

# A FRAMEWORK FOR UNDERSTANDING PRODUCT DESIGN PRACTICE AND EDUCATION

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## ABSTRACT

This paper describes the Industrial Design ecology framework model - a propositional model for product/industrial design practice and education, and explores how this model can illuminate current and future scenarios in these fields. The model was informed by qualitative research with product/industrial design graduates, and is important in visualising the breadth of local and international design practice. It highlights the tensions and dynamism of the profession, and how this mutable landscape could drive continuing evolutions in design education. Changes in the priority attached to the elements comprising the Industrial Design ecology framework model can describe the past, illuminate the present and provide scenarios for possible futures; all dependent on their proportional relationships, connectedness and emphasis. Privileging different elements can reflect or create new educational policy frameworks that may send us back in time or propel us into emerging futures. The Industrial Design ecology framework model provides a conceptual basis to consider possible futures and potential directions for steering product/industrial design practice and education.

*Keywords: Design education, future practice.*

## 1 INTRODUCTION

Like many other developed countries, Australia has seen a shift of its manufacturing base to emerging economies with lower production costs [1] [2]. As manufacturing's share of national GDP continues to decrease, the contribution of services sectors has correspondingly increased [3]. The resulting decline in traditional industrial design services, Design For Manufacture (DFM) has led to staffing reductions in both design and development areas.

Industrial design roles have also been impacted by ever increasing advances and refinements in technology, such as computer aided design, computer software and programming, and rapid prototyping technologies. Today's industrial designers are expected to be skilled in these new technologies, materials and manufacturing processes; and to take account of social, ergonomic and environmental factors, to operate in multi-disciplinary teams and to liaise across other knowledge areas. This places increasing importance on the decisions tertiary institutions make in calibrating different priorities within design curricula - for example between specialist versus generalist skills.

If industrial design is to continue to be relevant in the 21<sup>st</sup> century, fundamental reform of its educative processes and professional structures is urgently needed. The model described here cannot itself deliver instant answers or quick reforms. Instead it provides a basis for communication which can facilitate the debates on which such reforms must be grounded.

## 2 APPROACH

The Industrial Design ecology framework model was developed as part of broader primary qualitative research investigating career paths of industrial design graduates from an Australian university. The creation of conceptual models was a key part of understanding, theorising and articulating relevant research findings. Qualitative research methods based on a phenomenological approach and individual perspectives were used both in initial genesis of concepts and in subsequent progression of relationships, testing of validity and iterative refinements. The epistemological basis and research methods of the study have been detailed elsewhere [4]. However in brief these comprised:

- A grounding in the theory of scholarship of teaching [5] and reflective practice [6], and application of design approaches to the identification and investigation of challenges [7] [8].
- Participant selection based on purposive sampling techniques [9] and semi-structured in-depth interviews as the primary data collection tool.
- Question design developed from predetermined themes drawn from literature review and reflections on the practice of design education [10].
- Iterative data analysis processes using both computer software and manual approaches and a range of thematic analysis approaches [11].

This paper covers two of the conceptual models developed in that process.

The Adopter-Adapter-Departer (AAD) [12] model is briefly described before focusing on the industrial design ecology framework.

### 3 THE INDUSTRIAL DESIGN ECOLOGY FRAMEWORK MODEL

Research outcomes were used to develop two key conceptual tools:

- Categories reflecting the lived experience of industrial design graduates – the Adopter-Adapter-Departer categories (Box 1)
- A model mapping the breadth of design practice by depicting two pairs of inter-related attributes – the Industrial Design Ecology Framework model (Figure 1).

Taken together, the Adopter-Adapter-Departer categories and the Industrial Design Ecology Framework model can be used to decode changes in design practice over time and to analyse potential futures.

#### Box 1: Adopter-Adapter-Departer categories [12]

Categories of industrial design graduates

- Adopters: who focus on traditional industrial design practice /Design for Manufacture (DFM).
- Adapters: who adapt to changing circumstances and successfully modify their practice beyond DFM.
- Departers: who respond by leaving the field entirely.

#### 3.1 The paired attributes

The  $x$  and  $y$  axes of the Industrial Design Ecology Framework model represent two pairs of attributes (Figure 1). The  $x$  axis is the attribute continuum regarding *what industrial designers do*, with endpoints described as Art and Technical. Art represents the aesthetic, form-giving and human component: technical is the functional and engineering orientated end of this continuum. The  $y$  axis is the attribute continuum regarding *how industrial designers work*, with the endpoints Producer-centred and Community-centred. ‘Producer centred’ reflects traditional industrial design in the design of manufactured products. Here, the emphasis is placed on the word industrial, as in ‘**INDUSTRIAL** design’. ‘Community-centred’ reflects newer aspects of industrial design generalist thinking. Here, the emphasis is placed on the word design as in ‘industrial **DESIGN**’.

