Abstract: This paper outlines an innovation-focused design research collaboration that connects New Zealand design and manufacturing industry with advanced design thinking about design for desirability, a research area pursued at AFFECT - the Centre for Affective Design Research at Massey University in Wellington (NZ). Nowadays, it’s all about offering products that are desirable; products need to appeal to their users on emotional, social and intuitive levels. Function and usability are still important issues of product design, but unless the product is instantly and as well as continuously appealing, chances for success are slim. Academic design researchers and five New Zealand companies have collaborated in a governmentally funded “Growth Innovation Pilot Initiative” scheme, that aims to foster design for desirability thinking and capabilities by means of knowledge sharing and enterprise training in the form of design projects and workshops. Within this collaboration, Master of Design (MDes) projects were conducted that created visionary product concepts for animal farm management and radio communication utilizing the perceptual product experience framework [1]. This paper describes the process of this project, highlighting the initial interviews with the companies, the collaborative knowledge sharing and enterprise training workshops, and the two MDes projects that aimed to foster and advance design for desirability thinking together with the companies. The described project provides a novel collaborative model between industry and academia that challenges advanced thinking and implementation of design for desirability in small- and medium-sized (SME) companies with the aim of improving international competitiveness of their products. Such companies often lack the knowledge and resources to devise strategies and adopt operational ways of working with desirability focussed design conceptualisation programmes that require a holistic understanding of the users, which can be provided through academic design research collaborations.

Key words: product design; affective design; design for desirability; case study; industry collaboration
innovative design solutions, such as the company Icebreaker\(^1\) for instance. However, most New Zealand manufacturing companies are small to medium sized by world standards [2, 3] and despite their entrepreneurial thinking, export of products and services to the global market has increased only in recent years [4, 5]. The main issues for NZ manufacturing companies are their geographical remoteness to major markets such as America, Europe or Asia, and their relatively small size, which, through resource scarcity, makes it difficult to compete internationally. With the pressuring need for sustained economic development, the NZ Design Industry Taskforce [6, 7] found that NZ businesses do often not recognise the level of design input needed to succeed internationally. Previous studies have acknowledged the need for more sophisticated understanding of business improvement and the pursuit of international competitiveness [8] as well as the need for increased utilisation of industrial design [9]. A key strategy to support this design-led innovation thinking is the New Zealand Trade and Enterprise’s initiative called “Better by Design”, which aims to support NZ companies to integrate design principles right across their business [10].

1.2 The “GIPI” Industrial Collaboration Project

In alignment with this aim, a government-funded Growth Innovation Pilot Initiative (GIPI) “Industrial Competitiveness through Design for Desirability” was initiated by industrial design researchers at Massey University in 2006. The aim of the GIPI project (2007-2009) is to support New Zealand manufacturing companies to advance their design understanding and capability to generate products that are not only functional, reliable and useable, but moreover innovative, exciting and inspirational; inviting, pleasing and intuitive to use; and address users’ socio-cultural and emotional aspirations and needs. The GIPI project brought together industrial design researchers of the AFFECT research centre\(^2\) and five New Zealand design and manufacturing companies, from a range of industries, including radio communication, outdoor equipment, injection molding, animal management and kitchen appliances. With the aim of supporting those companies to create products that are competitive on a global market, the GIPI collaboration encompasses activities primarily in “Knowledge Sharing” and “Enterprise Training”. The main focus was thereby on three of the most critical areas for product success in today’s marketplace: innovation, aspiration and experience [11].

2 Design for Desirability

The central proposition of this case study is that the concept of design for desirability is fundamental for achieving a product that is positively perceived and successful in relevant markets. Nowadays, it’s all about offering products that are desirable; they need to appeal to their users on an emotional, social and intuitive level. Function and usability are still important issues of product design, but unless the product is instantly and continuously appealing, chances for success are slim.

It is well known that design largely contributes to the experience of products. For example, Givechi and Velasquez [12] showed that industrial design is capable of eliciting positive emotions and reactions such as joy, inspiration and achievement. Desmet [13] constituted nine sources of product-evoked emotions into a framework

\(^1\) Icebreaker is a New Zealand company that produces outdoor-focused clothing made of 100% merino wool, a natural product that is comfortable to wear, breathable, naturally temperature regulating and durable.

\(^2\) AFFECT- the Centre for Affective Design Research at the College of Creative Arts (Massey University in Wellington, NZ) focuses on research of affective issues in product design (www.affectdesignresearch.com)
for designers and researchers to discover and define concerns and stimuli for those emotions. In addition, Mano and Oliver [14] emphasize the connection between product satisfaction and product-elicited emotions, highlighting the importance of the subjective response for a positive product satisfaction. They report that the dimension of ‘hedonic’ or ‘aesthetic’ performance is one of the two major dimensions of product relevance, with the other being the utilitarian performance.

