INTENT-DRIVEN APPROACH TO INNOVATIONS

NICKY GOH KWEE CHUAN

{B.A. (Industrial Design), Honours} NUS

A THESIS SUBMITTED

FOR THE DEGREE OF MASTER OF ARTS (INDUSTRIAL DESIGN)

DEPARTMENT OF ARCHITECTURE

SCHOOL OF DESIGN AND ENVIRONMENT

NATIONAL UNIVERSITY OF SINGAPORE

2007

Abstract

More than over thousands of new products are being created and developed every month by companies. This creation and development of new products requires companies to invest great amount of resources to drive and to innovate on the horizon of existing product roadmaps. However, many will ask questions such as "*What do we innovate? Who do we innovate for? How do we innovate?*" And very often, many will reply that the consumer must be the focus and must always be at the heart of innovation. This resulted in the Consumer-Driven Paradigm, whereby IDEO, one of the most renowned and recognized innovation consultancy, created and developed products that seemed to address consumers' needs thereby achieving great successes. Many companies followed, creating the era of Consumer-Driven approaches.

However, how far can companies perceive using Consumer-Driven approaches? Will they still be able to innovate and look beyond the horizon of their existing roadmaps based on insights gained from understanding users' needs and desires? Or will they be falling short of looking beyond the horizon, only addressing the immediate issues that consumers are highlighting? In truth, consumers can only articulate what they already know of. Anything beyond their current knowledge will be difficult for them to articulate and even more challenging for companies to translate the information into actionable innovations. More need to be said for them to innovate in accordance to the companies' visions and strategies.

This paper studies into a new emerging paradigm of Intent-Driven Approach, innovating with an intention in mind, for consumers and aligned to the companies' visions and strategies. The research methodology, innovation approaches and variety of tools used during the different phases of the new product development process will be highlighted. These tools are important in helping the company innovate with a clear direction and also

resource smart in planning and utilization. Case studies undertaken by a major MNC based in Singapore will also be explained and analyzed to further illustrate the approach and tools. The scope will include product creation at the front-end and also development and alignment to the company's visions. The paper concludes that every phase of the product creation and development requires different sets of tools but yet the existence of one role, the integration agent is vital throughout the entire process.

Acknowledgements

Thank

God for His *directions* to me,

Dr. Yen for his *guidance* for me,

Pierre for his *faith* in me,

and Juju for her *support* of me.

Table of Contents

List of Figures

List of Tables

1 Introduction

New product development (NPD) is usually used to describe the entire process or workflow of introducing new products or services to the market.[1] The process of NPD, which has previously been dominated and led by the business and engineering departments in companies, has seen design fast emerging to be a more active player. Before, business perspectives focused on the Market-Pull aspects of the process while engineering applications were the Technology-Push for market demands or new market sources[2]. The role of design, which has very much been underrated to a final cosmetic job dealing with product aesthetics and usability, is now becoming more relevant and assuming more responsibilities in this process for companies to develop their new products and services.

Many companies have shifted from a Technology-Push towards a Market-Pull aspect in a bid to increase sales by focusing on the consumers. For example, Philips Electronics, known more for its technology has adopted many Market-Pull strategies in recent years[3].

As the different departments within a company tussle to be the leader in driving innovations, the result is that the company's NPD process becomes more diversified and alignment to its strategies rises in difficulty. In order to align their innovations to their strategies and visions, there is a distinct need for the company to adopt an integrated approach to innovations. Therefore, the key objective of this paper is to identify and formulate this fast-evolving integrated approach that companies should adopt to drive their innovations. By understanding the general NPD process, the gaps that caused the diversity in

---

1 The PDMA Glossary for New Product Development <http://pdma.org/library/glossary.html>

2 Howells, J. (1997) Rethinking the market-technology relationship for innovation, *Research Policy*, 25(8),1209-1219

3 Kil, P. (23 Jan 2007) Informal discussion with author. Philips InnoHub.

the process can be identified and an integrated NPD process composed by reviewing the entire process and minimizing those gaps.

In retrospect, the NPD process can be derived from the Market-Pull aspect, with design playing a more influential role within the four stages.[4] This is illustrated in Figure 1-1.

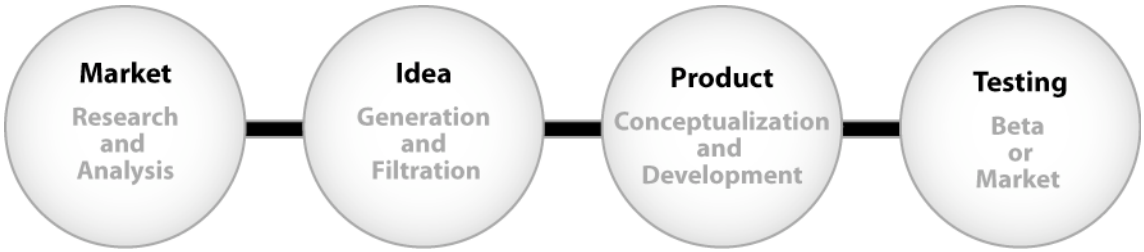


Figure 1-1 General process of NPD

1. Research and Analysis

Some companies define Research (in particular Market Research) and Analysis as part of their NPD as it is an activity that helps them to define their NPD parameters. Other companies have a dedicated research department to collect information from the ground and they are only seen as playing a support role to the development team in the NPD process. Depending on the scale of this activity, the expenses for Market Research or the research for new technology might be one of the costliest activities within the NPD. Because of the costs involved, many companies involved in the market research will want to make use of the opportunity to collect as much information as they can. However, one drawback to such a large-scale collection is that there will be a huge volume of information versus the minimal people who will have the application knowledge to use this information. This will create a lapse in the **Analysis** of the information when translating to the relevant persons in the company.

---

[4] Kil, P. *Op cit*

2. Idea Generation and Idea Filtration

There are a few major activities being carried out in most NPD processes: of which the most essential though not necessarily the most expensive activity is **Idea Generation**. Generally, Idea Generation is usually based on research findings. It is usually the front-end activity where the company generates ideas based on research findings prior to conceptualizing specific application solutions. Such sessions usually take a short amount of time compared to developing a new product and hence in comparison, such an activity is not an expensive activity. **Idea Filtration** comes after generation, whereby companies filter and select feasible ideas by evaluation based on their market findings and their visions and strategies. Depending on criteria defined by the companies, such activities should generally take slightly longer than the Idea Generation sessions. This stage is the most important stage of any NPD because it is the stage that defines the final outcome of the NPD.

3. Product Conceptualization and Development

The other major activity that happens within the NPD is the **Product Conceptualization and Development**. This is the stage that usually happens after the Idea Generation and Idea Filtration stage. After short sessions of workshops in generating ideas, the development team will proceed with the conceptualizing and development of these ideas. During this stage, ideas are collated and refined into feasible concepts that are more inline with the companies' objectives. Usually the business input will be coupled together with the concept. This helps to define the concept in a business context such as the target markets, products benefits and their value propositions. Concurrently, the engineers will commence their work into feasible technologies.

4. Beta or Market Testing

After the development stage, the conceptual products will usually be put through **Beta or Market Testing**. This is usually done in the context of real environments and the prototypes or demonstrators are being used and evaluated by consumer focus groups. At this point in time, the products are usually very close to market release and they should function as initially stated to function. The results of the tests are usually being used as the base for design refinement to finalize and tune-up the products. These feedbacks are sometimes not only used for refinements of a product, but also served as benchmarks, whereby the management team decides if they should even launch a product.

As the company shifts from a Technology-Push to a Market-Pull and presently a design-focused paradigm, the NPD process is fast segmenting into an array of possible diversified approaches to innovations. Not including the transitional gaps from step 1 to step 4, within each step are gaps that resulted in a diversified approach to the NPD process within a company. This study is to establish a new or adapted approach to innovation that is integrative to the company's strategies and minimizes the gaps within the diversified NPD process.

1.1 Aim and Objectives

There are two key objectives to the paper.

1. Structuring a new approach to NPD
2. Formulating simple tools to support the implementation of the new approach

There exist many approaches to NPD and different companies have adopted and adapted different approaches to suit their strategies. The **Consumer-Driven Approach**[5] (sometimes also known as Customer-Driven[6]) is probably one of the more popular approaches[7]. However over the years, many modifications to the Consumer-Driven Approach have made the NPD process a more tedious activity. Hence, one of the aims of this research is to identify a less tedious and more integrated approach to the NPD process, i.e. the **Intent-Driven Approach**.

Together with the many approaches, there are many tools that have been adapted by the companies. This study seeks to formulate simple tools that could be used by innovation drivers in this Intent-Driven Approach to drive innovations. The tools will be timeframe applicable in accordance to the stages of the NPD process.

The formulation of the tools was done by studying the existing approaches to NPD and identifying their underlying nature. A hypothesis was then built around the nature to structure a new approach corresponding to its application tools. The new approach is then applied to workshops and the strengths and weaknesses of the Intent-Driven will be reported at the end of the thesis. This will be further elaborated under the next section.

---

5 Anderson-Connell, LJ, et al. (2002) A consumer-driven model for mass customization in the apparel market, *Journal of Fashion Marketing and Management*, 6(3), 240-258

6 Terninko, J (1997) *Step-by-step QFD: customer-driven product design*. Boca Raton, Fla.: St. Lucie Press

7 Note that in this paper, *consumers* and *customers* are used in the same context.
The term '*customers*' is used in business research papers, while in design research papers, the terms used are '*consumers*' and '*users*'.

1.2 Methodology

There are two key segments in the course of this study. The first segment is to identify and address the detailed process of NPD. The objective of this first segment is to map out a generic framework of NPD that will aid in facilitating the studies into the second segment of the paper.

The first segment includes the research of the tools used in the NPD process, which will help in identifying the different phases and timeframe of the sub-processes within it. Subsequently, the relevant tools and approaches that will be beneficial in facilitating the sub-processes are drafted and formulated. This study was done via literature reviews and interviews with experts over a span of few years to understand how companies implement their processes. The list of the experts interviewed can be found in Appendix A.

After the background study, a hypothesis was drafted and practical enquiry was initiated by conducting workshops to identify the potential NPD tools. A total of four workshops were conducted over the span of a year for this initial research and drafting of the tools stage. The workshops included two from *Philips Domestic Appliances and Personal Care (DAP)*, one from *Nakamichi* and one from the graduating *National University of Singapore (NUS) Industrial Design* cohort. More detailed information of the workshops can be found in Appendix B. The mode of research and drafting of the tools can also be found within the same Appendix.

The results from the practical enquiry were then analyzed before first drafts of the tools were formulated. After formulating the tools, a more complete and concise intent of the paper was drafted for the second segment of the research. Part of this paper was also published in the 2006 IEEE International on Management of Innovation and Technology Conference held in Singapore and the paper can be found in Appendix C.

The second segment, being the core methodology and deliverable of this research paper was conducted via a more intensive **action-research** with the running of multiple workshops based on the initial draft of the tools in the first segment. From the results of the initial findings, the refined tools were mapped onto a timeframe and within the workshops, they were reconstructed and refined to fit into a generic framework of the NPD such that any user in any specific timeframe of the process is able to utilize and apply them.

Based on the hypothesis, the framework of each workshop was first being formulated with the stakeholders or participants. The objectives of the workshops were then determined prior to identifying the approach and tools that could be applied to achieve them. During the workshops, the approach and tools were refined to achieve a better flow of the workshops running and facilitation.

At the end of every workshop, the applied approach and tools were then evaluated and reconstructed such that they could be implemented onto workshops of different nature. This main approach and tools were then structured onto the NPD framework in their respective phases and timeframes. It has to be noted that the objective of this paper is not to redefine the process, workflow or tools for NPD but to structure a possible new approach and formulate tools that are applicable and complementary to existing approaches.

Five more workshops were conducted using the action-research and three are listed in this paper as case studies for the approach and tools. Of the other two workshops, one was conducted for the Philips Home Controls seeking to explore alternative features to add to their remote controls and another was conducted for a fashion apparels brand looking to redesign their flagship stores and due to its sensitivity, it will not be discussed in this paper.

The overview of the research methodology is summarized in the flow chart illustrated in Figure 1-2.

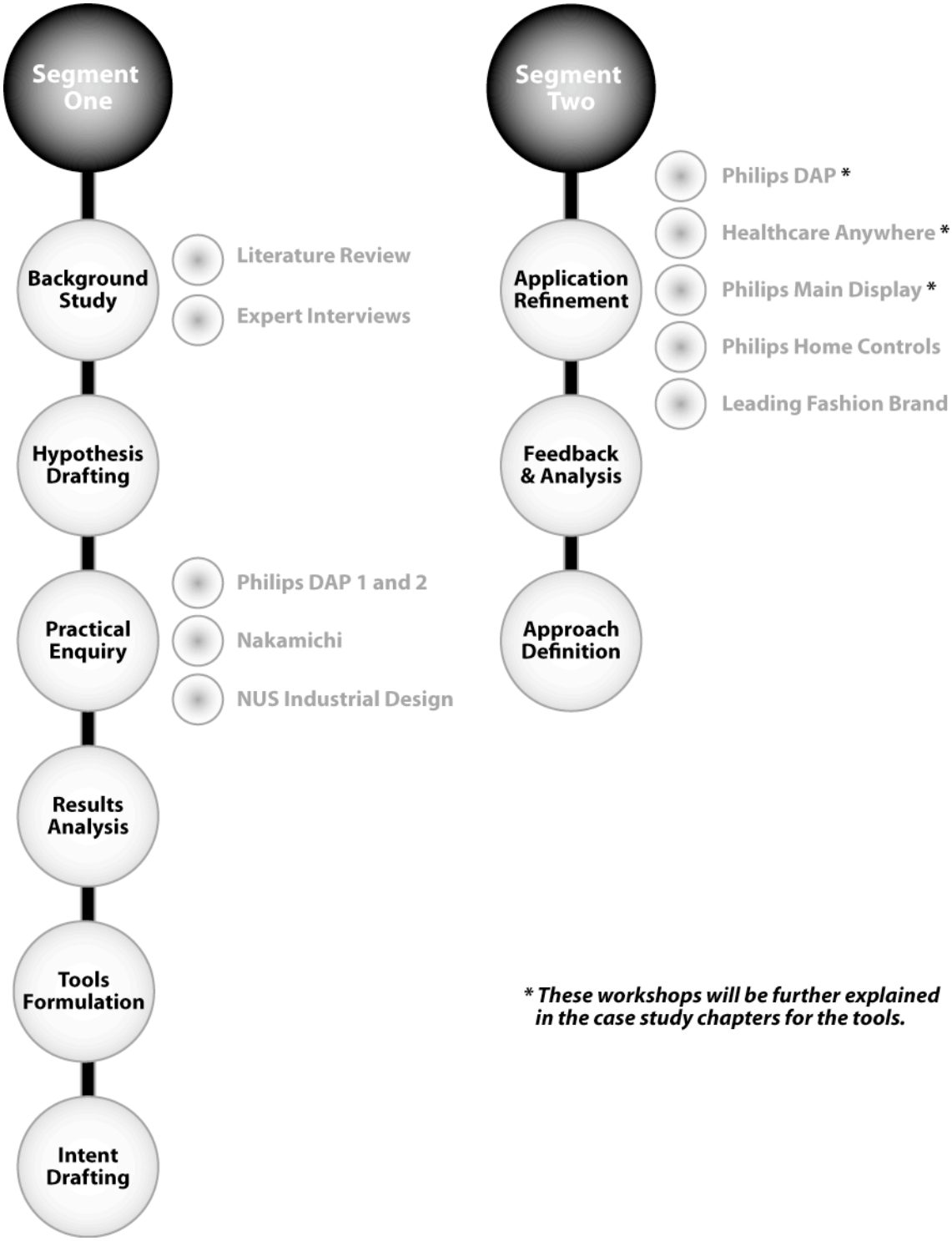


Figure 1-2 Methodology flowchart

1.3 Thesis Navigation

The flow of the paper is as explained below. Note that this flow does not represent the sequence of the research progress, but rather it is structured in the following manner to facilitate a clearer view and understanding of the Intent-Driven Approach to Innovations within the NPD process.

Chapter 1 Introduction

This covers the overview of the thesis. In this chapter, the aim, objectives and the methodology used for the thesis are explained.

Chapter 2 Overview of NPD Process

This chapter introduces the overview of the NPD process and the stakeholders involved in it. This chapter also explains the current Consumer-Driven Approach around the process and why there is a need for an integrated NPD process.

Chapter 3 Intent-Driven Approach to Innovations

An introduction to the Intent-Driven Approach, explaining the nature of the approach and how the tools used within this approach were formulated. The differences between the Consumer-Driven and the Intent-Driven approaches are also reflected in this chapter.

Chapter 4 The Tools and Their Flow

An overview of the tools in the respective phases of the Intent-Driven Approach is described in the chapter. The background and formulation of each tool is explained in detail in this chapter.

Chapter 5 Introducing the Integration Agent

The need for a key driver for the Intent-Driven Approach and his characteristics are explained in this chapter.

Chapter 6 Phase 1: Identification

The first phase of the Intent-Driven Approach is explained here in greater elaboration on the tools involved and their application guidelines.

Chapter 7 Phase 2: Exploration

The second phase of the Intent-Driven Approach is explained here in greater elaboration on the tools involved and their application guidelines.

Chapter 8 Case Study: Healthcare Anywhere

This case study looks into the application of the Intent-Driven tools in Phase 1 and 2 and the final outcome of the Healthcare Anywhere project.

Chapter 9 Case Study: DAP Innovation Support

The DAP Innovation Support research project is a refinement of the tools based on earlier similar workshops and this chapter explains the application and the outcome.

Chapter 10 Phase 3: Alignment

Phase 3 of the Intent-Driven Approach is explained here in greater elaboration on the tools involved and their application guidelines.