In addition, the vertical plane of the Framework is divided into three, reflecting the Adopter, Adapter and Departar categories. The lowest level is the Adopter zone (related to the adoption of traditional DFM practice), the middle the Adapter zone (where industrial design practice extends beyond traditional DFM), and the top the Departar zone (furthest away from traditional DFM industrial design practice).

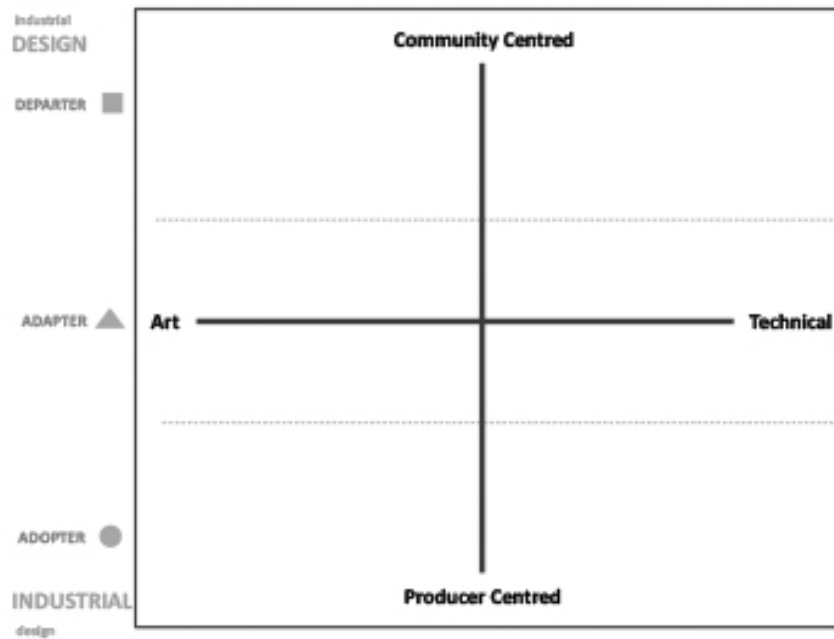


Figure 1. The Industrial Design Ecology Framework model

### 3.2 Applying the Industrial Design Ecology Framework Model

The Industrial Design Ecology Framework model was used to both analyse and communicate research findings on the changing practice and education of industrial design. Major developments were grouped into past, present and future scenarios and depicted with reference to the model. Its effectiveness in explaining these changes and highlighting their underlying drivers demonstrates how conceptual models help crystallise our thinking [13] and lay the groundwork for intra- and inter-disciplinary dialogue.

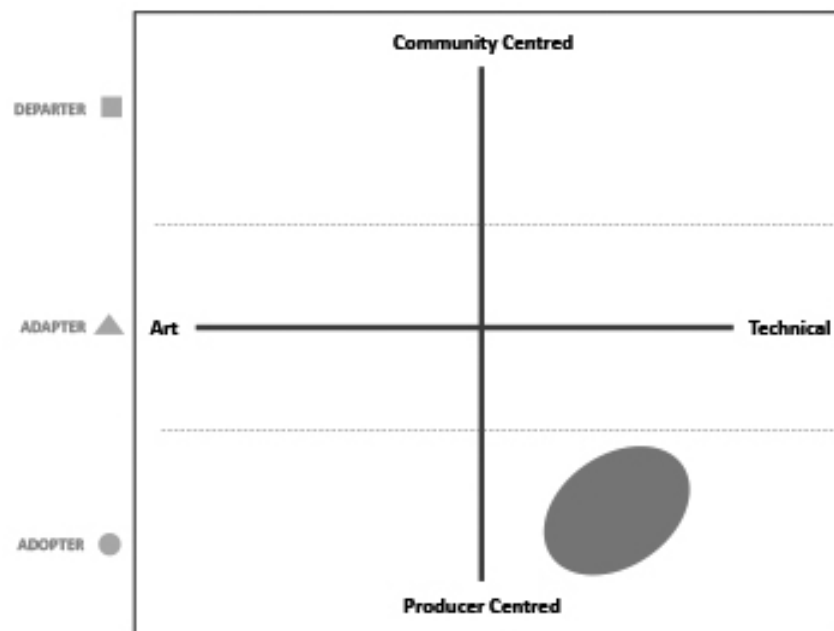


Figure 2. The Industrial Design Ecology Framework applied to the past

### 3.3 Past

Past Australian industrial designers engaged in product design in the domestic manufacturing sector. Jobs were not numerous, but tended to be stable and well defined. Graduates could expect to find employment in local Australian owned and operated industries. Employment prospects were clearly defined: students learned how to design objects made by mass manufacture. The focus of education was

