

# CASE STUDIES IN THE USE OF DESIGN PRACTICE BY PHD RESEARCHERS

# DPR

case studies

## BUILDING A COMMON LANGUAGE OF DESIGN REPRESENTATIONS FOR INDUSTRIAL DESIGNERS & ENGINEERING DESIGNERS

**CREATIVE DISCIPLINE:** Graphic design

**RESEARCH METHODS:**

- Semi-structured interviews
- Practitioner-observer based observations
- Likert-scale semi-structured interviews
- Case-study
- Design diary
- Pattern coding (Qualitative Analysis)
- Statistical analysis (Qualitative Analysis)
- Tabulated matrices (Quantitative Analysis)

**NUMBER OF DESIGN CASE STUDIES UNDERTAKEN BY THE RESEARCHER:** 1

**LENGTH OF THESIS:** 85000 words

**EXAMINATION FORMAT:** Thesis and oral examination

**DURATION OF STUDY:** 4 years full time

**EXPERIENCE OF DESIGN PRACTICE BEFORE START OF PHD:**

- Bachelor of Arts in Product Design
- Master of Science degree in Industrial Design
- Industrial designer (2 years)

**PERSONAL MOTIVATION FOR UNDERTAKING PRACTICE DURING PHD:**

- Desire to combine the knowledge and skills learnt from a design-centred Bachelor of Arts degree with an engineering-centric Master of Science degree
- Aspiration to learn research skills that are relevant to design practice
- Desire to develop an academic career

**AIM OF THE RESEARCH:**

Collaboration has been difficult because of the diverse backgrounds, interests and perspectives of new product development stakeholders from different disciplines. This work argues that current integrative tools are not sufficient for successful collaboration between industrial designers and engineering designers. The research highlights that visual design representations are subject to personal interpretation, leading to distorted views. The aim of the research was to build a common ground in visual design representations to support collaboration between industrial designers and engineering designers.

**RESEARCH QUESTIONS:**

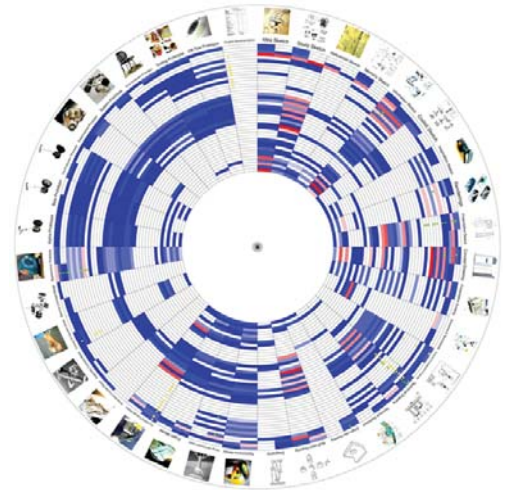
- What factors most greatly affect collaboration between industrial designers and engineering designers during new product development
- What visual design representations are used by both disciplines in the design process?
- Is there a common ground in visual design representations would support collaboration between industrial designers and engineering designers

**OBJECTIVES:**

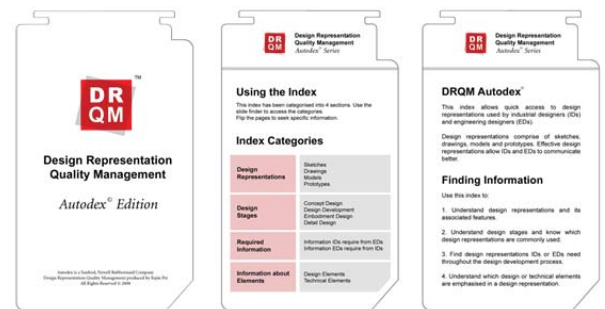
- To explore collaboration within the context of new product development
- To investigate issues and identify factors affecting collaboration between industrial designers and engineering designers during new product development.
- To determine whether a common ground in visual design representations will support collaboration between industrial designer and engineering designer



**RESEARCHER:** Dr Euijin Pei  
**INSTITUTION:** Loughborough University, UK  
**DATE OF AWARD:** 2009  
**SUPERVISOR(S):** Dr Ian Campbell  
 Dr Mark Evans  
**EXAMINER(S):** Professor Robert Young  
 Dr Richard Bibb



Wheel-based design concept design



Autodex-based concept design



Initial card design

**SUMMARY:**

This research developed a design tool (CoLab) to facilitate shared understanding in the use of design representations employed by industrial designers and engineering designers. To achieve this, a literature review was undertaken to understand the working relationship between the two disciplines. Following this, empirical research through interviews and observations outlined three problem areas: conflicts in values and principles; differences in education; and differences in representational tools and methods. The latter was chosen as the problem area of design representations was found to be highly significant. Taking a step further, a taxonomy comprising 35 forms of sketches, drawings, models and prototypes was generated and a second stage of empirical research conducted to establish the popularity of each representation and the type of design / technical information that industrial designers and engineering designers communicated with. The information was indexed into a card system that would enable the two disciplines to gain joint understanding and create shared knowledge when employing these representations. The tool was subjected to a pilot trials and refinements before presenting to students and practitioners to validate the system.