In the field of affective design, Jordan [15] argued for the importance of creating products that are not only useful and usable, but also pleasurable to use. He categorised these product-related pleasure aspects into four categories: physiological, psychological, sociological and ideological pleasure. Seva et al. [16] found that affect created by industrial design strongly influence purchase decisions. Authors in a number of other research areas, from psychology [17] to design, have offered a variety of viewpoints which provide insights into the complex nature of product experience and its relation to, e.g., meaning [18], formal aesthetics [19, 20], and emotions [21]. Clearly, desirability is created through a multitude of aspects related to the user’s experience of the product.

The term desirability has been used in product design related research, though not extensively. Benedek and Trish [22] describe ‘desirable’ as: “worth having or seeking, as by being useful, advantageous, or pleasing”. ‘Desirability’ with regards to a product development can be wide ranging depending on the viewpoint of the stakeholder (e.g. managers, designers, marketers and end users). This study focuses on desirability aspects related to factors that may be influenced by industrial design in whole or in part, as industrial design activity in companies is perceived as contributing to the creation of desirability.

The authors of this paper strongly believe that a higher level of desirability in products must be achieved in order to lead to a higher level of success in the marketplace, which is nowadays characterised by a global competition and often well-informed consumers. The role of industrial design hereby is to focus not only on functionality and usability, but instead to address the whole product experience (including use, attitudes, perception, emotion, etc.) that contributes to desirability. This leads us to the adoption of an alternative definition of design in this context, as: “The creation of appropriate, desirable and meaningful experiences for people” [23].

3 The Innovation-Collaboration with the Companies

In order to explore the notion of design for desirability of the companies within this collaborative innovation-initiative, several investigations have been conducted, as described in the following sections.

3.1 The Initial Interviews

At the first stage each of the five company was initially interviewed by the researchers to explore their perceptions of desirability, to assess their current design level and consequently to identify potential projects that would provide the companies with the support to expand their “design for desirability” competence[23].

The companies that participated in the study represent significant NZ exporters to the global market, operating in the business-to-business as well as in the consumer markets. The method used in the study was the qualitative research interview [24]. A semi-structured interview was conducted at each of the companies’ premises, which took approx. 2 hrs. The interviews were carried out together with 2-3 researchers and 2-3 representatives from the company, consisting mainly of: group and marketing managers, design directors, industrial designers and design engineers. The interviews were recorded and transcribed for later analysis.

During the interviews no definition of ‘desirability’ was presented, instead the views and experiences of the respondents was the basis for the qualitative data collected. The reason for this is that the researcher did not want to focus the attention of participants to any specific aspect of the term, instead allow for the participants to
explore the concept of desirability in their own terms with regards to the particular context of their own company. All interpretations of what desirability mean for the participants were seen as relevant and valuable. Based on these detailed findings [11], the researchers developed several projects and workshops in alignment with the “knowledge sharing” and “enterprise training” activities to achieve the goal of supporting the companies to advance their design understanding and capabilities to generate products/services that are desirable. A total of three workshops have been conducted, with the fourth one being currently planned. In addition several researcher, postgraduate, as well as undergraduate projects have been run to explore the opportunities of design for desirability thinking for each of the companies. The following will provide a short overview of the workshops’ foci and present two of the master of design projects in more detail.

4 The Collaboration Workshops
Three workshops were conducted throughout the project to introduce, discuss and develop approaches and goals for the project, in collaboration with industrial partners.

4.1 The Initial Workshop
Following the interviews, an initial workshop with the AFFECT researchers and the representatives of each company was held at Massey University in Wellington end of 2007. The workshop focused on presenting identified project opportunities for each company, which were then discussed and the level and scope refined for each company. Surprisingly, at this workshop the GIPI partner companies engaged vividly in an open knowledge exchange about their product development experiences. It is assumed that this positive side effect occurred due to the neutral environment of the GIPI project, which is protected by mutual confidentiality agreements.

4.2 The Perceptual Product Experience (PPE) Workshop
The second workshop was conducted within the premises of one of the company partners in May 2008, as requested and agreed by all other companies. The idea was that next to the “enterprise training” workshop, the companies had the chance to view the R&D and manufacturing facilities of the hosting company and share some knowledge in this way. The focus of the second workshop was on product experience, introducing the Perceptual Product Experience (PPE) framework [1], which is based on two major elements:

a. Perception: the process of becoming aware of physical objects / phenomena through our senses.
b. Experience: the entire set of effects that is elicited by the interaction between the user and a product.