Chapter 11 Case Study: Flat Panel TV Differentiation

This case study explains the application of the Alignment tool in the context of a company and how the company can use the outcome to move forward.

Chapter 12 Discussions, Conclusion and Further Study

This is the evaluation chapter, reviewing the Intent-Driven Approach, the tools and feedback from industry.

2 Overview of NPD Process

The pressure to innovate is now greater than before. With increased competition due to globalization and new technologies such as CAD and rapid prototyping, the average life span of products is shrinking[8]. In a world whereby innovation companies are judged by their product life cycles and their turnover rates, companies can no longer afford to have a long product development time because customers can afford to be choosy and change their demands more frequently.

In general, the process of NPD can be driven from three directions. (A): a *business* perspective where only profits and losses matter; (B): a *technology* progression whereby the more advanced the applications, the greater the sales and (C) an execution of a good *design*, attracting buy-ins from consumers and hence creating a greater demand for the new products.

In recent years however, the above three drivers have been intertwined to an extent that it is almost impossible to identify who the key driver is. Each component is responsible for their respective roles within the NPD cycle. For simplicity reasons, the NPD process will be broken down and told from the respective viewpoints of the three most relevant parties, i.e. the marketer, engineer and designer.

It should be noted that the industry is not only segmented into the three specific roles as mentioned above. However, for illustration purposes, the activities will be explained under the scope of the three roles so as to provide a better understanding of the NPD process. This

---

[8] Baxter, M. (1995) *Product Design: A practical guide to systematic methods of new product development.* London: Chapman & Hall.

chapter will discuss the relationship between these drivers and their roles within the NPD process.

2.1 The Drivers and the Stakeholders

The constant need for new products requires human resources to spearhead the development. The question thus lies in where, or with whom the responsibility for driving new products within an organization falls upon. Increasingly, every department of the organization wants to be seen as the driver of their new developed products. As a result, most departments undertake a far wider scope of work, which ultimately lengthen the time span in developing a new product.

2.1.1 The Marketer

The Marketer is someone who is usually on the front-line of the product war with the organization's competitors. From generating sales volume to the devising of marketing strategies and right down to gathering market intelligence, the Marketer handles everything related to the business of the organization.

Apart from the marketing and sales of the organization's products and services, perhaps it can be said that the most important role that the Marketer plays is being the bridge to consumers. Gathering market intelligence and constantly trying to understand what consumers want, he or she usually relays the information back to the organization for further actions. In other words, the responsibility to communicate with consumers and identify their needs is the key role of the Marketer. The organization usually relies very heavily on him or her to portray an efficient and accurate image to the consumers. However, being too dependent on one role might create unforeseen problems. Translating the information

from the businessman into tangible approaches and solutions that the team can adopt might steer the company in many different directions.

Take a simple example of the "*picture quality*" as seen on a LCD TV. What the marketers gather from consumers as wanting "good picture quality" might be interpreted as "accurate portrayal of colors and super high definition" by the development team when what the consumer meant was merely "robust colors" on the TV. If a simple phrase could be misinterpreted in so many ways, imagine the possible extent of misinterpretation of a market survey conducted by the marketers for the engineers back in their research laboratories. These problems will be further exemplified later in the following chapters.

In summary, the marketer can be seen as the one who is providing the "**Outside-In**"[9] (or Market-Pull) part of the NPD process for the organization.

2.1.2 The Engineer

This is possibly one of the biggest roles within the product development cycle. Some may call him or her the innovator, the developer, the manufacturer, the troubleshooter or simply the engineer. He or she is in charge of the engineering of the new product and ensuring that it works well within the product specifications that have been defined by the management team.

"*To make things work*". This phrase can be used to sum up an Engineer's responsibilities. They are mainly recognized for their roles in fabrication of products and for many years, they have been seen as the link between the market research and the company's application

[9] Baden-Fuller, C. (1995) Strategic Innovation, Corporate Entrepreneurship and Matching Outside-in to Inside-out Approaches to Strategy Research, *British Journal of Management*, 6(S1), s3-s16

solutions[10]. Focused on the functional aspects of the products, it is their key role in ensuring that all the necessary functions within a product are able to work.

The engineer used to be one of the parties who dominate the driving seat in the NPD process, especially for those technology-driven companies[11]. Patent applications were one of the few dominating ways forward for companies whose strategies were focused on new technologies[12]. The engineer was, in this case the key driver.

However, insights from consumers have since started to overwhelm this technology-push movement[13]. It was not always useful in just creating technological innovations when consumers do not see a great difference in terms of their daily applications. For example, in the gaming consoles wars between Microsoft's Xbox360, Sony's Playstation 3 and Nintendo's Wii, both the Xbox360 and the Playstation 3 are much more technological advanced in terms of their components and features compared to the Wii. Yet, initial market analysis has found that more than half of the consumers prefer the Wii due to its innovative game play[14]. On the sales front, Wii has also outdone its competitors, being the fastest to be sold out among the three. Hence, at the current age of the technology plateau, technology-push may no longer be the way to go.

In a nutshell, the engineer can be placed in the role of providing the "**Inside-Out**"[15] (or innovation/Technology-Push) to the NPD process.

---

[10] Hong, P. et al. (2005) Role change of design engineers in product development, *Journal of Operations Management,* 24(1), Dec, 63-79

[11] von Zedtwitz, M and Gassmann, O. (2000) Market versus technology drive in R&D internationalization: four different patterns of managing research and development, *Research Policy*, 31(4), May, 569-588

[12] Kalanje, CM (n.d.). Role of intellectual property in innovation and new product development, *World Intellectual Property Organization (WIPO),* <http://www.wipo.int/sme/en/documents/ip_innovation_development.htm> (cited 18.05.07)

[13] von Zedtwitz, M and Gassmann, O. *Op cit*

[14] Who will win? You decide. <http://nexgenwars.com, http://www.msnbc.msn.com/id/18348840/> (cited 18.05.07)

[15] Whalen, PJ. (2007) Strategic and technology planning on a roadmapping foundation, *Research Technology Management.* May/Jun, 50(3), 40-52

2.1.3 The Designer

Over the years, a fact remains, and that is, "*good design sells*"[16]. Increasingly, the designer has taken on a more substantial role in NPD than before, even though he or she is still rather under-utilized. Industrial design is fast becoming a household term since Jonathan Ives came up with the pearly-shaped iMac that revitalized Apple back in 1998[17]. The friendly-looking computer took Japan by storm and gone were the days of plain beige-coloured computers. Since then, Apple has been known for their design niche.

When technological innovations come close to a standstill, design is probably the next best differentiator[18,19]. Many companies are jumping onto the industrial design bandwagon to incorporate design into their product offerings. A Google web search for MP3 players for example, displays results of many permutations in designs of players offering similar specifications. Many companies, albeit from adding the design element into their products, do not recognize the full potential and capabilities of the designers, limiting their role only to the product's aesthetic department.

The designer is being under-utilized not because he or she is incapable of more contribution. Rather it is due to the fact that many companies still have not acquired the knowledge of placing him or her in an appropriate position that contributes to the product outcome. However, companies are beginning to gain knowledge in designers' placement and they are starting to use designers to conceptualize and to visualize new products

---

16 Hoffman, A. (2003) Digging Deeper into "Good Business", *DMI eBulletin*. <http://www.dmi.org/dmi/html/publications/news/ebulletin/ebvoctah.htm> (cited 03.10.05).

17 iMac Selling Well To First Time Japanese Buyers Says Apple 02/18/99 <http://findarticles.com/p/articles/mi_m0NEW/is_1999_Feb_18/ai_53910968>

18 Manjoo, F. (2002) *IMac: What's in a Design, Anyway?* <http://www.wired.com/science/discoveries/news/2002/01/49652> (cited 20.12.04)

19 Page, AL (1999) Lasting Impressions of Twenty-One Outstanding Corporate Innovators, *Vision,* Apr. <http://www.pdma.org/visions/apr99/lasting.html> (cited 05.11.06)

applications. The designer's key role is increasingly handling the surface "**Alignment**"[20] of the NPD process, which is communicating ideas and visualizing them to their companies and respective clients.

2.2 An Integrated Approach

In general, at any point in time, either the marketer, engineer or the designer has opportunities to innovate and create new products. With them playing their respective roles in the context of the NPD process, there seems to be no key driver behind this entire process. Not surprisingly, the starting point of a NPD is usually the needs of consumers[21]. At the end of the day, the consumer is the buyer of the product and the sales volume is usually the key objective of any profit-earning company. By addressing the needs of the consumer, there is a relatively higher chance of acceptance and hence more stable sales volume that will translate into revenue. This is very evident in the Consumer-Driven Approach to innovations that will be covered in the next chapter. The potentials and gaps will be addressed in Chapter 3, in comparison with the Intent-Driven Approach.

---

[20] Siemens. (n.d.) Design strategies for new product development. <www.ugs.com/initiatives/docs/br_design_strategies_npd.pdf> (cited 30.03.07)

[21] Berton, PR, et al. (2007) When customers get clever: Managerial approaches to dealing with creative consumers, *Business Horizons,* 50(1), Jan-Feb, 39-47.

2.2.1 The Integrated NPD Process

Externally, the key driver is the consumer, yet this is not sufficient as there is a need for an internal key driver too. Someone within the company must be the integral project manager for NPD.

The marketer innovates by bridging the consumer to the product development in the eyes of the consumer. The engineer innovates by inventing new technical solutions to resolve potential problems. The designer innovates by dreaming a vision and a trend beyond the horizon. All the three roles have the capability to innovate for the company in the NPD. However, this way of innovating can result in diverse solutions and is too ad-hoc and short term in perspective of the company's strategies forward.

There is a need to align these innovations to the company's direction forward. Hence, it is ideally sound to extract the innovating capabilities of the three roles and integrate them into an integrated NPD. As running such an integrated process requires a dedicated resource, an individual or a team will be most ideal to facilitate such an integrated NPD movement. Such a task force will be known as the Integration Agent.

As explained, each of the three key roles has capabilities to innovate under the NPD. However, each role has their respective winning edge and shortcoming.

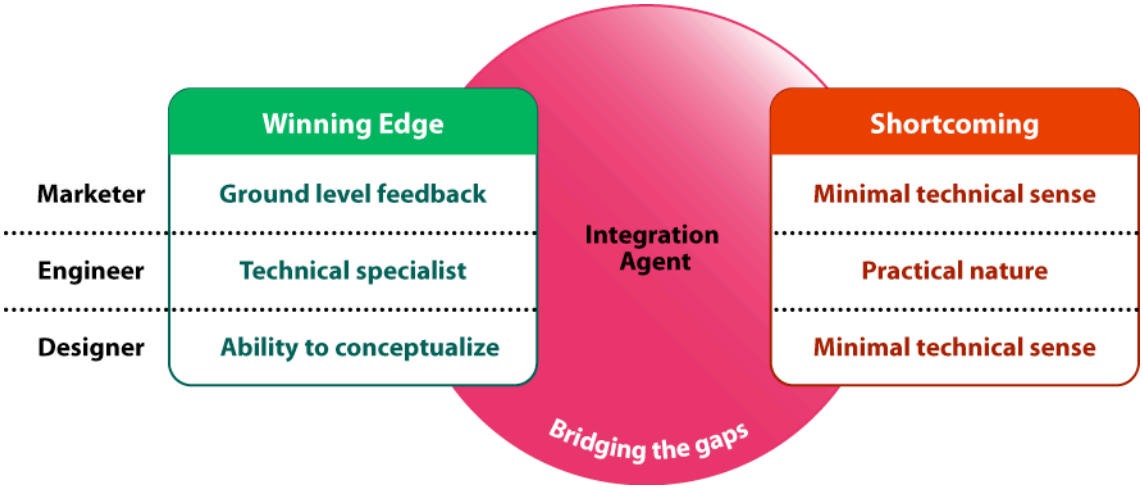


Table 2-1 Advantages and disadvantages of each driver

The most ideal way to resolve the shortcomings and boost the cutting edges will be hence to have an integrated NPD, driven by the Integration Agent whereby each role complements one another.

The process of NPD can be integrated into a flowchart comprising of three key phases involving the three roles mentioned earlier (see Figure 2-1). Many sub-activities residing beneath these three phases are industry-specific and different companies adopt variations of these sub-activities. For research and explanation purposes, only the main phases are expounded.

The first phase is the "**Outside-In**" part of it, with the marketer providing the market research and findings to the company. The second phase, being the utilization of the market information, will be the "**Inside-Out**", with the engineer commencing the exploration role in developing the product concept into a functional prototype. In reality, the "Inside-Out" phase may not necessarily be the sequential outcome of the first phase, as companies might develop a new technology and may be looking for a new market for it. Hence, the "Inside-Out" might supercede the "Outside-In" for such occurrence. The final phase and sometimes,

concurrent phase with the previous two phases will be the "**Alignment**" portion, whereby the designers are tasked with communicating their product concept to the consumers, engineers and marketers in addressing their perceived consumer needs. Figure 2-1 illustrates the integrated NPD process.

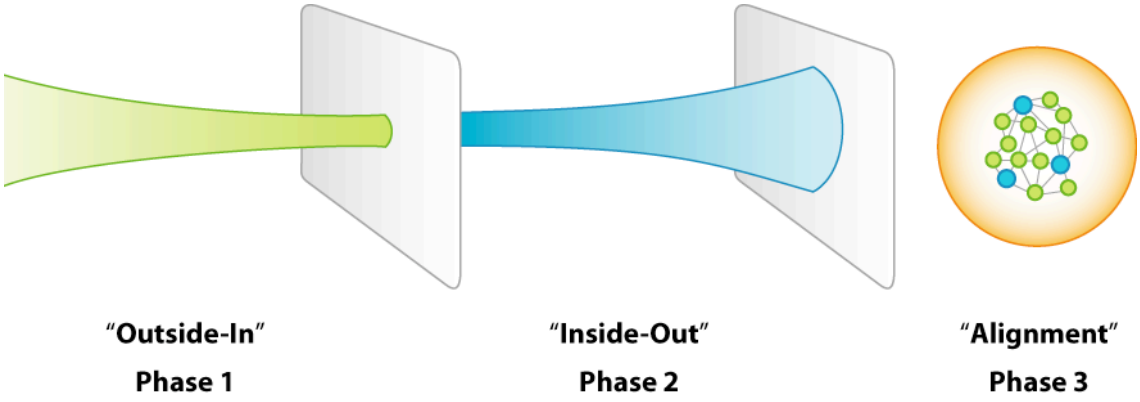


Figure 2-1 A simplified NPD process

The nature of the "Outside-In" phase being the market research and analysis can be broadly termed as **Research**. The "Inside-Out" phase being the task of the engineers taking on the technological explorations has an **Exploration** nature. Lastly, the final phase is the one where the product design has to be translated to the consumers; therefore the nature of that phase is **Communication**. As explained earlier, in this simplified process, both the "Outside-In" and "Inside-Out" phases can be the first phase depending on the nature of the development in the company. For the ease of explanation in this paper, the "Outside-In" phase is being positioned as the first phase.

The key characteristic of such a NPD process is that it is dominated by a Consumer-Driven trait. A summary of the phases in their nature of activities is listed in Table 2-2 below.

	Consumer-Driven	Nature of Phase	Proposed New Approach
Phase 1	Outside-In	Research	
Phase 2	Inside-Out	Exploration	
Phase 3	Alignment	Communication	

Table 2-2 Nature of Consumer-Driven Approach

In the following section, the characteristics of the Consumer-Driven Approach to innovation will be discussed and the existing problems pertaining to it will be identified. It will then be compared to the Intent-Driven Approach; a new paradigm to innovations with reference to this paper and subsequently, the tools within the Intent-Driven Approach will be explained.

2.3 The Need for an Intent-Driven Approach

There is no perfect approach to innovations. The Consumer-Driven Approach is just one of the many approaches that has been widely applied to innovate[22]. However, it may not be the best approach forward as it is lacking in certain aspects in making the NPD process more integrated. The approach in itself exists many gaps; an example would be consumers are unable to articulate what they want and translating this information to the development team will cause the NPD process to be less integrated.

As mentioned, this paper looks into another approach, the Intent-Driven Approach. With relevant case studies as illustrations in Chapters 8, 9 and 11to compare with the Consumer-Driven Approach, the remaining sections of this chapter will serve to explain the gaps of the

[22] Billington, J. (1998) Customer-Driven Innovation, *Harvard Management Update*, Jul, 7-9

Consumer-Driven Approach and the next chapter will show how the Intent-Driven Approach is able to fill those gaps.

2.3.1 Progressing from the Consumer-Driven paradigm

Many will be wondering what the Intent-Driven Approach to Innovations is because the Consumer-Driven Approach is all too familiar. The Consumer-Driven Approach is one where consumers are the center focus and companies seek to understand what they want and address their needs[23].

Many companies have been preaching and practicing Consumer-Driven innovations for years[24]. By putting themselves into the shoes of the consumers, understanding their concerns and thinking empathically, companies are usually able to derive innovative solutions addressing those concerns. However, this might not be the most appropriate approach forward in addressing what consumers are looking for. As consumers will never have prior experience if they have not seen the product, it is almost impossible for them to articulate what exactly they are looking for. If the consumers are not able to articulate their wants, companies will never be able to replicate appropriate solutions for them. This will therefore result in a vicious cycle of oblivion where companies keep developing unfocused solutions just because consumers are not able to articulate exactly what do they want. This can be illustrated in the following example of Dyson, one of the market leaders in innovations within the vacuum cleaner industry.