skills based, with well-defined techniques passed on from the existing generation of practitioners to emerging generations in an almost trades-based, master-apprentice pedagogical approach. The Australian design education sector was also characterised by stability. Industrial design was seen primarily as a skills-orientated profession. Courses were delivered within what is now referred to as the vocational education sector, conducted by institutes of technical and further education and the like. Graduate numbers were relatively low as industrial design schools were few in number. The Industrial Design Ecology Framework model applied to the past shows industrial design practice and education located low on the vertical axis, heavily weighted to the producer centred end point with limited recognition of community centred approaches (Figure 2). In the horizontal zones of Adopter, Adapter, Departer, practice was firmly sited within the Adopter zone: again showing the predominance of the DFM and producer centred nature of industrial design practice and education at the time.

### 3.4 Present

In contrast to the stability of the past, industrial design practice and education is currently in flux. Industrial design practice is diverse and its boundaries are contested. The number of Australian industrial design courses and the graduates they produce has increased, driving up competition for jobs just as traditional DFM positions have become scarce. Graduates must adapt their skills and market themselves in innovative ways to find employment. Australian industrial design education is correspondingly in a state of change. Course content has expanded significantly, incorporating social and environmental issues, human-centred design and experience design. New technologies are an everyday part of the student experience, with CAD and rapid prototyping standard. Face-to-face contact hours are under pressure and students are more likely to be taught by life-long educators with less or no commercial experience. Australian universities responses to these changes have varied considerably. Some continue to compress more into the same course duration despite reduced contact hours: others have expanded the 4 year undergraduate course to a 3 year plus 1 year separate honours program. Internationally, some courses have gone further towards resolving these dilemmas with the emergence of new specialties involving industrial design such as interaction design, strategic industrial design and experience design. When applied to the present, the Industrial Design Ecology Framework model shows a large ellipse remains in the Producer-Centred, Technical and Adopter area, as most design jobs still are found here (Figure 3). Two smaller ellipses show the emergence of new roles separate from these traditions. The middle ellipse in the Adopter zone holds a midway point on the Community-Centred – Producer-Centred continuum. The top ellipse, the newest and currently smallest employment market, shows the greatest separation from industrial design’s traditional parameters. It typifies the Departer, who has a role most focused on Community-Centred aspect, and also takes a balanced view on the Art–Technical axis.