The PPE framework is designed to allow its users to focus on perceived, non-instrumental aspects of product interaction in order to understand, map, organise and analyse possible user experiences. The PPE framework (see Figure 1) has three core modes that help understanding how people experience products:

1. Sensory (i.e. how we experience products with all senses)
2. Cognitive (i.e. how we process stimuli)
3. Affective mode (i.e. and how we feel and think of things)

These modes can be analyzed from two different sides:

a. The presentation side (consisting of impression, appreciation and emotion)
b. The representation side (consisting of recognition, comprehension and association)
In the workshop this PPE framework was exemplarily tested by companies using worksheets (see Figure 2), who analyzed one of each other’s current products followed by a presentation to all participants.
4.3 The Emotional Design Workshop

The third workshop was conducted at the premises of AFFECT in November 2008. Focus of this workshop was the introduction of several design tools/methods to explore the user-experience in more depth with focus on emotions. The presented tools were the “Nine Sources of Product-Evoked Emotions” [13], the “Product Personality Assignment” [25] and the “Sensory Experience Assessment” [23]. The latter one was also conducted as an exemplarily exercise to analyze a variety of newly designed products (see Figure 3) with regards to the sensory experience and interaction through consideration of the intimacy of sensation. The investigated products were selected on the basis of providing a product novelty, such as: a new aesthetic style; innovative magnetic locking mechanism; ergonomic force reduction; multi-touch screen; shake-to-shuffle technology and material fusions.

Figure 3: Products reviewed in the third workshop: Phil & Teds VIBE Stroller; Fidlock magnetic closures; Fiskars pruner; APPLE IPod Touch and Nano; VAUDE Versametric Backpack

The workshop provided the companies with “enterprise training” in utilizing new tools and methods that they can apply for their design development, and thereby opening new avenues for integrating design for desirability in their product development.

The forth and final workshop is currently being planned and will be held during 2009. The workshop aims to broaden the companies understanding about design for experience by collaborating with cross-disciplinary fields that deal to a great extent with design for experience, such as the movie industry.

5 The Master of Design Projects

Following the initial interview and the first workshop, two Master of Design (MDes) projects were selected to provide an in-depth example of how “design for desirability” thinking can be applied to the product range for two of the companies. Both MDes projects utilized the PPE framework [1] to analyze the existing products of the respective companies and to direct their product development towards a desirable design outcome.

5.1 Master of Design Project (MDes): Desirable Electric Fencing

One of the MDes projects dealt with the development of a desirable electric fencing system for livestock focusing primarily on the lifestyle farmer market. The new fence concept had to be desirable to the customer from the point of purchase, through to its installation and operation. Research interviews with end-users, professional fencing contractors and observations of fence installations were translated into scenarios (see Figure 4). This research revealed that the new system had to be intuitive and physically less arduous to install, easy to operate and aesthetically matching within a lifestyle farm environment.
Subsequent to the research and design criteria generation, an iterative design development followed, which was done in close correspondence with company staff using several focus groups to discuss the performance and experience aspect related to the design. Including extensive idea exploration in the form of sketching and initial prototype testing to assure critical performance criteria, the design development was progressed in conjunctions with the company and the researchers of GIPI project. This lead to a final design solution (which cannot be disclosed here for confidentiality reasons) that was presented to the company’s global sales representatives at their annual meeting in New Zealand. Feedback from this meeting has been so positive that the company is pursuing to develop the presented product concept to market over the next years, leading to patent all viable design ideas and employing the master graduate for this process.

5.2 Master of Design Project (MDes): Future Police Radio Communication

The second MDes project focused on developing a future-forecasted concept for a police radio communication tool for the New Zealand police [27]. Using the PPE framework [1] to analyze current radio products, speculative scenario planning [28] to forecast the future requirements of police radios and end-user investigations (i.e. interviews, observations and concept evaluation with twelve NZpolice officers) the study provided a comprehensive research background to provide a realistic design concept. Based on the initial police interviews (in-office) and “ride-along” police work observations the master student [27] developed several possible future scenarios and identified future police radio requirements. These scenarios were then developed into four ‘product streams’ (see Figure 5). The intent of this method was to develop an understanding of the associative design requirements for the user: “what the product stands for” [1]. Each product in a stream was selected because of similarities in the product messages being communicated. Vehicles were chosen because they make it easy for people to identify themselves with, while the cell-phones were chosen due to similarity in design and functionality to radios.
The officers were asked to determine which of the vehicles and cell-phones they would choose to use for their job (product association exercise). Officers were then asked to highlight their positive and negative associations of each one in context to their job. Following this product association, the officers were shown a simplified physical model of the concept (to communicate the size, form, weight and texture) and a short video clip that explained the scenario-based concept in a similar way in order minimize subjective bias from the researcher.