It is said that James Dyson, founder of the Dyson brand of powerful vacuum cleaners, took consumer feedback with a pinch of salt. Prior to him launching the first version of his vacuum cleaners with the transparent polycarbonate air cylinders, it was understood that he did a

---

[23] Lojacono, C and Zaccai, G. (2004) The Evolution of the Design-Inspired Enterprise, *MIT Sloan Management Review,* Spring, 45(3), 75-79

[24] Moschella, D. (2003) *Customer Driven IT*: How Users Are Shaping Technology Industry Growth. Boston: Harvard Business School Press

consumer research to evaluate if consumers like the "see-through" effect of the cylinder that demonstrates the rotating cylinder within. However, findings showed that consumers do not like to see the collected dirt, as it is probably too gross and disgusting for them. Based on his personal beliefs and judgment, James decided to ignore the results and proceeded with the transparent finishing for his cylinders and a post-market feedback suggested that consumers find the act of vacuuming very gratifying as they are able to see the amount of dirt and dust they actually managed to clean out from their homes.[25]

Another situation that may arise from putting unacquainted consumers in the driving seat is the contradiction where companies will be faced with too many channels of consumer feedback in contrast to one focused direction. With numerous feedbacks, instead of one strong consumer voice, the NPD process based on a Consumer-Driven Approach might look something like Figure 2-2.

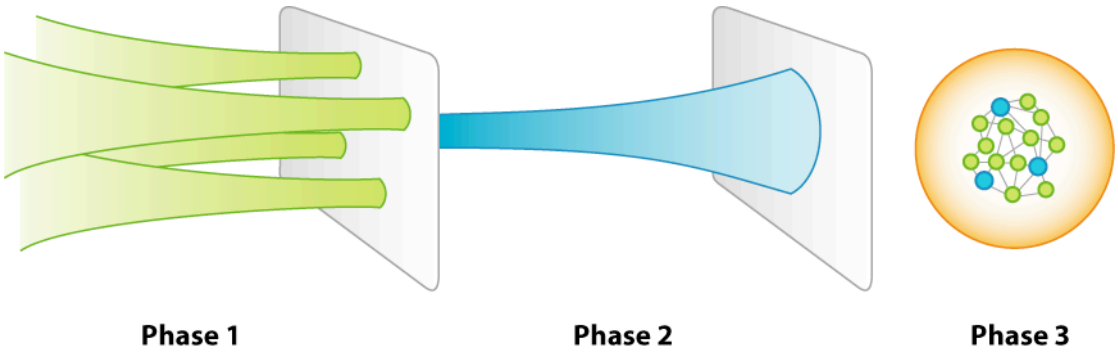


Figure 2-2 Many channels of consumer feedback in Phase 1

The Consumer-Driven paradigm has greatly affected and changed the way in which companies operate. Yet, not much is known beyond this paradigm. If James Dyson had decided to follow market findings, he would probably not have created the self-gratifying powerful suction cylinders for the industry. That brings back the issue and reliance of the

[25] Dyson History, Engineering & Design Process (Dyson Design Lecture and Workshop), NUS, 01/03/2007 <http://www.arch.nus.edu.sg/guest-lectures/vod/2007/dyson.html>

Consumer-Driven paradigm. Despite all the talk and buzz about this approach, the Consumer-Driven Approach may have long been outdated and it is time for an alternative approach.

2.3.2 Chasm of the Consumer-Driven Approach

As the name suggests, consumers are at the heart of this innovation approach. Firstly, the approach begins with the marketers who will identify the market segment and then define a product or service that addresses this segment[26]. Ideation, conceptualization and development are all centered on this consumer segment and role-playing of consumers in this segment is conducted so as to better "see and hear" what these consumers want. They listen to their best customers and usually consumers that fall within this perceived category are the ones with the final say. In the extreme end of the Consumer-Driven Approach, the consumer's feedback is the ultimatum and is not to be questioned. His or her wishes will be the command for the development of the innovations.

Secondly, the starting point of this approach begins with the consumer. In conducting consumer research, companies may carry out role-playing (*Learn*), observe consumers' lifestyles and habits (*Look*), conduct focus groups discussions (*Ask*) and test the product itself (*Try*).[27]

Thirdly and possibly the most important, is that this approach to innovation is usually converging in nature when the development is mapped onto a time axis. As there is a high tendency for companies to focus on addressing the needs and wants of the consumers and by doing so product development is usually converging instead of taking on an exploratory

---

[26] Christensen, C. M. and Raynor, M. E. (2003) *The Innovator's Solution*. United States of America: Harvard Business School Press

[27] IDEO Method Cards <http://www.ideo.com/methodcards/MethodDeck/index.html> (cited 06.06.07)

trajectory, resulting in an overlook of the greater meaning behind the consumer wants. As a result, companies are too focused on addressing and innovating for their best customers and along the way, they get blindsided by new disruptive innovations. A gap between the perceived and real consumer needs therefore exists.

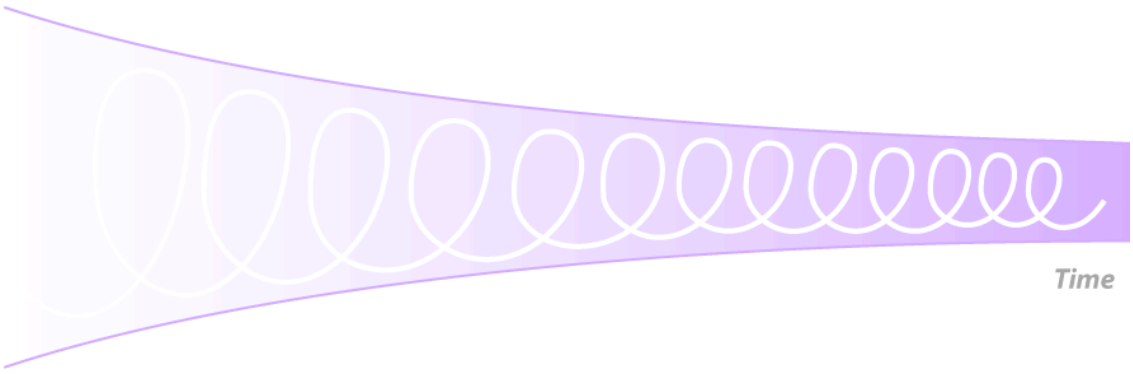


Figure 2-3 Converging product development

One obvious gap in taking on a Consumer-Driven Approach is that it may not be the most appropriate solution as can be seen earlier in the Dyson example. The resources pumped into developing a perceived solution might be too weighted and misguided due to the convergent nature of the approach. Usually, one wrong direction will lead to subsequent mistakes following that direction. It will then be too late and resource-intensive to make any changes in the future.

Finally, such an approach usually begins from the consumer market segment that is provided by the marketers in the company. Market segments are important in their own nature, but how true these segments are to the ever-changing market is becoming a question. The ability of product managers to interpret these segments that correspond to making a consumer purchase their products or services is being challenged. The distinction has to be

made, between catering for a real need, which consumers are looking for and aiming to sell their products to "phantom targets".[28]

The Intent-Driven Approach to Innovations is proposed in place of the Consumer-Driven Approach. To find out the core differences between a Consumer-Driven and an Intent-Driven Approach, the key characteristics of both approaches will be looked into.

[28] Christensen, C.M. and Raynor, M.E. *Op cit*

3 Intent-Driven Approach to Innovations

Theodore Levitt, a legendary Harvard Business School marketing professor once said, *"People don't want to buy a quarter-inch drill. They want a quarter-inch hole!"*[29] Whether the intention is to address the issue of creating a quarter-inch hole or to address the market segment that those consumers fall under, the real intent is unclear. In light of the gaps mentioned, the following will explain how the Intent-Driven Approach would be a better solution compared to the Consumer-Driven Approach.

3.1 Introduction to the Intent-Driven Approach

Briefly speaking, the Intent-Driven Approach is actually innovating with an intention to address the underlying purpose as to why a consumer would acquire a product or service, which aligns to the company's strategies. Incidentally, the other purpose of implementing the Intent-Driven Approach is to minimize resources needed in the upfront of the entire product development process but yet maximizing impact in the business. In contrast, the Consumer-Driven Approach usually initiates from defining a target market segment and conceptualizing a new product or service around this target market.

The Intent-Driven Approach is not to change the paradigm of the current Consumer-Driven Approach but to highlight an alternative approach to innovations. It is an approach that can be implemented within any timeframe of the NPD process and the key characteristic of this approach is this implementation flexibility as compared to the Consumer-Driven Approach, which may need to be processed in a linear manner.

---

[29] Christensen, C.M, Cook, S and Hall, T. (2006) What Customers Want from Your Products, HBS Working Knowledge. <http://hbswk.hbs.edu/item/5170.html> (cited 20.04.06)

It is a methodological approach based on the same three key phases of the NPD cycle that was addressed earlier; "**Outside-In**" (**Research**), "**Inside-Out**" (**Exploration**) and "**Alignment**" (**Communication**). Adopting the nature of the development cycle that was identified in Chapter 2, the Intent-Driven Approach can be summarized in Table 3-1.

	Consumer-Driven	Nature of Phase	Intent-Driven
Phase 1	Outside-In	Research	Identification
Phase 2	Inside-Out	Exploration	Exploration
Phase 3	Alignment	Communication	Alignment

Table 3-1 Similarities between the two approaches

The Intent-Driven Approach seeks to innovate by addressing the underlying purpose of what consumers want to derive from the products regardless of who or which market segment these consumers are in. Its defining element is actually the intended value-add that it can create for both the company and the consumers. It bears certain resemblance to the Consumer-Driven Approach, as it is a fusion of some tools within the Consumer-Driven Approach and creative problems solving tools. The tools are then mapped onto the generic NPD process to derive the Intent-Driven Approach to Innovations. Even though it is a fusion of tools, it must be made obvious that the Intent-Driven Approach is fundamentally different from the Consumer-Driven Approach. The starting point of the Intent-Driven Approach is purely focused on addressing intentions of a new product creation rather than focused on trying to find out what consumers want in the Consumer-Driven Approach. The flexibility of this approach is derived from the fact that the tools are independent of one another and can be utilized at any point in the NPD process. The fundamentals differences can be derived and explained by studying the three phases of the NPD framework.

3.1.1 Research

The first phase of the NPD framework being the "**Outside-In**", explores into constructing what consumers want. When consumers purchase a product or service, they usually purchase it due to a perceived need, which they interpret that the particular product or service is able to help them in getting their tasks completed. This perceived need within them creates a demand within the market that results in a Market-Pull demand. For example, a businessman who travels for long hours might be seeking for a product that is able to kill his boredom during such trips. There are many products for him to choose from such as books, MP3 players, gaming devices and portable players. With that in mind, he might decide to purchase the Sony Portable Playstation (PSP) as he perceives that the PSP will be able to keep him company during long travelling trips alone. He will be able to enjoy the gaming, music and video viewing features that the PSP offers and thus a perception that the PSP is able to provide a solution to his needs is formed. This example is to illustrate that the concept of perceived needs through Market-Pull, where due to a perceived need translates into a consumer demand, which ultimately results in Market-Pull. It has to be highlighted here that perceived needs need not be initiated from the consumers but companies are also able to create strong perceived needs for consumers. This is evident in many marketing strategies.

Perceived need → Consumer demand → Market-Pull

3.1.2 Exploration

After the purchase of a product, consumers will usually have their personal expectations on how should a product perform. Those expectations form a set of values that the consumers use to measure the performance quality. In turn, companies can use this set of values to derive the features, which they can offer to the consumers. Be it benchmarks or new additional features, the set of values often determine the "**Inside-Out**" phase of the company.

The issue with these values is that there exists many different kinds of values and the consumers do not usually articulate all of them. The values could be as simple and technical as *screen resolution* or it could be something intangible like a feeling of *satisfaction feeling* derived from using the product. Consequent to the previous example, it has to be made clear whether the businessman is looking an all-in-one portable device that allows gaming, music and videos or is he looking for a specific device for each function. This makes it really difficult for companies to capture and let alone understand these values. However these desired companies usually define outcomes and expectations of the consumers when they decide to invest resources to explore and develop solutions that they think can cater to the expectations. In this context, it is very much an "Inside-Out" developmental activity for companies.

NPD activities span over a long duration. From the time a product is defined, conceptualized and developed, feedbacks from different stakeholders help shape the final outcome. It is necessary and crucial that the original intent of the product and its values are defined clearly for the team. This is to ensure everyone is synchronized and moving in the same direction without losing focus and drifting off tangent into another direction.

3.1.3 Communication

In the "**Alignment**" phase, the company usually has a rough direction of the set of values that they would like to provide for the consumers. After identifying this set of values of the product solution for the consumer and knowing which direction to focus on, the main activities within this phase of NPD are the aligning and executing of value-add to those values. Within the context of a company, there are many different stakeholders such as design, marketing, research and development involved. Thus, there will be many avenues to create value-add to the product. Due to this diversity, it will be difficult to regulate everyone to a common understanding and to pursue a similar direction. Many questions will come about during this phase and some of the key questions are:

- How does the company decide the focus or where to invest their limited resources?
- How can the company break down this set of consumer-perceived values into smaller projects for the different stakeholders in order to achieve their original intent?
- How will the company then be able to develop actionable plans for each functional unit?

There are a lot of alignment activities that occur in this phase and without a proper alignment strategy or tool, many companies struggle to move their products in a common vision.

In the front line, the business unit has to decide on launch strategies, the logistics, the brand positioning etc. On the back end, the development team works on the product itself, ensuring that it functions well and is able to add the necessary values to the consumers. Both the business unit and the development team have to align and synchronize their "Intents" of

the products in order to deliver a convincing product that the consumers will perceive to help them to get their work done and be able to derive more value out of their existing solution.

The learning experiences and post-market analysis of the previous products serve as strong inputs for the development of the next generation of products. The post-market analysis is important in helping to refine the details for execution. These information needs to be conveyed back to the different functions of the company. From the development team to the marketing team and the research team, everyone must be able to run with the information and analyze it to work out their own actionable plans. These plans are based usually on one key factor, which is to be able to create, refine and add value to the consumers. This value creation phase falls under the **Alignment Phase** of NPD.

The alignment activities here are the crucial links to complete the NPD cycle. These links forming the cycle will be further explained in the later part of the chapter under the details of the phase. The entire Intent-Driven Approach can be illustrated as shown in Figure 3-1, which shows the three key phases and their cycle.

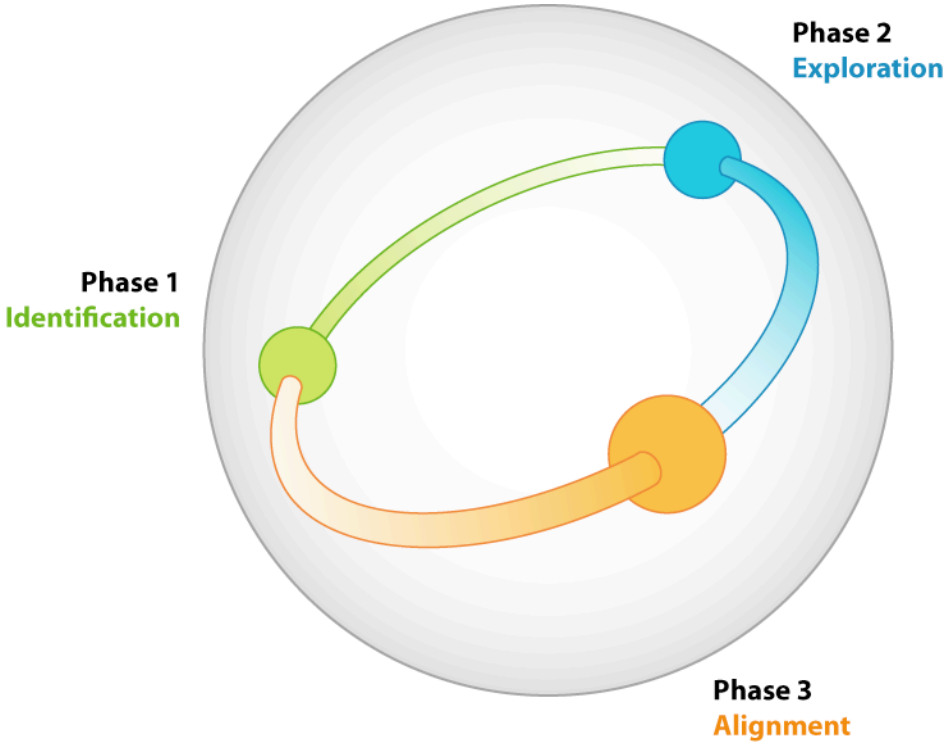


Figure 3-1 Intent-Driven Approach to Innovations

3.2 Creating Value-add as the Differentiator

In the "**Outside-In**" phase, the significant information is not to understand who is the consumer and what he or she wants, but more of understanding the value-add of how the product can help solve his or her issue. In the "**Inside-Out**" phase, the significance is not in knowing what the company can produce for the consumer, but in actual fact, it is to identify the values or benchmarks that consumers use to judge the value-add of their products. In the "**Alignment**" phase, the functions in the company are focused on creating value-add for their consumers.

If the focus is on the value-add of the product, this will mean that the development of the product solution is time-independent as value-add can be created at any point along the three phases. The Intent-Driven Approach, with a value-add focus to new products creation and development can occur anywhere along the three phases. The flexibility of this approach is exemplified, as it is independent of time.

Referring to the Consumer-Driven Approach in which the NPD process is a linear and time-based event, the Intent-Driven Approach is different as its focus is on creating value-add, as it is time independent. This creation of value-add thus becomes the key differentiator for the two approaches.

This Intent-Driven Approach allows companies to stay more relevant and focused. There is no direct innovation route, based however on the above fundamentals, moving away from Consumer-Driven Approach, the next paradigm will be the Intent-Driven Approach.

3.3 Constructing the Tools

There are many tools used within the Intent-Driven Approach. Of the tools, some are newly developed and formulated based on the different workshops whereas some are tools in practice, used wholly or modified to fit in the Intent-Driven context.