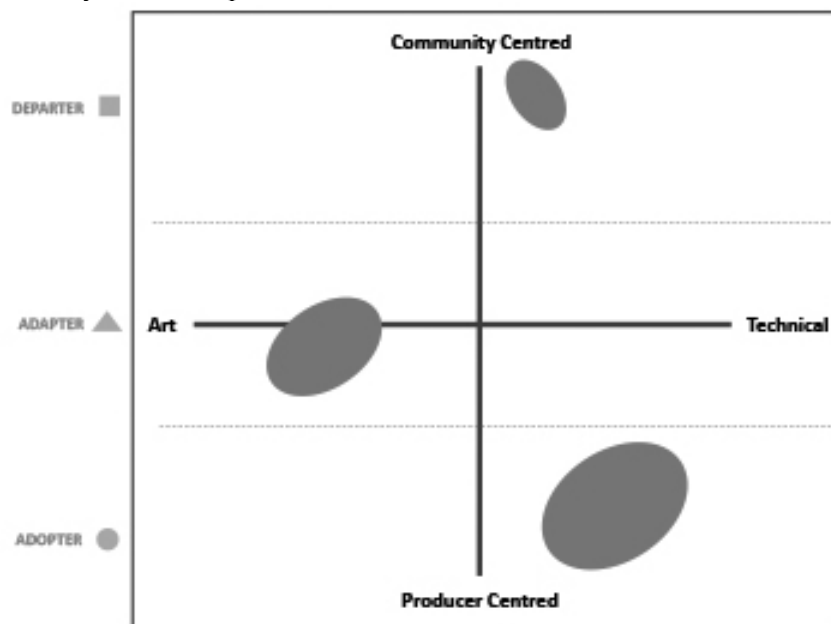


Figure 3. The Industrial Design Ecology Framework applied to the present

### 3.5 Future

In the future, the profession of industrial design as currently understood is gone. The future will hold no place for a narrowly defined role such as the ones for which many present-day industrial designers were educated. Graduates will be integrated throughout many aspects of society. Associations with manufacturing will be no stronger than links with services such health, banking or tourism. Career trajectories will incorporate many forms of work (onsite, remote, trans-national, employee/contractor), many formats (part-time/casual/full time), and many disparate fields of application. Job parameters are likely to be fluid and adaptive to emerging issues. Job titles and roles will reflect the archetypes of design practice, such as the dissident designer, the visual creative, the technical product designer, the digital maker, the design deviser as described [14], with design graduates employed in roles based on, for example, interaction design, service design and strategic design. Design thinking will be recognised as a field of expertise by employers, businesses and the wider public. In education, the current tension between competing poles of attraction will be resolved by a bifurcation of curriculums. Realising single courses can no longer ‘do it all’, universities will instead offer education focusing on separate areas on the Art–Technology and Community–Producer continuums. Designers will engage in life-long learning, individualising their learning experience to meet different employment opportunities, emerging trends and personal philosophies.

Applied to the future, the Industrial Design Ecology Framework model shows a large ellipse positioned at the top, in the Community-Centred, ‘Departer’ zone of the model, reflecting that many jobs will focus on community-centred issues (Figure 4). The second large ellipse – towards the art end of the Art – Technical horizontal axis and in the middle of the ‘Adapter’ Zone – shows that design of objects as bespoke solutions for particular contexts will increase in importance. The two smaller ellipses indicate significant changes in producer-centred design for manufacture opportunities. One represents traditional DFM industrial design located at the Producer-Centred end of the vertical axis, towards the technical end of the horizontal axis and in the Adopter zone. The other, at the technical end of the Art–Technical horizontal axis and in the Adapter zone, represents a stronger engineering link to industrial design.

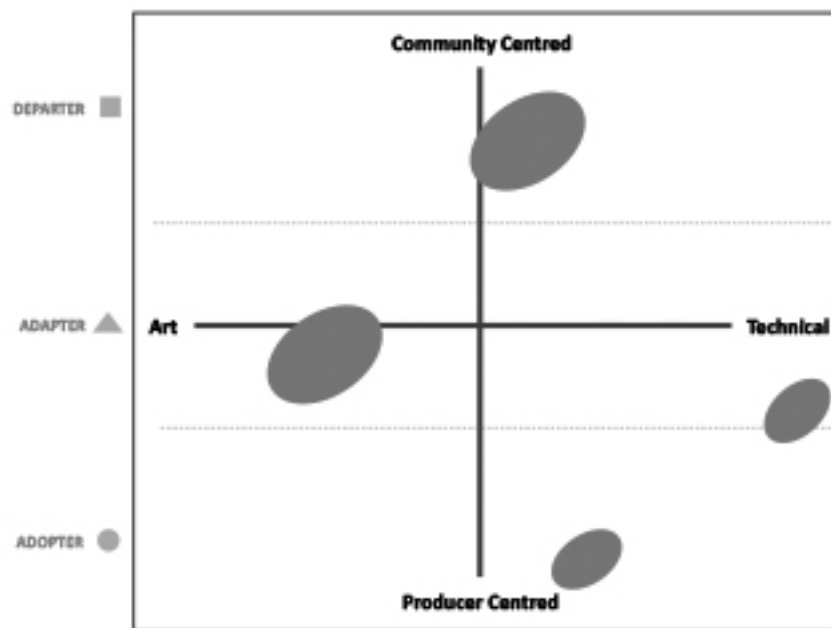


Figure 4. The Industrial Design Ecology Framework applied to the future

## 4 CONCLUSION

The application of the Industrial Design Ecology Framework model allows new approaches for industrial/product design education to be explored and understood. For example, the reduction in local manufacture can and should drive an ongoing review of industrial design education and any single focus on the teaching of DFM. Links with a greater diversity of ‘employer’ bodies to encompass non-manufacturing agencies would be an important step in this process. Likewise, universities will have to

confront and manage change, including staffing profiles, capacities and capabilities while also responding to the wider and ever changing contexts of higher education. Any change can be difficult but surely design is equipped with the tools and knowledge to implement this reform process.

Those currently working in the profession and education of industrial design must be equipped for the emerging post-industrial design world. The mindset of those who set limits on novel applications of design should be challenged. Likewise new terminology which reflects, rather than limits, these potential futures, is needed. Finally, the industrial designers of today will have to become the disseminators of design principles beyond the profession of design to the wider world.

Future research could extend this analysis beyond the single university studied to consider similarities and differences between this and industrial design graduates of other institutions. Research is also needed into new ways of carrying these models into educational practice. While the goal of building new forms of resilience into design education and practice is clear, methods for achieving this are less well understood.

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