**RATIONALE FOR THE INCLUSION OF DESIGN PRACTICE UNDERTAKEN BY THE RESEARCHER:**

To fully enable design practitioners, educators, researchers and other users to access the knowledge framework as embodied in the PhD, it was necessary to organise this into an accessible format. The only feasible way to achieve this and thereby facilitate appraisal and validation was for the graphic design to be undertaken by the researcher.

**HOW THE PHD DESIGN PRACTICE DIFFERED FROM THAT OF COMMERCIAL PRACTICE:**

The activity of producing information graphics involving a structured layout with colour coding is similar to that carried out in commercial design practice. However, the key difference with that undertaken during the PhD was that the activity was carried out by an academic researcher, thereby leading to a deeper understanding of the groundwork and, in turn, producing a more structured and systematic approach within the context of a research methodology. On a fundamental level, the iterative loop of producing graphic design solutions that were then subjected to critique and review was no different to that of professional practice. Had the researcher not been a designer, it would not have been possible to produce credible graphic design solutions and the methodology would have been very different. By having graphic design integrated within the methodology, one of the outcomes (the CoLab cards) was developed to such a high state that it was suitable for commercialisation.

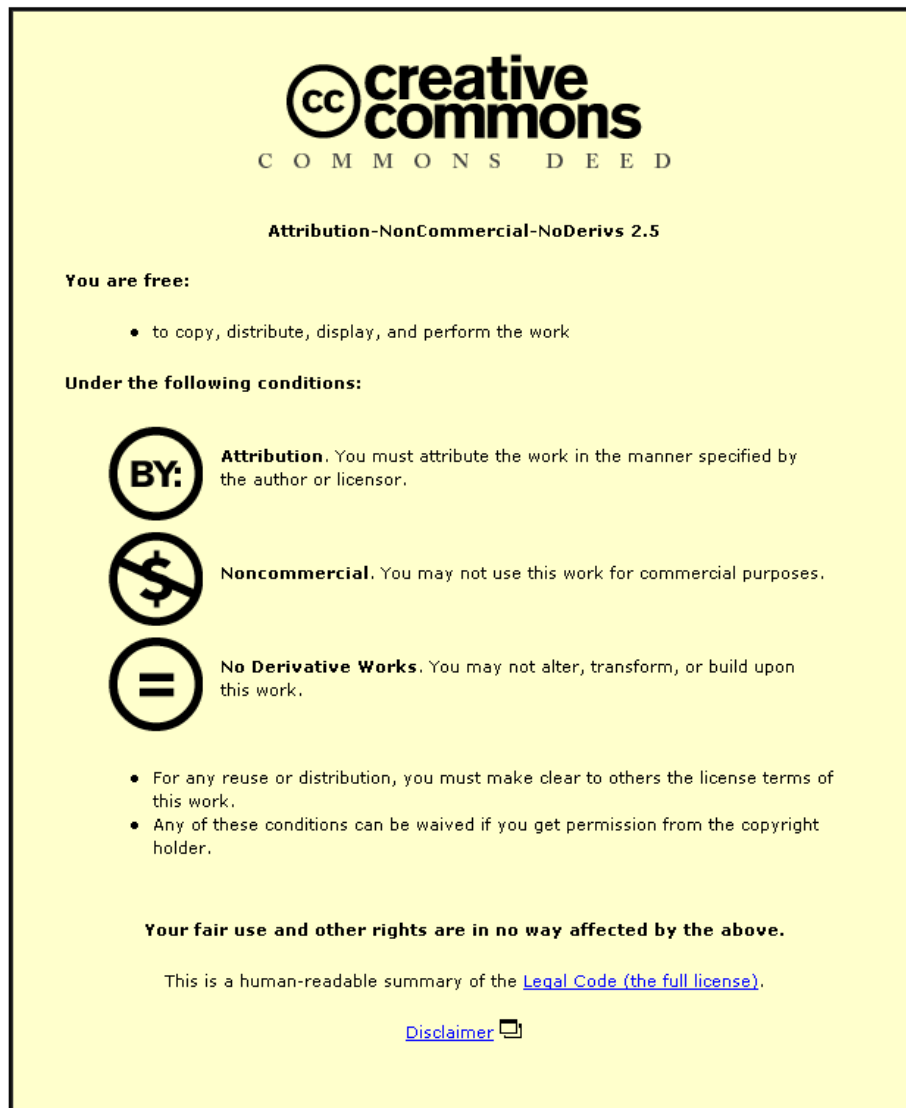
**THESIS AVAILABLE AT:** <http://hdl.handle.net/2134/5432>

**CONTACT DETAILS:** DeMontfort University, UK (epei@dmu.ac.uk)

**Design Stages****Design Information****Technical Information****Design Representations: Sketches****Design Representations: Drawings****Design Representations: Models****Design Representations: Prototypes****The overall card system****Final design showing coloured tabs for the 4 packs**

Design Practice Research Case Studies have been compiled by the Design Practice Research Group at Loughborough Design School. If you would like to work with us or contribute a case study, please contact the Design Practice Research Group Leader, Dr Mark Evans (M.A.Evans@lboro.ac.uk).

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