As a general background, each of the tools was identified during the first segment of the action-research studies. The application context and situation of the workshop was identified together with the tools and they were then mapped onto a timeframe application prior to refinement. Since this was only an initial draft of the tools, each tool had to be modified in accordance to the second series of workshops during the second segment studies. During the application, each tool was tweaked progressively to find an ideal fit to suit the workshop objectives. After the progressive refinement at the end of each workshop, the tool was then redefined in a context of a generic application model. This generic application of the tool was then defined as the final tool in the paper.

The tools will be explained in the following template:

- Phase of the Intent-Driven Approach that the tool will be used in
- Name of the tool
- Objectives of the tool
- Characteristics and Advantages
- Building Blocks that form the basis in executing the tool
- Execution Steps
- Guidelines for formulating and tweaking the tool in a generic context
- End deliverables

3.4 Overview of Intent-Driving Tools

Different tools are used in the different phases of the Intent-Driven Approach. These tools were developed and refined based on different workshops and projects. Table 3-2 illustrates the objectives of each phase within the Intent-Driven Approach and the list of tools that would be useful for each phase. This list of tools is not exhaustive and it has to be noted that the crux of the matter is the nature and the objectives in which why the tools were used during each phase of the methodology. This is just a summary and details of each phase, their tools and the necessary building blocks will be elaborated in their respective chapters.

	Identification	Exploration	Alignment
Objectives	"Setting the stage"	"Ideating + Collating"	"Stitching expectations"
Tools	Purpose Hierarchy Tool Road-Map Tool	Focal Ideation Tool Affinity Diagrams	Strata Four Tool
Building Blocks	Initial Intent Principal Intent Paramenter Handles Timeframe	Prinicpal Intent [How] Questions Paramenter Handles Road-Map	Principal Intent Themes Paramenter Handles Layers of Relationship

Table 3-2 Overview of the objectives of the phases and tools used

The tools for the first two phases, **Identification** and **Exploration** were developed based on a generic workshop approach to idea generation. Different scales of idea generation workshops were conducted and the generic approach was identified. The tools were then developed and refined action-research based on the objectives of each phase of the generic workshop approach before finalizing on the details of each tool. As for the final tool of the **Alignment** phase, it was developed based on project deliverables for clients. The refinement of the tool was based on clients' expectations and feedback (case study). For a list of the workshops that were being conducted using this generic approach, refer to Appendix B – Workshops on Design Application Tools.

3.4.1 Generic Approach to Idea Generation

Although Idea Generation workshops can be of different nature, they are usually being conducted in four to five generic steps. These steps have being identified as a systematic approach to first "**Setting the stage**" (the dotted zone in Figure 3-2) for participants and then to "Cultivating and Developing" the ideas into strong concepts. Bearing reference to the first two phases of the Intent-Driven Approach, notice the similarities in nature for "Setting the stage" to the **Identification Phase** in the dotted zone and "Cultivating and Developing" to **Exploration Phase**.

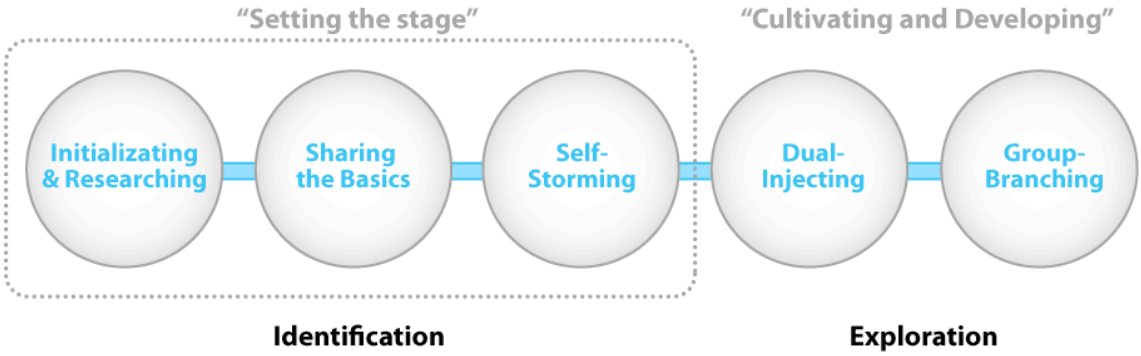


Figure 3-2 Steps of generic Idea Generation

Initializing and Researching

Initializing the participants is the step used to set the stage to all participants involved. The background understanding and the objectives of the workshop are being explained here. Along with that, the backgrounds and specializations of the participants are also being shared. The initial obvious problems are also being identified at this step so that everyone will share a common understanding. After initialization is research, whereby the participants are tasked into their own areas to conduct their own in-depth research.

Sharing the Basics

The second step so termed as "Sharing the Basics", is for participants to bring back and share their research to build a greater pool of information. This step will also involve a review of

the workshop objectives and the problems identified initially. The list of problems will definitely be changed during this step as more problems are added and some could even be cancelled out as they might not be the real problems but are actually only symptoms of the problems.

Self-Storming

With the list of problems and the workshop objectives reviewed, participants work out the possible solutions for the workshop individually. The key intention for this step is for participants to immerse into the subject by thinking of the solutions themselves first. This step also facilitates the build up of a large pool of possible solutions.

Dual-Injecting

This step is optional for the workshop depending on time availability. It allows each participant to share his initial thoughts and ideas derived from "Self-Storming" with another participant. The other participant is preferably from another field, so as to provide a radically different perspective. In this step, the two participants will share and develop their ideas further.

Group-Branching

Similar to the earlier step, the intention of "Group-Branching" is to build a firm foundation under the ideas derived in the earlier steps. Participants will again share their ideas, but this time develop their ideas into more structurally sound concepts. This is achieved usually by grouping ideas of similar intentions together and identifying similar underlying themes. Once these themes are established, the group will branch out to develop the themes into feasible outcomes that satisfy to the workshop objectives.

3.5 Differences between the Intent-Driven and Consumer-Driven Approach

Even though the tools of the Intent-Driven Approach share a common basis as with the Consumer-Driven Approach to innovations, there are distinct advantages and disadvantages between the two approaches.

As Theodore Levitt mentioned in the beginning of the chapter that people want a quarter-inch hole rather when they buy a drill. The basis of the Intent-Driven Approach rests on the end task that the consumer wishes to achieve. This can be aligned easily to the companies' strategies if their competencies are identified.

In comparison, for a Consumer-Driven Approach, the basis rests on the targeted imaginary persona created by the marketing branch. This specification and approach is not wrong but there will be a need for greater activities to align to the companies' strategies.

Since the key objective is to have an integrated NPD for companies to adopt, the Intent-Driven approach portrays greater potential for structured alignment activities to take place within the companies.

In summary, the advantages and disadvantages between an Intent-Driven and Consumer-Driven Approach can be illustrated in Table 3-3.

	Advantages	Disadvantages
Intent-Driven	More integrative approach for companies to adopt Aligns everyone in the team to the same basis for NPD Greater alignment possibilities to the company strategies More front-end innovation activities for the company Tools can be utilized at any point of the NPD Houses the potential for a company to branch beyond its current portfolio of offerings	Might have a possibility of being too company-focused and less consumer-focused resulting in the company falling back into a loop of being "technology-push" rather than "market-pull" Developmental and refinement activities are still necessary after defining the perceived tasks for consumers Defined tasks might not be agreeable with everyone in the company
Consumer-Driven	More consumer-focused activities for the company to position itself in being "market-pull" rather than "technology-push" (brand equity) Allows a good level of refinement acitivites for the company's product offerings (depth in the product development) Approach is easier for the development team to identify with as it is a mature approach (since IDEO with their "Deep Dive" activities)	Less integrative nature for NPD Mainly affecting developmental activities of the NPD rather than defining and creating new innovations Activities might be too focused for a department in the company to adopt Specific tools can only be used by specific groups in the company Defined personas might not be agreeable with everyone in the company

Table 3-3 Summary of advantages and disadvantages of the two approaches

4 The Tools and Their Flow

In this chapter, an example in the healthcare industry will be used to explain the Intent-Driven Approach and the three key tools within each phase. These tools will be further elaborated with specific case studies in subsequent chapters. Figure 4-1 shows an overview of the different tools and the methodology of the Intent-Driven Approach to Innovations.

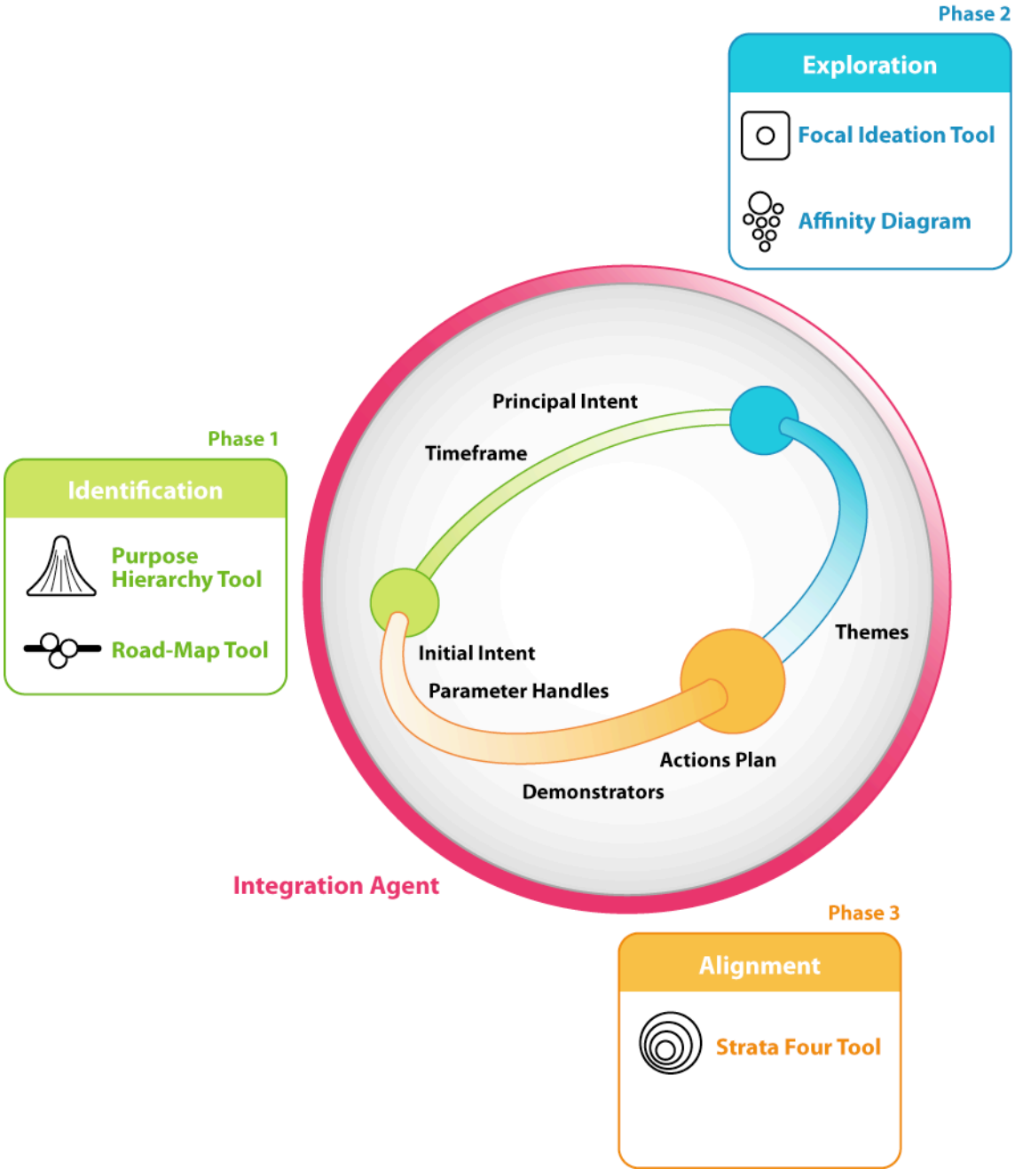


Figure 4-1 Overview of the Intent-Driven Approach

4.1 Phase 1 of the Intent-Driven Approach: Identification

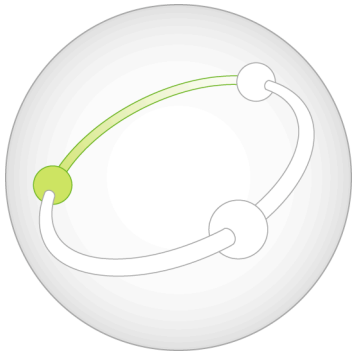


Figure 4-2 Identification Phase in the Intent-Driven Approach

Even though this is written as the first phase of the Intent-Driven Approach, it is important to note that this approach is a cycle rather than a linear approach. Innovation can start at any point within the cycle and it does not necessarily start and end in a linear manner.

The objective of this phase is to align all the considerations and factors involved in this process, and develop a common understanding and direction for the group. Participants are to paint and articulate the entire solution that they are trying to innovate or provide. Although it sounds similar to "Setting the stage", there are distinct differences between that and "Identifying an Intent".

4.1.1 Difference between "Intent" and "Outcome"

It is important to distinguish between "Intent" and "Outcome" because they are different. Identifying the intent, the starting rational of any needs is of great importance, because intent can result in many outcomes. By identifying intents, companies are able to explore more potential grounds and do not converge too early unnecessarily on their decisions. This is significant because one wrong decision too early in the product development process might result in resource mismanagement that is costly for the company.

Intent is the primary motivation, the driving factor behind the perceived needs of consumers. Perceived needs may not necessarily be derived from a Consumer-Driven Approach but is necessarily derived from an Intent-Driven Approach[30], as it is possible for the company to generate a perceived consumer need based on the intent it wants to pursue. It is also in the best interest of the company to create this value-add for the consumers.

The characteristic difference between Intent Identification and "Setting the stage" is the need to single out and identify the intent as the starting point to innovation. "Setting the stage" can take on the form of simply identifying an outcome rather than identifying an intent. As mentioned, there are distinct differences between an outcome and intent and this is one of the key differences.

This Phase 1 is also the most crucial process as it sets up the foundation for the work to begin, in consideration of resources management. Being the least resource-taxing phase, it affects the distribution of resources for the subsequent processes. If done correctly, it has positive effects on the other processes.

4.1.2 Definition of Intent Identification

The Intent-Driven Approach is to identify the hierarchy of the need or the purpose that a solution is trying to address. In the following example, the purpose of a simple stationery item: the butterfly clip will be examined.

Like most businesses, a company manufacturing butterfly clips could easily be satisfied with optimizing production of butterfly clips, as their key concern could be profit margins.

---

[30] Ulwick, A.W. (2005) *What Customers Want*: using outcome-driven innovation to create breakthrough products and services. United States of America: McGraw-Hill

Alternatively, they can go a step further and research into other methods to bind and organize paper. Should they choose the former, they will probably be making variations of butterfly clips and stay stagnant in their innovation paths. Perhaps different clips of different shapes, sizes and colors will appear on the market, with an emphasis on the aesthetics. On the other hand, if they choose to research into other methods of binding and organizing papers, they will have the opportunity to branch into other new ideas or alternative solutions.

By researching into ways of organizing papers, they might come across an innovation that may just phase out the need for butterfly clips. That is because consumers may actually be looking for solutions to organizing papers rather than just looking for butterfly clips per se. However, the task of identifying what consumers are looking for may not be so clear to the company. They might not be able to explain that they are looking for these solutions during the market research and hence making the task more difficult.

In general, consumers purchase a product because they have a perceived notion that the product is able to help them accomplish their needs. Rather than selling consumers a butterfly clip, the company must be able to identify the rationale of the product that they are seeking to sell to the consumers. In other words, the company must rationalize if they are redesigning a product or trying to find a new market for the product.

During the **Identification Phase**, the different levels or hierarchy of rationales and purposes of the clip can be identified collectively as a group. By using this hierarchy of rationales, the company is able to synchronize and agree on how they would like to innovate because they already have an end vision in mind on what they would like to achieve for the consumers.

4.1.3 Purpose Hierarchy Tool

One of the most significant tools used to identify the intent is called the **Purpose Hierarchy**[31] Tool, and its application is to allow companies to understand the reasons behind the choices made by the consumers. It is important to understand why consumers are using the specific solutions, and the reason or intention for using these specific solutions instead of alternative offerings. The point is to highlight to the companies the consumers' intentions for any specific product and its usage.

In a workshop, this simple tool keeps participants focused on their objectives by identifying the hierarchy of the rationales behind some of their intended solutions. The reason why this tool is being kept simple is to keep them concentrated on identifying their intentions rather than to distract the participants with too many factors.

A more concise approach to this tool will be elaborated in Chapter 6 but for an overview, it will be explained briefly here.

Participants start off using this tool by identifying what is known as the **Initial Intent** of their proposed solutions or directions. During the commencement of a workshop, participants will list out their objectives and their proposed directions. An example of Initial Intent could be

"To design and make a better butterfly clip"

[31] Plsek, P.E. (1997) *Creativity, Innovation and Quality*. Milwaukee, Wi.: ASQC

Collectively as a group, they will conclude upon a common objective and proposed direction. This newer and more refined intent is known as the **Principal Intent**. An example of Principal Intent could be as simple as

"To hold and organize a stack of papers together"

The characteristic difference between that of an Initial Intent and Principal Intent is that the Principal Intent is not to design a butterfly clip, but it is to design the solution which the butterfly clip offers, relating to the key idea that the solution addresses the perceived need of the consumer who needs to hold and organize his stack of paper together.

Taking another example in the healthcare context, the Initial Intent will be

"To cater complete healthcare solutions to providers and patients."

In such a context, there will usually be many participants from different backgrounds. There will be doctors, nurses, patients, hospital administration, IT administration, etc. Bringing them together could be quite a challenge itself, let alone exploring suitable healthcare solutions that cater to all the participants. Hence, such Initial Intent will usually comprise of many different factors for considerations. The Purpose Hierarchy Tool will be useful to keep the participants focused on identifying their intentions.