The findings [27] showed clearly that the favorite concept was the “performance” driven multi-functional hand-held device. The police officers were very receptive to the weight, shape and form of the concept, as well as the touch-screen interface (despite some doubts of robustness). These findings and the results from the ride-along observations lead to performance and experience criteria to inform the development of the final design (see Figure 6). The final design was presented to the R&D and marketing team of the company and resulted in an overwhelmingly high interest in the project outcome, which is currently followed up by further discussion with the MDes graduate.
6 Discussion

The type of in-depth applied research, as demonstrated in the described Master projects, is often neglected during design and development in small- and medium-sized companies prevalent in New Zealand. This can be likely attributed to the demands in everyday projects, which are challenged by an increasing product complexity, multidisciplinary teamwork and time pressure [29-32]. Time for conducting such user-focused research to explore the notion of desirability for the product [26, 27] is often referred to as a “blue-sky” design project and difficult to conduct in smaller company environments due to time and cost constraints. However, these desirability-focused and in-depth user-focused design developments are highly important for the companies to create products that are desirable and increase their chance of success in the competitive international market. Academia instead has the ability to provide this advanced knowledge and capacity to conduct such projects in collaboration with industry in order to foster the companies’ potential to create innovative, inspirational and desirable products that have a greater chance of success in global markets.

As discussed by Warell et al. [11] the concept of desirability is multi-faceted and elusive in nature, which is also a reason why companies struggle to define and to achieve specific objectives with respect to desirability. The level of understanding desirability, as well as the ability to engage with designing for desirability, varies across the companies portrayed in this chapter. It is also important for stakeholders such as managers to realise that design for desirability is complex and interactive in nature and requires a holistic approach in order to be effective. It is important for industrial design to have an effective interaction with other disciplines involved in new product development to assure this holistic approach. From a management point-of-view, the development of desirability should be driven by strategic goals and be informed by a thorough understanding of target markets and end users.

7 Conclusion

The “Growth Innovation Pilot Initiative” described in this paper shows great potential as collaborative method to foster advanced thinking and implementation of design for desirability in small- and medium-sized companies, which often lack the knowledge and resources to advance this thinking and to conduct desirability-focused design development projects that require a holistic understanding of the users. The presented paper outlines a novel approach consisting of “knowledge sharing”, “enterprise training” and individualized research projects to foster collaboration between manufacturing industry, which is pressured by the need to succeed with their products on international markets, and academia, which has the knowledge and capabilities of supporting industry to advance their thinking and capabilities in design for desirability. As presented multiple avenues were pursued to assure a holistic knowledge transfer and enterprise training with regards to design for desirability, such as:

a. Initial analysis of the companies’ knowledge level regarding “design for desirability” thinking and mindsets
b. Identification of company specific projects
c. Collaborative workshops involving different manufacturing companies and academic researchers
d. Conduction of the specific design projects that foster and advance design for desirability thinking and approaches together with the companies

This paper describes how both the advancement of desirability through individual design projects, but also the training of the companies’ understanding of new approaches and methods to focus on the whole product experience in their product development processes, can be achieved in collaboration between academia and
industry. Initial outcomes indicate that newly developed knowledge and capabilities with regards to design thinking beyond functionality and usability could be established within the companies. Exemplarily, the individual projects (MDes projects) demonstrated the companies’ commitment to advance their thinking to foster product success in international markets by focussing on emotion, aspiration and experience in their product design processes, which represents a radically different approach compared to current practice. As this collaboration is still ongoing and the workshops and the first projects have just recently been completed, it would be too early to draw final conclusions about the hard-to-measure long-term consequences of this initiative for the companies (e.g. increased brand recognition; growing success in international markets; move to design-led product development and innovation processes, etc.). However, the appreciation of the companies for the opportunity to engage in this advanced design for desirability thinking, their commitment to develop the individual masters projects further and their desire for further collaboration with academia in the future, indicate that this innovation-initiative is likely to contribute to change and advancement in the companies’ design-driven thinking beyond functionality and usability with regards to the development of new products. The future will show to which extent the products that are currently in development, and hopefully have been influenced by this design-for-desirability collaboration, will actually be successful in the global market.

The authors would like to highlight that such large and multi-faceted collaborative projects are naturally complex. They do not only demand dedication and commitment of the researchers to keep the project sustained, but require also the resources of administration, time and funding, as well as an open-mindedness of all people involved in order to achieve the goal of advancing design understanding and capabilities to generate products that are desirable. However, the authors are hopeful that more of these collaboration innovation-initiatives will occur in the future, not only to support industry in future design thinking, but also to advance the design research by applied projects that are relevant to both industry and academia.

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9 References


