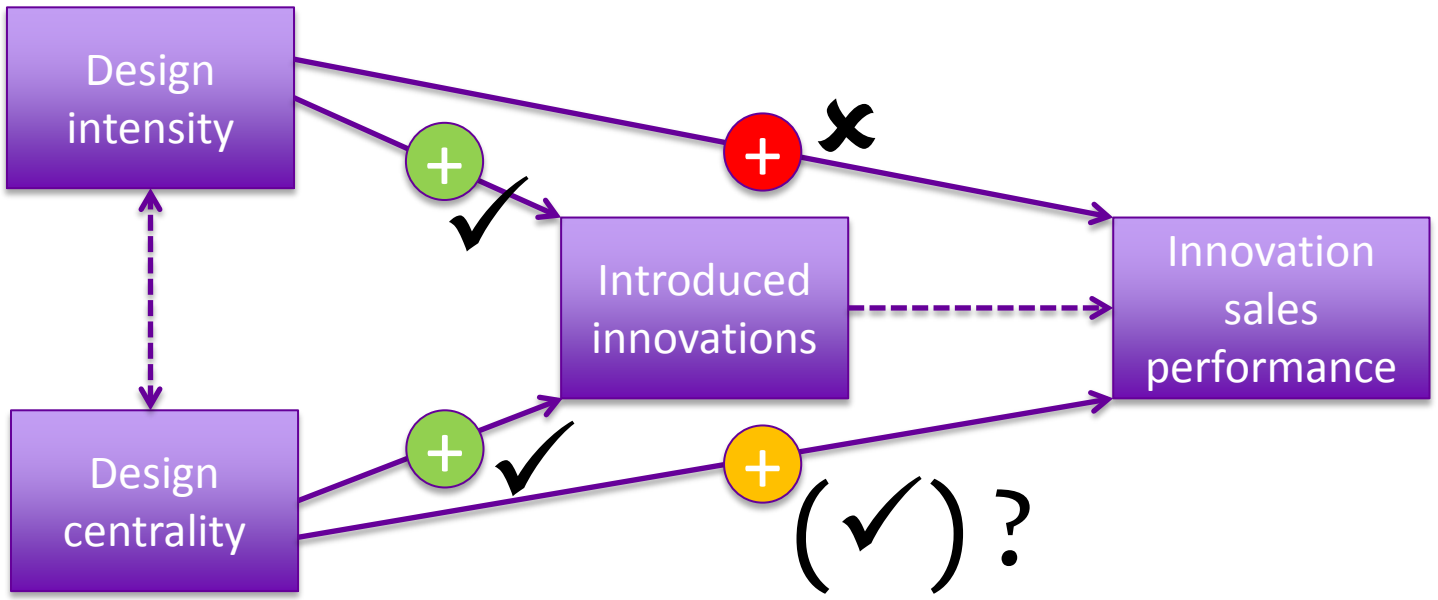
Design Commitment & Innovations
(Montresor & Vezzani, Innobarometer 2015 study)

Marginal effects on share of sales due to innovative products/services



MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

(Preliminary) Findings: Design and Innovation (Performance)



Controlling for investments in R&D, software, branding, machinery, sector, size, age, country

Evidence suggest design intensity and design centrality are associated with introducing innovations but only design centrality is more important for innovation sales performance

Using design, then moving from styling to 'integrated' may be the most important 'upgrades'

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Conclusions

Summary

- Design matters!
- … as a competitive weapon
- … as an input to innovation
- … as a form of innovation

- Design is changing …. and understanding of design is changing
- … design is appearance – and appearances matter!
- … but design is much more than appearance

- Design is ..
- … a complement to R&D & Marketing in most high-tech sectors: RDD
- … a starting point for innovation in low-tech sectors – D&D not R&D
- … a set of techniques to innovate services – "Service Design"

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

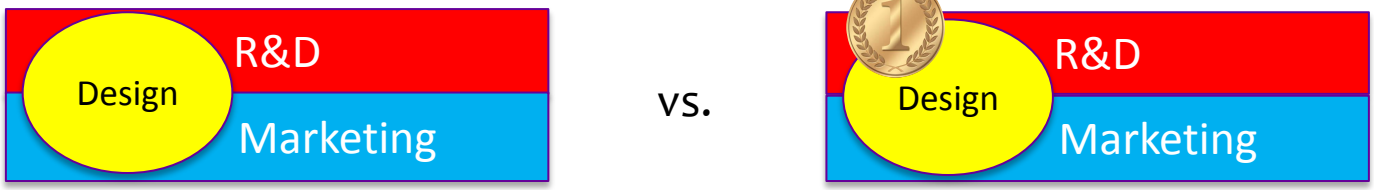
Some Measurement Challenges

1. What is Design? …. Different understandings … no 'Frascati manual' to clarify roles

2. Design is often hidden … subsumed into R&D or Marketing (dislike of double counting)

3. Position, role or centrality of design may matter more than the extent of investment

4. Quality of design inputs may matter more than position and/or extent of investment



5. Contingencies and complementarities – under what conditions is design most effective?

MANCHESTER 1824
The University of Manchester
Alliance Manchester Business School

Further Reading