Before starting the brainstorming, the participants will have to collectively identify the Principal Intent, which could be phrased as

"To make healthcare solutions accessible to mass public."

Note the slight difference between Initial Intent and Principal Intent, one being more directional while the other being more focused. This will be further elaborated in Chapter 6, where the process of identifying the Principal Intent will also be discussed.

Notice how this application of the Purpose Hierarchy Tool to identify the Principal Intent is similar to the "Initialization and Research" step of the generic workshop approach. One is listing out the intended solution whereas the other is listing out the initial problems to resolve. Even though they seem to be of similar nature, utilization of the Purpose Hierarchy Tool is the key distinction between the two because it determines the context and direction of the entire workshop.

4.1.4 Road-Map Tool

The other tool used in Phase 1 is a 'simple road-mapping'[32] where a few parameters are identified (*technology*, *lifestyle* etc) and mapped onto a timeline. This involves a discussion among the people in the workshop with regards to the timeframe of technological advancement or development. Outline of road mapping allows them to identify the different focuses that are important to product development. It serves as a marker for development, while simultaneously providing a quick overview of events and situations that pertain to the company or consumer behavior.

---

[32] The PDMA Glossary for New Product Development, *Op cit*

This is a complementary tool in which participants use to ensure that their identified Intents do not drift off too far from what is feasible and achievable within a certain time frame. For example, a company manufacturing LCD displays might have the intention to provide flexible display for consumers to replace newspapers. However, while using the Road-Map Tool, they realized that many factors are still hindering the implementation of such a solution. Factors could include *immature technology*, *user acceptance level*, *expected trends*, etc.

In the healthcare context, such a Road-Map is exceptionally useful for a large group of participants to come together and recognize which timeframe do some of the important events happen. Everyone in the workshop is able to have a broad overview of the entire framework of his or her peers and hence will be more objective driven to achieve a more aligned solution for the group.

This Road-Map Tool can be referred to as the "Sharing the Basics" step of the generic Idea Generation workshop.

4.2 Phase 2 of the Intent-Driven Approach: Exploration

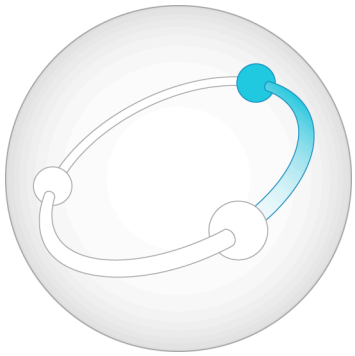


Figure 4-3 Exploration Phase in the Intent-Driven Approach

Exploration, ideation, generation, creative thinking, brainstorming; they represent the same concept of divergence of ideas based on a common starting point or problem[33].

The main activity for this phase is to explore, diverge and ideate, or in layman terms, "*to write as many Post-It notes as you can*" based on the Principal Intent identified in the earlier phase. This is probably one of the most documented portions of any innovation process. There are countless methods and workshop tools to generate countless ideas. A search on the Internet can reveal the popularity of the SCAMPER tool, the morphological analysis, TRIZ and many other tools for idea generation[34].

Even though there exists so many readily available tools for use in this phase, this phase of divergence stays very relevant, as with any innovation process. This paper however will not go into details of the better-known tools but rather it will touch in detail of a simpler tool that was developed during some of the workshops. Similar to the Purpose Hierarchy Tool, this tool, known as the **Focal Ideation Tool**, will be further elaborated in Chapter 7.

---

[33] Fraley, D. (2003) Innovate safely, Quirk's Market Research Review <http://www.quirks.com/articles/a2003/20030510.aspx?searchID=849246&sort=9> (cited 03.04.05)

[34] Facilitating Idea Generation, Creative Thinking Tools <http://www.cre8ng.com/creativethinkingtools.htm>

It has to be made clear that divergence is not the principal activity in this phase. After branching out, there is a need to collate these ideas into feasible and digestible themes such that the company is able to build action plans around them in order to realize them. These themes are marked against their initial **Road-Map** that they have constructed in the earlier phase of Identification.

This process of diverging to scout for potential new grounds and then structuring their plans to acquire the grounds is known as **Exploration**.

4.2.1 Definition of Exploration

Exploration means "*a careful systematic search*" or "*to investigate systematically*". There are always expected outcomes from exploring and the outcomes should be systematically investigated. Phase 2 is termed as **Exploration** because the process is not just about a divergence of ideas. After divergence of ideas, there is a step to cluster these ideas into themes. Hence, there are two sub-phases in this phase of Exploration: ideating and clustering.

4.2.2 Focal Ideation Tool

The Focal Ideation Tool was developed and refined during workshop sessions that were designed to help facilitate the brainstorming and idea generation process that acts on the principles of creative and liberating thinking. It warms up and challenges the mind to think beyond its rational understanding.

This is a divergent tool used to generate ideas on a quantitative basis but as the name suggests, the Focal Ideation Tool is to keep the participants focused and keep to topic while diverging to ideate. There is a very high tendency that participants tend to drift away from

the workshop agenda and processing ideas like these can be taxing on resources. This is especially true when in a dilemma of choosing between spending extra time to process an off-topic idea or to throw away ideas without processing them much. No one is able to tell when there will be a fresh idea, so by throwing away ideas too early in the process, the group might be throwing away the next big thing. The point here is to ideate in focus. The tool works through the use of a series of [How] questions that guides the person who engages the questions into a higher level of thinking process. This allows more released idea generation thinking.

Using the healthcare context as an example again, the large group of participants in the workshop will definitely drift from their focus from time to time. The Focal Ideation Tool will be useful in keeping them focused on generating ideas that are applicable to the workshop agenda based on the Principal Intent that was derived with the Purpose Hierarchy Tool. An example of the [How] question in using the Focal Ideation Tool in this context will be

"[How] can we provide assurances to the patients? "

A series of such questions based on the Principal Intent was generated during the healthcare workshop and participants are tasked to provide solutions based on these questions during one of the brainstorming session. A guideline of drafting these [How] questions will be explained in Chapter 7.

Simple but yet effective, the Focal Ideation Tool will also be elaborated further in Chapter 7.

4.2.3 Building Themes and Affinity Diagram

The second sub-phase is collating the ideas into themes. As simple as the name sounds, this collation sub-phase helps organize the random thoughts and ideas conceived during the earlier brainstorming phase. The flow of Phase 2 is supported by the K-J method[35] with the Affinity Diagram.

Deliverable of these will be themes of different solutions that companies can develop on to further the creation of value such that they can deliver to customers. That can be developed to address the intent that was identified previously. However, the approach on the delivery process will be executed in the third phase, elaborated in the Alignment phase.

In this context, the theme is a set of ideas that possesses similar qualities and characteristics; they have natural relationships with one another, all serving a similar purpose. If a particular idea is different, a qualifier or an exception can be applied if the idea is compelling and collectively agreed upon to be a part as a theme.

In the healthcare example, many ideas could be generated using the Focal Ideation Tool. These ideas are based on the different people with different backgrounds and hence there will distinctly be a difference in the nature of the ideas. It is hence necessary and useful to categorize them into themes that is more compelling for the group to explore and implement effectively. This part of collating to building themes will also be elaborated in Chapter 7.

[35] Idea Creation Tools <http://www.asq.org/learn-about-quality/idea-creation-tools/overview/affinity.html>

4.3 Phase 3 of the Intent-Driven Approach: Alignment

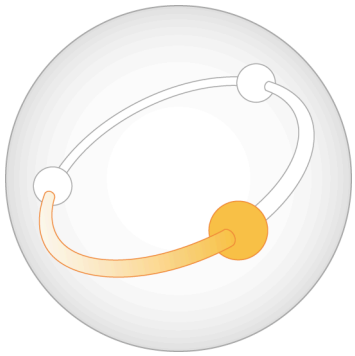


Figure 4-4 Alignment Phase of the Intent-Driven Approach

Alignment of ideas to a company's strategies and visions is probably one of the least documented aspects in modern innovation processes. There are many literatures written about defining problems, generating ideas, and developing them. There are articles about considerations that a company should factor in, policies that the company could have and also structures that a company could adopt. However, when it comes down to actual implementation and alignment to a company's directions, there are minimal studies about it.

This phase of the Intent-Driven Approach to Innovations explains and proposes a methodology and tool that companies can use while doing their alignment to their strategies and visions. Not necessary the only tool available for such a purpose but the purpose of the paper is to develop a methodology that can be built on to further the drive to implementing sound and feasible innovations.

4.3.1 First and Final Phase

Even though this is labelled as Phase 3 of the Intent-Driven Approach to Innovations, this is the one phase that can either be termed as the first phase to innovating or the final phase to making innovations happen. First phase because a group in a company can take the results from this phase to start innovating, to take on ideas and quickly create scaled-down versions

of solutions with minimal funds and convince the rest of the company to invest in these proofs-of-concepts on a more massive front. Likewise, it can be termed as the final phase because it marks the conclusion of the results from the first two phases, in identifying the intention to innovate, the solution the company seeks to deliver to consumer, and in devising themes to achieve the intentions.

This flexibility of the phase in its ability to be in both ends of the innovation process is why the Intent-Driven Approach to Innovations is represented as a cycle, because this phase bridges the linear process and forms the cycle. The tool was developed over time using an action research method and its parameters were defined as they were being worked on.

4.3.2 Background of the Alignment Tool

This Alignment Tool, known as the **Strata Four Tool**, was developed over three years purely via an action-research methodology. It started off as an organization method for consolidating and organizing ideas during a brainstorming workshop. The workshop was conducted for a newly formed major telecommunications company based in Sweden. This company was formed as a partnership between a huge Japanese electronics company and a Swedish telecommunications company. For nearly two years after the formation of the new company, its strategies were still very diverse as the new team was made up of both Japanese and Swedish and its cultural differences though created variety, also created diversity. Its Asian-based design consultant then proposed to conduct a workshop meant to align the company's visions and strategies for the design team. Many product ideas were conceived during the workshop and the consultancy was tasked to develop an approach to organize these ideas and align them to the company's strategies.

By the end of the workshop, quite a substantial amount of development took place and it soon became a tool with multiple facets for addressing the company's strategies. During its development and refinement, it was used as both a research organization tool and also as a brainstorming tool. However there was still a lot of application potential in the unrefined tool; its flexibility nature allows it to find its place as one of the key alignment tool that companies can use in any phase of their innovation cycle. After one year, the tool became the starting point for the entire research paper.

Following up its development using action-research, the tool was used on a few other workshops in the context of a few other companies. The application of the tool and its case studies will be reflected in later chapters.

4.3.3 Strata Four Tool

Strata Four Tool is termed as such because it explores into four layers of alignment relationships between a product, user and the company. By studying into these four layers of relationships, the company is able to map out its execution plans to achieve a focused innovation approach.

Product – Consumer

How does the product interact with the user? This is the most basic level in which the product interacts with the user, via its own outlook without any externalities.

Product – Product

How does the product attempt to differentiate itself? Product – Product can be interpreted as 'Product positioning', whereby the product is being looked upon to other products around it, be it same brand or industry.

Product Portfolio

How does the product reinforce itself in the market? Through an establishment of product portfolio comes the sustainability and the consistency of the brand to users.

Company – Consumer

What other applications affect the consumer's perceptions of the company brand name? Product portfolio alone does not build a brand. Other externalities in tune with the company's directions reinforce the company's brand image to users.

Applying these four layers in the healthcare context, an example of a **Product – Consumer** solution will be mobile device for the care-providers such as the doctors and the nurses that can access to patients' information on-the-go. Relationships between the product and the consumer (doctors and nurses) will have to be defined.

In a **Product – Product** level, an example will be a competitor to this mobile device. It could be simply the notepad that doctors and nurses bring about during their duties or it could be a mobile device of similar nature developed by another brand. All the factors of the potential competitors should be studied and defined in this application layer.

For **Product Portfolio**, the example could be a complementary device to this mobile device. It could be a monitoring device attached to the patient that takes measurements of the patient's vital signs and uploads to the mobile device automatically. It could also be a base server that stores all the information and provides live updates to the mobile device. There are endless possibilities to build a Product Portfolio and this should be planned in alignment with the company's strategies and visions with care.

The final layer of relationship is the **Company – Consumer** layer. In the healthcare context especially, brand reliance and assurance plays a vital role in product recognition. There are already established market leaders such as Philips and Siemens in the healthcare domain and this provides an important leverage should they want to launch a new healthcare solution. For the less recognized companies, they might choose to leverage off the market leaders if they want to penetrate the industry.

By segmenting into these four layers, the company is able to align its strategies in a more implemental approach that each task force in the company is able to execute. The working mechanics of the Strata Four Tool will be further elaborated in Chapter 10. For illustrations on the four layers of relationship, refer to Figure 10-1.

5 Introducing the Integration Agent

In general, there are three key drivers: the marketer, engineer and designer within the NPD framework. Each has his respective role to play, hence there is a need for a common platform for the three roles to come work together for an integrated NPD. Companies usually have innovation processes in place to ensure that the entire team is pursuing in that direction. The solution to innovations is not just about having an approach or process to drive innovations but in order to do so, there has to be a resource. The resource can be in the form of a team or an individual. In other words, if the Intent-Driven Approach is a car, having that car is not sufficient.

Like any project requiring a project manager to champion the project through, it will be most ideal that the company can allocate and assign a definitive resource to champion through their innovation processes within the realms of NPD. The company should avoid a situation where an innovative idea passes through many hands during its development phase. For every hand that the idea passes through, it will bear a different signature. Chances are that the end outcome will probably have veered too far off its course from the original intention that the idea was trying to solve.

In order to prevent such situations, there needs to be someone to safeguard the interests of innovation projects, to ensure that the original intention of the application offering is maintained and does not change its purpose.

However, unlike a project manager, an Integration Agent takes on a more involved role in the NPD process. He does not only project manage but rather defines the content during the different phases of the NPD. To a certain extent, he is adopting the role of a product

manager as well as that of a project manager. The most ideal resource for the company to allocate in the Intent-Driven process will be someone who is familiar or have a background to all the three key phases. Even though these phases are seen to be chronological in order, the interactions within each phase are multi-dimensional with different people having different backgrounds, knowledge and specializations as can be seen in the case of the businessman, engineer and the designer. This resource, be it a team or an individual should be able to put on the different hats during the different phases to execute the different roles without compromising the main intention of the company which is to drive innovations via the Intent-Driven methodology.

5.1 The Integration Agent

Looking at the nature of the three phases of the Intent-Driven Approach, **Research**, **Exploration** and **Communication**, each one of them requires a different skill set.

		Nature of Phase	Intent-Driven
Phase 1	Consumer-Driven Approach	Research	Identification
Phase 2		Exploration	Exploration
Phase 3		Communication	Alignment

Table 5-1 Nature of Intent-Driven Approach

During Phase 1, the Integration Agent's role will be to facilitate the NPD process to identify the Principal Intent and subsequently the research direction for the team. In Phase 2, he has to facilitate the group to explore based on this Principal Intent and plan out the enabler, which are the [How] questions for the group. During Phase 3, his role is to ensure that the group is aligned in their objectives in addressing the Principal Intent.

There is no hard and fast rule as to who the Integration Agent should be in an innovation process. Ideally, the person should be cross-trained in all the three roles so as to be able to move the project forward. However, so long the person is able to appreciate the three different aspects and make appropriate decisions, s/he should suffice to be an Integration Agent. In this aspect, it is usually up to the company's decision to appoint their Integration Agent and to task him with the responsibilities and the power to develop the project.

Companies can also appoint somebody who is residing outside the normal product development roadmap to be the Integration Agent. This is because such a person or team outside the normal product development roadmap will be able to look beyond the existing roadmap and visualize a more purposeful solution. Another reason is that this resource will be able to provide a more objective approach to the NPD process. An example of such practice can be found within Philips, with the Philips InnoHub team playing the Integration Agent role to the different projects they undertook.[36]

[36] Yeo C.S. (Jun 2005) Informal discussion with author. Singapore.

5.1.1 Characteristics of the Integration Agent

The Integration Agent is so aptly named for he has to be:

- Someone who is responsible of communicating with the different stakeholder.
- Someone who has a background in understanding consumer research and has the ability to translate the findings into actionable steps.
- Someone who is able to help explore and conceive fresh ideas.
- Someone who can communicate the solutions to other stakeholders to help realize the solutions into feasible plans that support the company's strategies and vision.
- Someone who can integrate the entire approach and the people seeking to drive innovations.

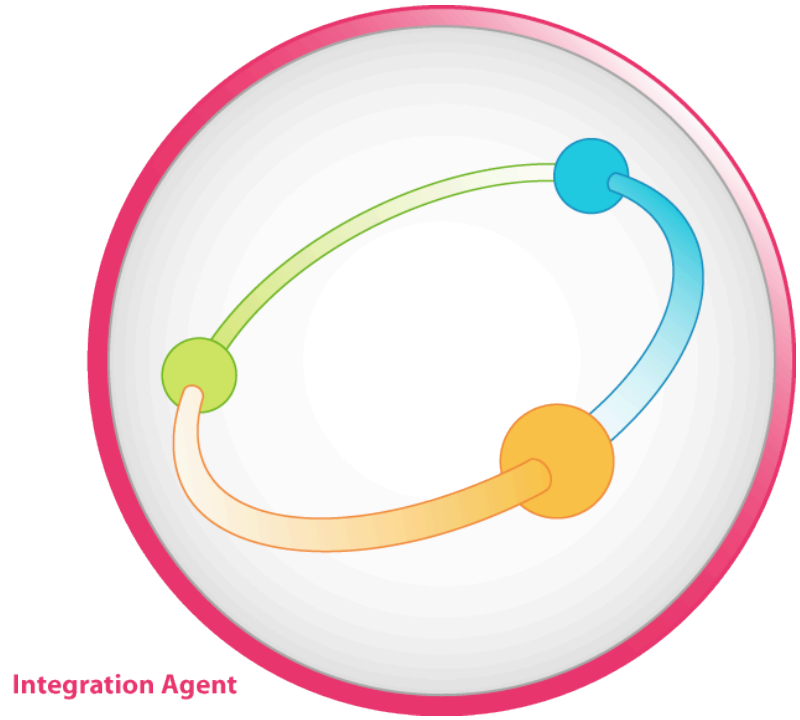


Figure 5-1 Role of Integration Agent

6 Phase 1: Identification

The **Identification Phase**, is to develop a common understanding and synchronize a direction for the group to innovate or provide.

Two tools will be covered in this chapter with the main being the **Purpose Hierarchy Tool** and the **Road-Map Tool** as the supporting complementary tool. The focus of this chapter is on the Purpose Hierarchy Tool and it will be explained in greater detail. The Road-Map Tool plays a role in "Setting the stage" and supporting the Identification Phase. However, it is not as crucial as the Purpose Hierarchy Tool in identifying the intent. Therefore it will only be explained briefly to provide a background understanding of its nature and objectives.

6.1 Purpose Hierarchy Tool

6.1.1 Objectives

Purpose Hierarchy Tool is derived and refined from Michael Brassard's *Memory Jogger*[37]. The objective for the application of this tool is for the workshop participants to have a deeper understanding behind the purposes of why consumers are using certain solutions. Participants have to understand that the main purpose of what consumers hope to achieve from the consumption of a product usually exists in higher levels of questioning which are actually built up by different purposes on lower levels.[38]

For example, in the area of household cleaning, a father has an option to purchase between a bacteria-free vacuum cleaner and a conventional vacuum cleaner. He chooses the former

---

[37] Brassard, M. (1998) *The Memory Jogger*: A Pocket Guide of Tools for Continuous Improvement. United States of America: Goal/QPC

[38] Similar to the Maslow Hierarchy of Needs, the Purpose Hierarchy Tool is based on the different levels of consumer needs.

because he has a greater desire is to play an active and participative role in keeping the house bacteria-free in comparison to just keeping it clean.

The term **Purpose Hierarchy** is so called because the main rational purpose is being built up successively level-by-level, similar to that of a pecking order. Expanding on the earlier example, the reason for the father wanting a bacteria-free house is because his children are prone to falling ill easily. Thus, the purpose of his desire of a clean house could be more for the sake of his children's health.

An important thing to note here is that the **Purpose Hierarchy** is actually a cycle that does not end. One can keep questioning the purpose and he will arrive at an accumulation of general ideas that will form a very generic purpose as illustrated in Figure 6-1.

The broader base represents the different possibilities of purposes and the rounded tip illustrates the generic purposes on the higher level. The base rationale usually comprises of executable decisions and as the level of purpose goes higher in the hierarchy, the decisions become more strategic.

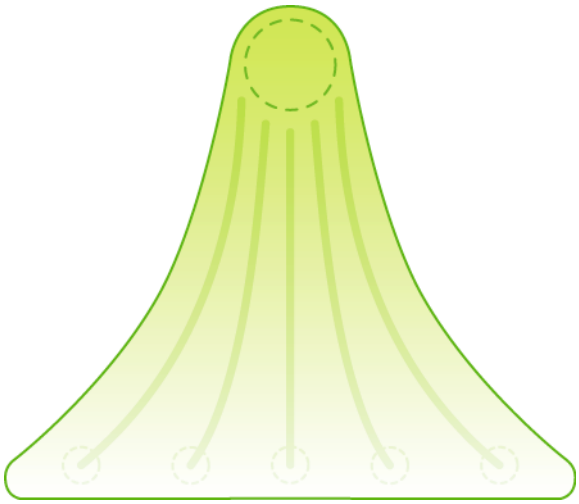


Figure 6-1 Purpose Hierarchy Tool

At this juncture, the workshop participants will have to collectively conclude on a purpose, which they deem is still within the scope and directions of the workshop. For example, a vacuum cleaner manufacturer will not want to look into multi-vitamin pills for children but will consider exploring the development of a vacuum cleaner that kills bacteria easily. Within a more definitive scope, the participants are then able to identify the main purpose of the consumer as wanting a bacteria-free house for his children.

6.1.2 Characteristics and Advantages

The unique characteristic of the **Purpose Hierarchy Tool** is in how it is able to extract the purposes at different levels of the hierarchy. By digesting the purposes into different levels, workshop participants can have a clearer estimation of the resources required to deliver those rationales. Referencing back to the example of household cleaning, developing a bacteria-cleaning solvent may be a more strategic move because it could be cheaper and easier than developing a vacuum cleaner that is capable of dispensing the solvent. Likewise, it will also be a strategic decision by the company should they choose to branch into the multi-vitamins business for children.

The ability to identify these purposes at different levels is one of the core advantages of using the Purpose Hierarchy Tool as it allows participants of the workshop to quickly prioritize their resources and focus on any specific purpose that they want to resolve.

6.1.3 Building Blocks

There are three building blocks in this tool. They are:

- ***Initial Intent***
- ***Principal Intent***
- ***Parameter Handles***

Initial Intent

Initial Intent is the initial solution that the workshop participants wish to propose to the consumers prior to any filtering or refinement. At the start of the workshop proper, each participant of the workshop will write down his solution that he wants to offer to the consumers. As there are many variations of initial solution within a group, the participants will have to come together and refine this offering. The final statement of offering will be the Initial Intent. An example of Initial Intent will take on the form of

"To cater complete healthcare solutions to providers and patients."

Principal Intent

After the Initial Intent is being defined, the participants will go through the Purpose Hierarchy application, which will be explained in detail in the later half of this chapter. The end outcome will be known as the Principal Intent. The Principal Intent usually does not deviate too far from the Initial Intent and it is usually of a higher hierarchy in its purpose and allows more potential exploration grounds. This is the main focal point for everyone in the workshop and the principal direction which all will adopt and carry out their plans. In other words, this is the crux because it is actually the Principal Intent for the entire Intent-Driven Approach. Prior to making key decisions or whenever the participants feel that they have drifted in directions, they will refer back to the Principal Intent for clarifications and

evaluations. Any decisions or actions that do not correspond to the Principal Intent are usually not of any benefit to the group. Principal Intent can look similar to the Initial Intent.

"To make healthcare solutions accessible to mass public."

Notice that this statement has got more potential exploration grounds in comparison to the earlier Initial Intent statement. The Initial Intent talks about catering healthcare solutions to providers and patients whereas the Principal Intent looks into the purpose of catering healthcare solutions; the empowerment of patients to take care of themselves and the potential to lighten the ground workload for providers. The Principal Intent concluded that it was not just catering solutions but actually to provide accessibility options to the mass public are what healthcare providers and patients want.

Parameter Handles

The last building block is the Parameter Handles. Parameter Handles are issues that are of concern to the participants. They can be of any variable that will affect the project and are usually issues that participants might know subconsciously and assume that everyone in the workshop is aware about them. It is usually good to identify and record them during the workshop so that the group is synchronized on addressing them as the workshop progresses. Parameter Handles are also used in different phases of the entire Intent-Driven Approach and they are so-called because they are parameters that participants can use as handles to either move or put a halt to their project. Some examples of Parameter Handles include *costs*, *technology knowledge*, *user acceptance* et cetera.

6.1.4 Execution Steps

This is a step-by-step explanation of how the Purpose Hierarchy Tool is to be used. There is no fixed manner in using this tool and the following is just a guideline on using it in order to acquire the Parameter Handles and the Principal Intent based on a two-hour workshop. Figure 6-2 shows the basic steps:

1. **List** out **Initial Intent** (5 mins)
2. **Agree** as a group on the **Initial Intent** (15 mins)
3. **Apply** **[What]**, Purpose Hierarchy Tool
4. **Conclude** the **Principal Intent** (60-90 mins)
5. **List** out **Parameter Handles** (15 mins)

Figure 6-2 Proposed generic flow of implementing the Purpose Hierarchy Tool

In a nutshell, participants will need to list down their Initial Intent and as a group; they have to agree collectively on the Initial Intent that the group feels is best for the workshop. This usually takes about 20 minutes in total.

The next step is the application of the Purpose Hierarchy, which is codenamed **[What]**. This is a recurring questioning event that is usually quite time-consuming. Based on the Initial Intent, the facilitator will phrase a question that begins with *"What is the purpose…"* for the participants. If the Initial Intent is

"To cater complete healthcare solutions to providers and patients."

The question that the facilitator will phrase to the participants will be

"What is the purpose of catering such solutions to providers and patients?"

Participants will then provide solutions to this question. There will be many variations of answers and correspondingly, the facilitator must be able to record them so that the group can collectively identify the most compelling solution to the question. The facilitator will keep questioning, *"What is the purpose…"* to the group's solution. Suppose the solution to the earlier question is

To reduce medical costs by utilizing existing technology.

[What] is the intention of utilizing existing technology?

To facilitate growth in the respective technology sectors.

[What] is the intention in facilitating growth?

At a certain point, the group will feel that some of the solutions will be deemed too general for them to be able to carry out any executive decisions and actions. The facilitator will then go back to the earlier point and check with the group which solution is the most appropriate and which is the one they believe can be executed. As a general rule of thumb, the facilitator should refer back to at least three solutions.

The solution that the group decides upon will be the Principal Intent.

"To make healthcare solutions accessible to mass public."

This entire process of identifying the Principal Intent should take about 60 to 90 minutes depending on how long the recurring questioning takes.

In the course of answering to the [What] questions, participants will list out some solutions that are potential Parameter Handles. *"Existing technology"*, *"Medical costs"* are some of these examples and as explained, they should be listed out and make known to all participants during the workshop as they will affect other phases of the innovation approach. Listing out the Parameter Handles should not take longer than 15 minutes.

6.1.5 Guidelines for [What]

Without the recurring questioning of [What], some participants might conceive ideas with no compelling reasons or value-add and these are the kind of ideas that should be avoided. Hence, this is a very compelling reason as to why only [What] questions are used and why should they be phrased in this manner. By phrasing in this manner, it helps to direct the thoughts of the participants to answer straight to the point. It also keeps them focused on identifying and addressing the purpose of their solutions because more often than not, the solutions to [What] questions are the purposes that the workshop is seeking to identify. Feedback from some of the participants mentioned that by phrasing the questions in the [What] format, they were able to see clearer the rationale behind some of their ideas and subsequently able to filter out irrational ideas in a more efficient manner.

Some simple guidelines for the facilitator to follow includes:

- Always start the question with ***"What is the purpose…"***
- Solutions to the questions should always begin with ***"To…"***
- Solutions should have
  - An *"Action"* word (i.e. verb)
  - *"Result"* of the *"Action"* word (i.e. outcome/adjective)
  - To ***make (Action)*** healthcare solutions ***accessible (Result)*** to mass public

It helps if the facilitator has background knowledge of the workshop objectives and is able to prepare a few additional [What] questions in case the workshop veers off its course. However, the facilitator should not restrict the session too much into the directions of his [What] questions, he should only interfere and bring the group back on course if it veers off too much. Such are the responsibilities of a facilitator.

6.1.6 Deliverables

There are two deliverables within the application of the Purpose Hierarchy Tool. They are:

a) By running through the application, participants are able to evaluate the Initial Intent with the end objective of identifying the **Principal Intent**.

b) **Parameter Handles** can also be raised and synchronized among the participants as factors to consider for subsequent stages of the innovation process.

6.2 Road-Map Tool

6.2.1 Objectives

During a workshop or a series of workshops, participants usually have many thoughts along the way that they feel could affect the outcome in some way or other. These thoughts as defined earlier can become potential Parameter Handles. The Road-Map Tool allows them to chart these Parameter Handles onto a common basis so that they can have a visual overview of the linkages of these thoughts or factors. More often than not, the most common basis that affects all these Handles is the element of time. Incidentally, the most effective mode of display to have a quick overview will be to use time as one of the axes and all other variables mapped onto a timeline.

This Road-Map Tool is useful also in the context that it highlights a participant's thoughts to the entire group. For example, the engineer in one of the workshops might want to push for a scroll-wheel function in one of the computer product ideas and he lists that out as a current feasible technology that can be implemented. On the other hand, another participant from the marketing department expresses his concerns regarding the launch of a computer product from a rival company. The nearing date of the launch makes the rival company appear as the market leader while them as followers. After further discussions, the group may then decide to bring forward their launch date as a result. Factors such as these usually reside subconsciously within every participant and until they are brought out, there is likelihood that they might be overlooked.

The Road-Map Tool creates the platform for participants to proactively add their Parameter Handles to the workshop within a timeframe. It should be seen as an overview strategy tool that participants can refer to for clarifications and discussions.

6.2.2 Characteristics and Advantages

By charting the information against a timeline, the Road-Map provides a "peek" into the future of what is expected to come and strategic decisions can be made based on this "peek". This will be the platform of information that provides an overview of data for the workshop.

The advantage of having the Road-Map is such that with this visual reference to the timeline of upcoming events, participants are able to have a clearer gauge on some of their ideas and they are able to use the Road-Map to evaluate these ideas.

The accuracy of the Road-Map will depend on the collective effort as plotting of the information is based on the group and it will likely be more thought-out and precise as compared to being based on an individual's opinion.

6.2.3 Building Blocks

There are two building blocks to this Road-Map Tool. They are:

- ***Parameter Handles***
- ***Timeframe***

Parameter Handles

As mentioned in the earlier part of this chapter, these can take on the form of *technology*, *costs*, *trends*, et cetera. These are the main categories in which participants will use to map out more sub-factors under them. For example, under the category of technology, *touch screen display, scroll wheel, memory card* can be mapped out as its subsidiaries. Under trends, they might want to map out *user scenarios* and *market acceptance* as the subsidiaries. Every participant will list out their subsidiaries based on the Parameter Handles and use these subsidiaries to chart onto the Road-Map.

Timeframe

Different businesses have different rulers to gauge their timeframe. The timeframe can take on absolute values that state the year and a few years after (i.e. 2007, 2008 or 2009) or if the workshop nature is slightly more abstract, the timeframe can be segmented into three sections namely, ***Direct Implementation***, ***Near Future*** and ***Visionary*** as shown in Figure 6-3.

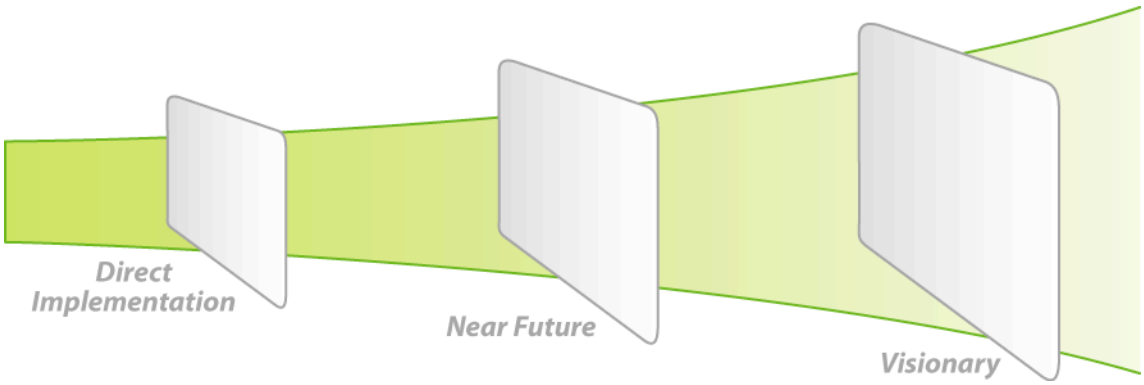


Figure 6-3 Timeframe of projecting products into the future

Direct Implementation is the timeframe whereby the workshop results can be applied onto immediate projects. ***Near Future*** refers to the time where there exists some room for laboratory research and development along the business strategies. When the results can be very blue-sky and not necessarily fitting to the current businesses' strategies, ***visionary*** would be the more appropriate timeframe.

For visibility and ease of understanding, it is usually better to use absolute values in the timeframe as not all participants in the workshop have work areas that require them to plan beyond a certain number of years.

6.2.4 Execution Steps

The steps to charting a Road-Map are very direct. Based on the Parameter Handles, participants will individually *brain-write* out about an ideal number between 5 to 10 relevant subsidiaries that they deem will affect the Parameter Handles. Note that these subsidiaries should fall within the workshop-defined timeframe. This brain-writing activity should not exceed 15 to 30 minutes.

With the facilitator's prompt, participants will share their subsidiaries with the rest of the group, Parameter Handle by Parameter Handle. And the facilitator will chart the shared subsidiaries onto the timeframe. The subsidiaries will be charted along the Parameter Handles (vertical axis) against the timeline (horizontal axis). This charting should not take longer than 30 to 60 minutes.

Since the objective is to chart out a Road-Map, there is no fixed way of doing it so long the participants are able to create the Road-Map.

6.2.5 Guidelines

As the Road-map is a consistent feature showing the timeline, it should ideally be displayed at all times during workshops so that participants are able to refer to it whenever they need to make clarifications or to add on new concerns. Participants should be encouraged that at any point during the workshop, they are allowed to add more subsidiaries onto the Road-Map.

It will also be useful for the Integration Agent to prepare some subsidiaries himself so as to be able to prompt the workshop in case the group loses momentum on building up the

Road-Map. Ideally he should be speaking to the client who commissioned the workshop so that he will be able to translate some of the client's request into subsidiaries.

6.2.6 Deliverables

It is recommended that the Road-Map be as large as possible so as to accommodate more details that the participants might wish to add. The end deliverable should look something like Figure 6-4. The bubbles represent the pockets of information that are affecting the Parameter Handles.

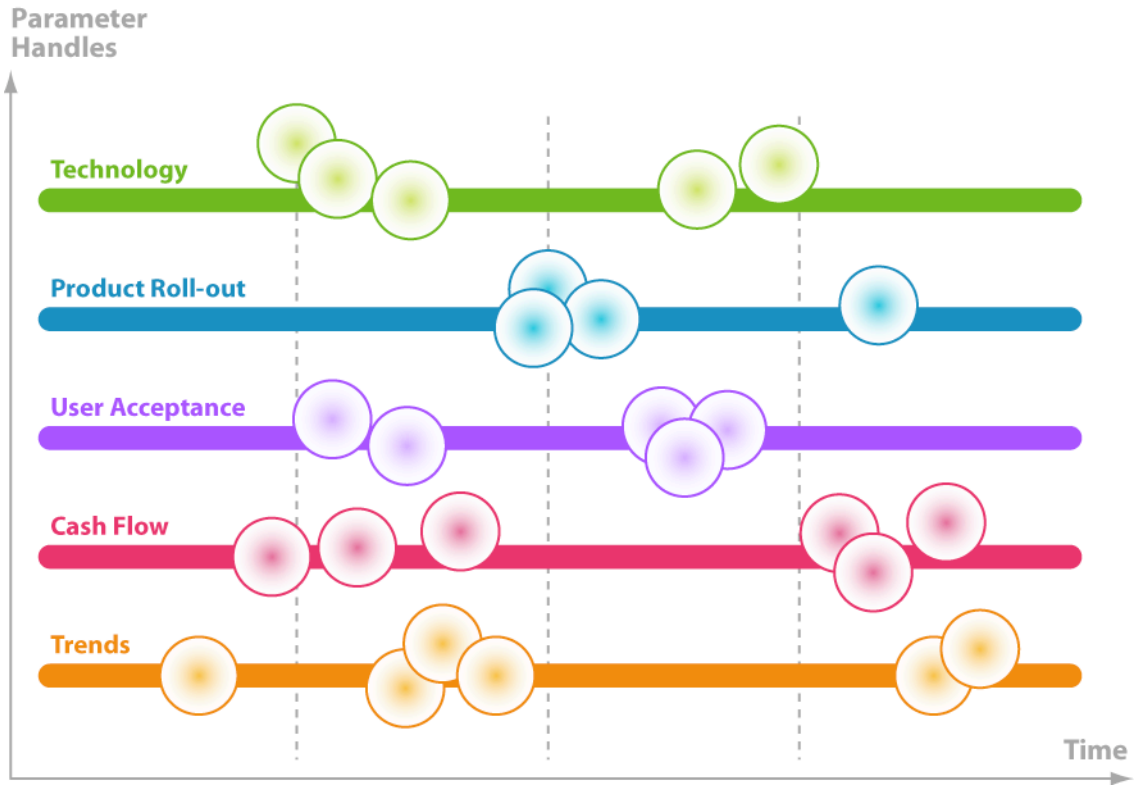


Figure 6-4 Illustration of a Road-Map with Parameter Handles mapped against Time

6.3 Role of the Integration Agent

The role of the Integration Agent during this phase of Intent Identification is to be the key facilitator when applying both the tools mentioned. Note that the recurring element in this phase for both tools is actually the Parameter Handles. These are usually specific information that belongs to one specialization of the participants and they are not necessary information that other members of the group will deal with in their daily jobs. The information will be quite multi-dimensional for the participants to handle and hence, the Integration Agent plays an important role.

The core advantage of the Integration Agent in this context as a facilitator is that he is able to observe from the neutral perspective and consider all the Parameter Handles. He will be the resource that is needed to put on the different hats when handling the Parameter Handles.

6.4 Case Studies

The case study used for this phase of the Intent-Driven Approach is based in the healthcare industry. It was a project made up of different industry players with diverse backgrounds. The research methodology of this case study is **action-research** and it will be further elaborated in the next part of the chapter.

The tools and the application outcome are results and refinements of earlier smaller workshops that were being conducted prior to this healthcare case study. Information of the smaller workshops can be found in the Appendix B.

6.5 Summary

The **Purpose Hierarchy Tool** established the foundation of the Intent-Driven Approach to Innovations. It addresses the rationale to creating a new product. It is a simple yet essential tool to use to help align the views of participants. Coupled with the **Road-Map Tool** that displays an overview of the entire timeline of events for the parameters that affects the NPD, the Integration Agent is able to help facilitate a more integrated progress of the NPD process. The objectives, tools and building blocks for the **Identification Phase** of the Intent-Driven Approach are illustrated in the Figure 6-5.

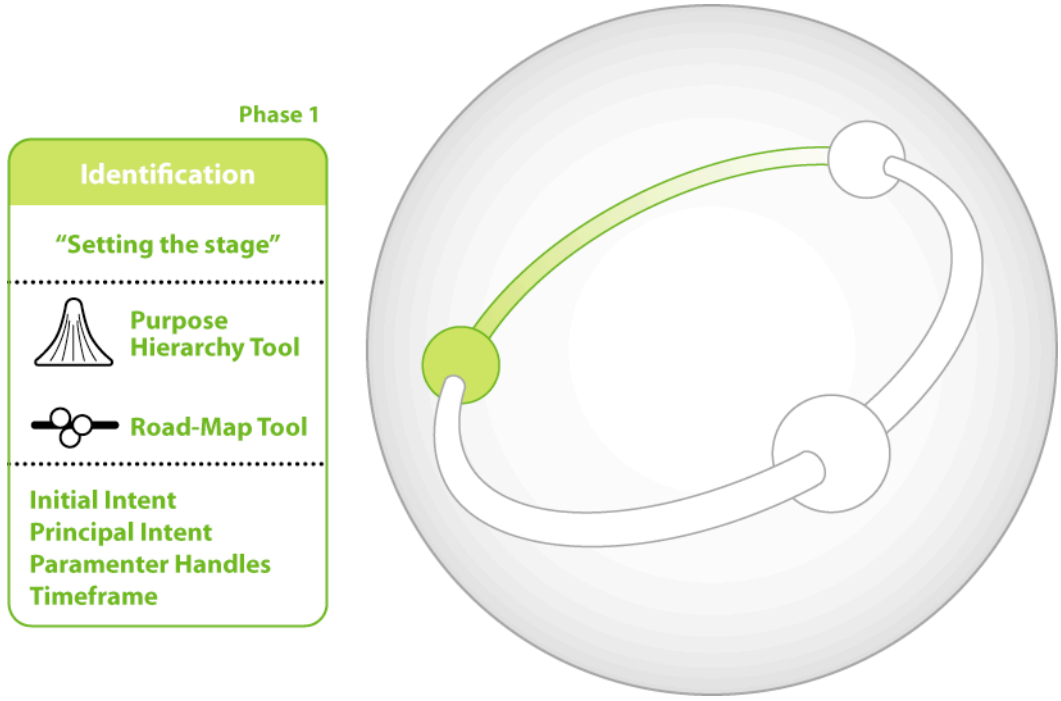


Figure 6-5 Summary of Phase 1: Identification

7 Phase 2: Exploration

The **Exploration Phase** is not just a phase to conduct a systematic search or investigation. It includes the collation of the ideas derived during the ideation so that the group can systematically move towards the implementation of the ideas by building themes around the collated ideas.

Exploration = "Ideating + Collating"

Even though there are countless tools within the domain of public access for ideation, two tools, one for ideation and one for collation will be touched on briefly. The ideation tool named as **Focal Ideation Tool** was developed over the run of a few workshops and the approach will be explained in greater details in this chapter. For the collation tool, it is based on Kawakita Jiro's *K-J method*, also known as **Affinity Diagram**[39]. Both tools are useful in achieving the objectives of the Exploration Phase and their relevance should not be shortchanged and overlooked in the Intent-Driven Approach to Innovations.

7.1 Focal Ideation Tool

7.1.1 Objectives

The main objective when using this tool is to ideate and conceive as many ideas as possible based on the Principal Intent. During the process of ideating, there is a tendency for the workshop participants to think off-course. Such trends of thoughts are welcomed as they

[39] Idea Creation Tools. *Op cit*

allow the participants to be thinking creatively and out-of-the-box. However, there must be boundaries drawn in the process of ideating.

The most important thing during the Exploration Phase is to guide the ideation to stay centered on addressing the Principal Intent. This tool is aptly named as **Focal Ideation** because it is applied in a manner that will keep the participants in the workshop focused on the Principal Intent when they are ideating.

There can be many derivatives to go about focusing:

- By keeping everyone's sights on the main board where questions are written.
- By highlighting keywords such as "*Stay focus*", "*Principal Intent*" to participants.
- By having the facilitator to constantly remind the participants to stay focused.
- By using the **Focal Ideation Tool**.

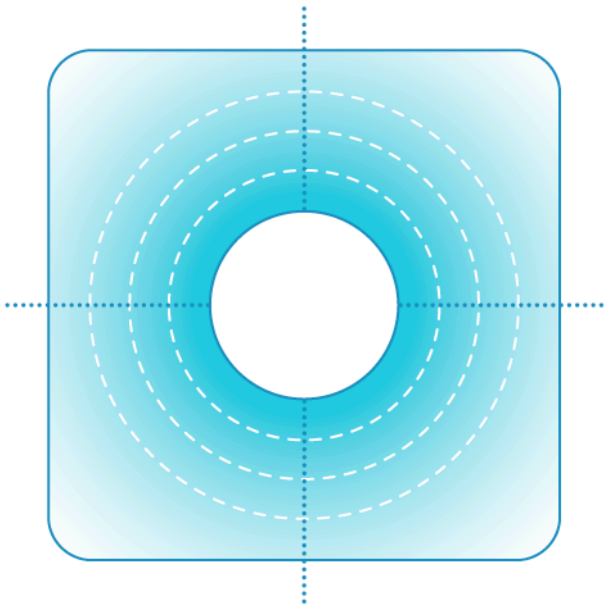


Figure 7-1 Focal Ideation Tool

Notice that when participants are tasked with questions that begin with "*How…*" their proposed solutions are usually addressing the problems that were asked. Like a filter, the Focal Ideation Tool keeps their solutions very much aligned to the questions phrased.

Apart from ideating by addressing the problems, the Focal Ideation Tool also challenges the limits of thoughts and facilitates creative, out-of-the-box thinking and this will be elaborated further later.

The Focal Ideation Tool is built up by a series of questions that begins with "*How*…" and participants are tasked to answer the questions based on the generic Idea Generation workshop approach.

7.1.2 Characteristics and Advantages

The differentiator between the Focal Ideation Tool and any other brainstorming tools will be the attribute that the Focal Ideation Tool is more effective in keeping the participants' frame of mind focused on addressing the problems. By doing so, the time spent on ideating can be better managed which is especially useful for workshops with larger number of participants. This characteristic of keeping the participants focused is also a key advantage of the tool over other tools as it is more intent driven to deliver targeted solutions. Ideating with a purpose. Not just making aesthetic variations but ideating to address the Principal Intent.

7.1.3 Building Blocks

There are two building blocks to using the Focal Ideation Tool. They are:

- ***Principal Intent***
- ***[How] questions***

Principal Intent

The Principal Intent was identified earlier in the Identification Phase using the Purpose Hierarchy Tool. It is the cornerstone to the ideation and is the reference point for all the

solutions that were generated during the workshop. The generated solutions will be evaluated against the Principal Intent for reality checks.

[How] questions

These are the "*food-for-thought*" for the participants. They are the starting point to the ideation process and hence they are very important in setting the directions for the participants. Derived based on Principal Intent, the [How] questions usually offers a vast potential of possible solutions for participants. Examples of [How] questions to Principal Intent will be

Principal Intent:	***"To make healthcare solutions accessible to mass public"***
[How] questions:	How do we make healthcare solutions accessible?
	How do we reach out to mass public?
	How can we bring doctors out of the hospital?
	How can we not disrupt a patient's everyday life?

Note that the questions result in varying implemental solutions but they all serve to build up the achieving of the Principal Intent. Construction guidelines of the [How] questions will be explained in the later part of this chapter.

7.1.4 Execution Steps

Prior to the commencement of the workshop, the facilitator must construct his list of [How] questions based on the Principal Intent. He can build his questions based on individual sharing with topic owners or by discussing in greater details with the workshop owner; the one who commissioned the workshop. Depending on the time availability for

the workshop, the facilitator should prepare an adequate amount of [How] questions. A good gauge is for the participants to spend at least 5 minutes on ideating per question.

After building the list of [How] questions, the execution is similar as to how a brainstorming workshop is to be conducted. For reference purposes, the generic Idea Generation workshop approach as illustrated earlier in Figure 3-2 will be used.

The main execution steps for the Focal Ideation Tool are as follow:

1. **Construct [How]** questions
2. **Restate Principal Intent**
3. **Review Road-Map** and **Parameter Handles** (15 mins)
4. **Self-Storm** (5 mins per question)
5. **Dual-Inject** and **Group-Branch** (5 mins per question)

Figure 7-2 Execution of Focal Ideation Tool

The facilitator will reiterate the Principal Intent to participants during the start of the workshop to get everyone back on the same page. He will also share the Road-Map and the Parameter Handles with the participants so as to allow new input should there be any updates. This activity should not take more than 15 minutes.

Self-Storming marks the start of the ideating in the Exploration Phase. With the list of [How] questions, the participants will go through the questions and generate ideas and solutions that address the questions. There is no fixed rule as to whether to show the

participants the entire list of questions or to reveal them one by one. However, it is more ideal to show them the entire list so that they will be able to manage their own time in order to answer all the questions. Participants have a tendency to try to answer all questions when given the sovereignty to manage their own time. They will write each idea clearly on one Post-It note while ideating. An estimated timeframe for this phase will be 5 minutes of Self-Storming per question.

Dual-Injection and Group-Branching is when the participants come together collectively to share their written ideas. In pairs or in groups, the participants will attempt to ideate more based on some of their generated ideas. They will write new ideas on each Post-It note. The aim is to see as many Post-It notes as possible at the end of this session. The estimated timeframe will be also 5 minutes per question.

It is the facilitator's responsibility to constantly remind the participants against evaluating their ideas at this stage of the workshop.

7.1.5 Guidelines for [How]

After conducting some workshops using this tool, the [How] questions were being reviewed and refined to identify the classifications and nature of the questions. A composition guideline was designed subsequently to ensure that all future question lists follow a similar format.

By starting the questions with "How", it puts the participants' frame of mind to be focused on providing solutions addressing in particular to the questions. For the solutions to be implemental rather than conceptual, it will be useful to be specific and have tangible questions in the list. As the participants proceed with the list of questions during their

Self-Storming, their brains will warm up as they go down the list. Placing the more challenging "Wow" *(out of the ordinary)* questions towards the end of the list usually resulted in more creative ideas, as the participants' brains are more flexible in ideation at that point in time. Hence, the composition guidelines for the facilitator includes the following:

- Always start the question with "*How can/do you/we…*"
- Questions must be directed to have a tangible nature
- Insert a few challenging "Wow" questions at the end of the question list
- Be very specific at times
- Include "subtractive" application questions as they allow participants to think by subtracting elements in their solutions rather than the usual addition
- Include questions related to pre/post activities of product usage
- Prepare extra questions for injecting stimulant during the workshop

Note that the abovementioned guidelines are neither exhaustive nor applicable to all projects nature. They are suggestions of how the [How] question lists should be composed. The list should be generated prior to the workshop proper with the topic owners and the facilitator. This helps to keep the questions stay relevant to the topic. Another reason why the topic owner should be involved is because the topic owners usually have the background knowledge and is able to articulate the problems while the facilitators help to translate the issues into [How] questions.

7.1.6 Deliverables

The deliverable for this sub-phase is very simple. It is to generate as many ideas on Post-It notes as possible within the given timeframe of the workshop. Evaluation and collation of the ideas should not occur during this sub-phase.

7.2 Affinity Diagram

7.2.1 Objectives

This is the collation sub-phase after the ideation. As the deliverable from the Focal Ideation Tool was a huge number of ideas, this step of collating is necessary for the group to sort out the generated ideas into sensible themes that is beneficial for the workshop. The Affinity Diagram is used for this collation and it was based on the *K-J method* that was created by Japanese anthropologist Kawakita Jiro.[40] It helps to organize and cluster large numbers of generated ideas into their natural relationships. These clusters of organized ideas in the Affinity Diagram are known as **Themes**. It is useful at this stage of the Exploration Phase to use Affinity Diagram to build Themes because this is the point whereby there are many new generated ideas with complicated issues laid out in a chaotic manner and it will be only manageable if they are being sort out collectively as a group.

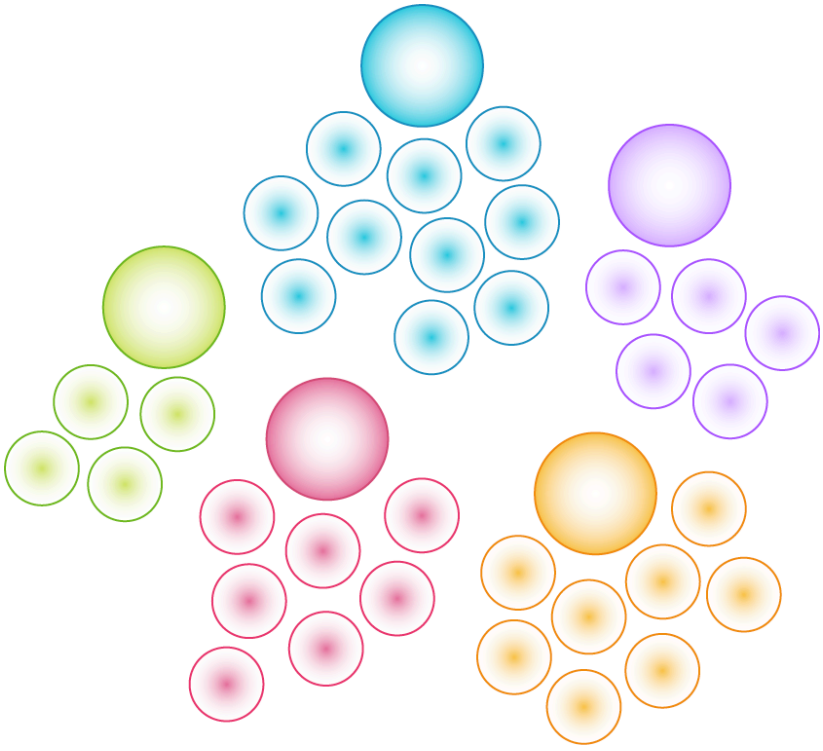


Figure 7-3 List of ideas grouped according to their Themes

[40] Biography of KAWAKITA <http://www.rmaf.org.ph/Awardees/Biography/BiographyKawakitaJir.htm>

7.2.2 Characteristics and Advantages

By having Themes, the group is able to evaluate them and have a good gauge to see if the Themes fit into their strategic directions. Themes are exceptionally useful in digesting the amount of resource needed for implementation. Instead of facing a huge amount of ideas, the group is now faced with a smaller number of themes that still allow them much room for action.

This process of building Themes allows the participants to move beyond their preconceived thinking. This process also taps onto the knowledge and intuition of the collective nature of the group.

7.2.3 Building Blocks

Building blocks to building Themes include:

- ***Generated Ideas***
- ***Parameter Handles***
- ***Road-Map***

Generated Ideas

As with any brainstorming phase, these are the ideas generated by the participants. Preferably they are ideas generated during application of the Focal Ideation Tool. However since the Affinity Diagram is a well-established tool, so long there is a large amount of ideas it will be possible to apply the tool.

Parameter Handles

These are the same Parameter Handles identified in the earlier Identification Phase. They can be used as categories when the participants are building their themes and naming

their headers. Reviewing the constructed themes to the Parameter Handles allow the participants to find greater relevance in their output and this will be very useful for participants who want to have a very quick evaluation of the themes in terms of implementation.

Road-Map

This is the Road-Map that was built using the Road-Map Tool. Just like the Parameter Handles, having the Road-Map as the building block facilitates fast evaluation of the constructed themes. Participants are able to review at a glance the issues pertaining to their Road-Map and hence able to have a good gauge of the Themes.

7.2.4 Execution Steps

All the generated ideas should be spread across randomly on a huge surface that is visible to all participants. There should be an equivalent huge surface that is empty.

It is important that there is no form of communication during this step. Facilitator should brief the participants not to talk at this phase of the process and constantly remind them if anyone breaks the silence. In a sequential manner, the participants will take a few Post-It notes from the first board and arrange them onto the second board. The participants will in their own interpretation, group ideas that seem related in some way or other together. They will keep moving the Post-It notes from one board to the other until the first board is empty and all the Post-It notes are grouped together. There is no issue if there exists a few stand-alone ideas. This phase can take place from a few hours within a workshop or over a span of several days depending on availability.

After the grouping is done, the participants can resume communications and should discuss about the groups. They can make further refinement to the arrangement of the Post-It notes and add more ideas that came to their mind during the grouping if necessary. Usually there will be a few new ideas generated during this phase of grouping. This should be a planned workshop session.

Participants will then give a heading and label the groups. These groups shall be known as themes. After building these themes, they are mapped back against the Parameter Handles on the Road-Map for a quick evaluation on implementation timeline.

The collating is complete when the group is able to quickly chart the themes onto a feasibility timeline with reference to the Road-Map. Note that the group is only charting the themes onto a timeline. Even though the themes might be implemental within a very short timeframe, the group might not want to pursue the theme due to strategic reasons. For a better evaluation and alignment, the tool that will be introduced in Phase 3: Alignment can be used.

7.2.5 Guidelines

- Every idea must be on separate Post-It note
- Spread the ideas out randomly and do not arrange them till collating begins
- Participants should not communicate during the collating phase
- It is fine to move notes that have been grouped by another participant
- Duplicate the Post-It notes if the group wants to use the idea for more than one Theme

7.2.6 Deliverables

Themes consisting of generated ideas that are linked together by their natural relationships will be the deliverable for this sub-phase. These themes are mapped against the Parameter Handles for evaluation and will be used for in Phase 3: Alignment.

7.3 Role of the Integration Agent

The Integration Agent plays a very major role in this Exploration Phase. This is the phase that he will be engaging in more in comparison to the supporting role played in other two phases. The Integration Agent should have a very good understanding of the entire workflow and should have apt knowledge in the Principal Intent, the Road-Map and the Parameter Handles. Based on his knowledge, he should be able to work with the client on the workshop objectives.

As for his specific role in the Focal Ideation phase, the preparation of [How] question list is the most important task for him. This will dictate and influence the direction and nature of the workshop outcome and if possible, he should have discussions with the client and few of the more important stakeholders in the workshop.

During the Theme-building phase, the Integration Agent plays a facilitation role and while the group is building on the themes, the Integration Agent should be able to visualize the themes as they proceed. This visualization will aid him in the next phase of the Intent-Driven Approach to Innovations.

7.4 Case Studies

The **action-research** case studies for this phase of the Intent-Driven Approach are set in two very different industries. The first being a healthcare industry and the second a domestic appliance industry focusing on **Garment Care** and **Health & Wellness**. The healthcare industry is looking into building healthcare scenarios while the domestic appliance manufacturer is looking into developing the next generation of appliances for consumers. Both case studies will be explained in greater details in Chapter 9.

7.5 Summary

The **Focal Ideation Tool** is an outcome of continuous development over a few workshop runs as mentioned in Chapter 1.2 - Methodology. Building **Themes** and the use of **Affinity Diagram** are not new to in the realms of idea creation. However when coupled with the Focal Ideation Tool in the beginning and mapped onto Parameter Handles and **Road-Map** at the end, the entire Phase 2: Exploration of the Intent-Driven Approach to Innovations is strengthened.

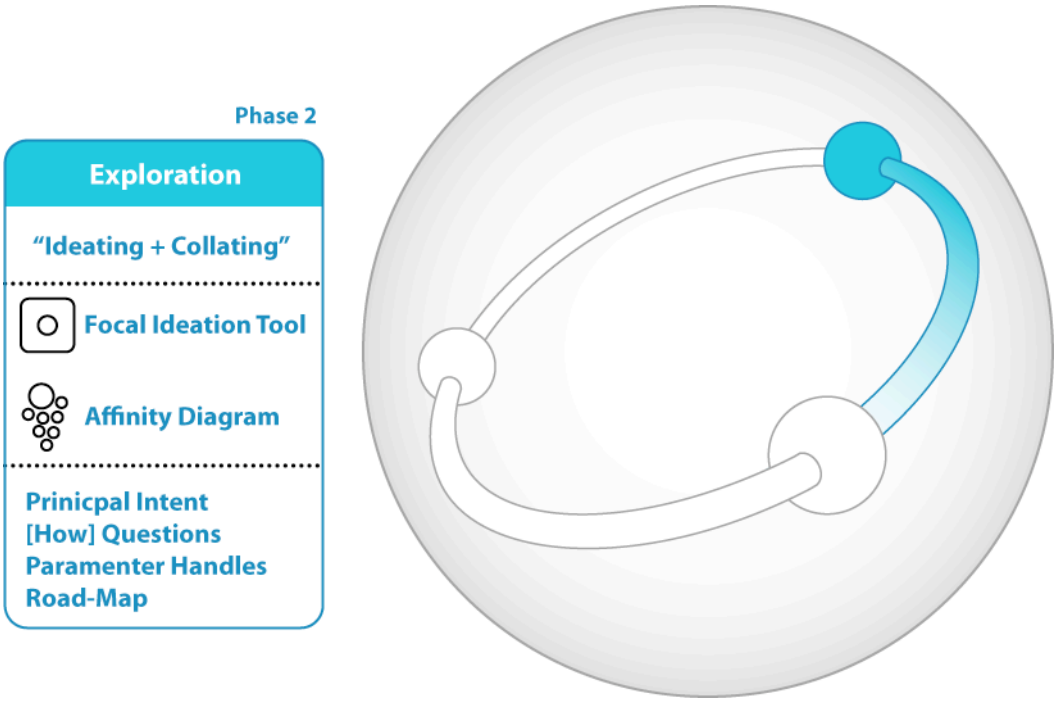


Figure 7-4 Summary of Phase 2: Exploration

8 Case Study: Healthcare Anywhere

8.1 Research Objectives

The approach to this case study was to adopt an action research method because there was an opportunity to test the first two phases, **Phase 1: Identification** and **Phase 2: Exploration** of the Intent-Driven Approach to Innovations given the nature of the topic. There was also quite a fair bit of implicit knowledge that was acquired in some earlier case studies that could be implemented and refined here. In such a context, both internal and external validity of the approach could be executed.

8.2 Case Study Background

Healthcare solutions are usually complex and difficult to implement due to the different nature of the needs of "users" and "consumers or purchasers". Unlike the relationship of direct consumer goods such as the mobile phone whereby the user, consumer and decision-maker could be the same person, many parties are involved within a healthcare context.

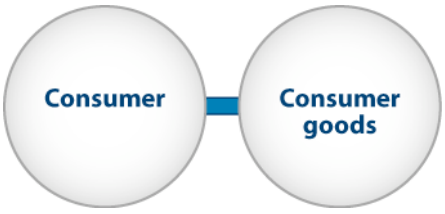


Figure 8-1 Relationship between consumer and goods

In the healthcare context, the relationships are much more complicated. There are doctors, nurses, patients, IT specialists and policymakers who have varying range of influences over the implementation of healthcare solutions.

First and foremost, there are the patients who are the primary or end users of the healthcare solutions. They usually do not operate the devices or solutions and do not have decision-making capabilities when it comes to acquisition of the solutions. The second group of users is the operators of the solutions. They are the doctors and nurses who will be using the devices or solutions on the patients. Their main concern is to ensure that they are able to administer healthcare to the patients so that patients can be at ease and recover quickly. The other party with relationships to the healthcare solutions will be the administrator group. They are defined as the IT specialists or healthcare policymakers who usually also influences the decision making for acquisition of a product solution. Their responsibilities are to ensure that the infrastructure is well supported and built to facilitate the doctors & nurses in their daily chores and to serve the patients better.

The added complexities come from the fact that "users" of the healthcare solutions; the doctors and patients especially, usually find it difficult to articulate their concerns and needs to the administrators. They are usually ignorant of the available solutions in the market and thus have the tendency to accept the solutions as how they are and adapt their duties and working habits around these solutions. Administrators on the other hand, usually have their own set of issues in implementing new solutions for they have to consider the existing infrastructures for implementation and even to look into feasible business models for their organizations.

These difficulties in articulating the information between the three parties in healthcare domain renders it even tougher for the "healthcare solution providers"; who are the likely drivers for new solutions, to conceive and develop new application solutions in the domain. Thus "healthcare solution providers" often find themselves facing the issues of developing their solutions for multiple parties in the healthcare domain. Such needs to involve the needs of multiple parties are usually a stumbling block and they result in very

time-consuming discussions. This hinders the movement and development of healthcare solutions in comparison to a normal resource needed in developing a mobile phone for example. This is also one of the key reasons why solutions in the healthcare domain are usually very slow in their development compared to other industries when they are all riding under similar technology progressions.

Figure 8-2 Relationships in the Healthcare context

"Healthcare Anywhere" started out in September 2006 as a Call for Collaboration (CfC) by the Singapore Infocomm Development Authority (iDA) to explore new applications of utilizing information technology on the healthcare domain. Being one of the market leaders in the healthcare domain, Philips Electronics took on the initiative to arrange for an inaugural workshop with several potential collaborative partners to explore applications. The theme "**Healthcare Anywhere**" was not conceived at the beginning of the CfC. Rather, it was a collaborative effort involving different business groups who came together during a workshop to explore and discuss on what they are currently doing and what they could potentially offer for information technology applications in the healthcare domain.

As the nature of such a project was not of a business model in terms of marketing and sales, there was no unit within Philips Electronics, Singapore to champion this CfC. The Philips InnoHub within the central organization of the Philips Electronics structure was then tasked to lead the initiative. Some of the key benefits of having the InnoHub to lead the initiative include:

- Independent body not under any business models and thus greater liberty in developing the project at its own pace
- Serves as an central contact point for liaison for both within the Philips organization and the external parties (Integration Agent role)
- Structure within the InnoHub provides a good and substantial platform in studying different application scenarios involving users (They work closely with the Consumer Experience Center that conducts focus group discussions, new products testing with consumers, etc)

The CfC started out with many potential collaborative partners but as the project defines itself and takes on the theme of Healthcare Anywhere, few collaborators were then identified and they are mainly from the different business divisions within the electronics giant. They are from Philips:

- Philips Applied Technologies (InnoHub is hosted within it)
- Philips Medical Systems (PMS)
- Philips ConnectHealth
- Philips Mainstream Displays (MD)
- Philips Semiconductors (now known as NXP)

8.2.1 Workshop Objectives

Having such a nature of project whereby both users and consumers have limited articulation capabilities, the direction of this project lies very much on the healthcare solution providers. Equipped with minimal consumer insights then, this group thus had to adopt an Intent-Driven Approach in generating application solutions. One very clear intent stood out among the many, that is to integrate Philips Electronics' technology (and strategy), healthcare needs (the three groups) and iDA's objectives (Singapore government's call).

Hence the main objective of this project was to derive healthcare solutions that are satisfactory to the scope of these three parties. Using that as the key objective, a workshop was conducted to identify the intent of each of the parties and brought to the table to discuss the best way forward for the project. This workshop approach will be further elaborated later.

8.2.2 Issues of Contention

The group that was formed was facing a major time limitation in submitting the proposal for possible healthcare solutions in this CfC. Going for an initial research and interviewing of the relevant healthcare parties would have been too time-consuming and resource-intensive for submitting a proposal of such a nature. Not having a concise and in-depth understanding of the different needs of the healthcare sector from the relevant perspectives, the team could only rely upon the expertise of the people from Philips Medical Systems (PMS). However, the representatives from PMS were from the regional sales organization that only caters certain solutions to the healthcare sector in the region and their offering could be too niche to build sizeable application solutions in this CfC

proposal. Considering that the team was made up of other product divisions, there was great potential to tap on them and build a wide range of application solutions.

8.2.3 Approach

Ruling out a Consumer-Driven Approach, the team adopted an Intent-Driven Approach to build scenarios that would be more in line with what is termed as satisfactory to the three parties as mentioned earlier. Such an approach will be more time-efficient and yet maintaining, if not a possibly better end outcome. Since timing was the crucial issue of contention, this approach was deemed more appropriate in terms of resource management than conducting intensive consumer research.

8.2.4 Utilized Tools

The key objective for this CfC was to identify and build user scenarios for IT applications in the healthcare industry and the tools that were used to generate these scenarios included

- **Purpose Hierarchy Tool** for Intent Identification of the different scenarios
- **Road-Map Tool** for the different business groups to align themselves
- **Focal Ideation Tool** for exploration and concepts enrichment
- **Affinity Diagram** for building and reinforcing the scenarios

8.3 Phase 1: Identification

The very first phase of the entire workshop series began with the Identification phase, having the **Purpose Hierarchy Tool** as the key-driving tool. Participants began by listing out their objectives that they hope to achieve out of this CfC. Different parties listed different objectives and they come together collectively as a group to conclude upon the Initial Intent that they feel addresses the objective of the CfC. The Initial Intent that was concluded upon reads

"To cater complete healthcare solutions to providers and patients."

In this context, the term "providers" refers to the healthcare solution administrators such as the hospitals, doctors, nurses and the policymakers while the "patients" are simply the patients who require the healthcare solutions.

As mentioned, the objective of this initial phase is for all parties involved to align their considerations and to develop a common understanding between one another so that everyone will be able to progress towards a common goal.

The underlying objective apart is for the parties to paint and articulate the entire solution that they would like to provide in their own perception of the context. With that in mind, they proceeded on the Identification phase.

8.3.1 Purpose Hierarchy Tool

With the Initial Intent, the group then proceeded with a series of short question and answer and discussions to identify their Principal Intent. Listed are some of the sample [What] questions and solutions derived during the workshop.

"To cater complete healthcare solutions to providers and patients."

[What] is the intention of catering such solutions?

To reduce medical costs by utilizing existing technology

[What] is the intention of utilizing existing technology?

To facilitate growth in the respective technology sectors

[What] is the intention in reducing medical costs?

At a certain point, the group came together and discussed on all the solutions that they have arrived at. When the group felt that they have listed out the problems to a hierarchical level that is general enough, they collectively concluded on their Principal Intent for the workshop.

"To make healthcare solutions accessible to mass public"

Note that while the group was listing out the solutions with the Purpose Hierarchy Tool, they have also listed out some solutions that were actually potential Parameter Handles. Hence along the way, they identified their Parameter Handles and listed them out for the group to see.

8.3.2 Road-Map Parameter Handles

Respective technology sectors, medical costs and accessibility were the Parameter Handles that were used subsequently during the Road-Mapping step. The CfC group was able to map these Parameter Handles onto a time-line which allowed them to have a clearer and more concise gauge of what could be achieved by when.

The Mainstream Displays group explained their TV technology time-line; Semiconductors laid out their options for Near-Field-Communications (NFC) possibilities; ConnectHealth presented their products Road-Map and Medical Systems shared their knowledge of competition in the region.

Through the mapping, all the parties involved were able to list out their concerns and were able to share their knowledge effectively to contribute to the workshop.

Referring back to the Intent-Driven Approach, this is the end of **Phase 1: Identification**.

8.4 Phase 2: Exploration

After identifying the Principal Intent and mapping out the Road-Map, the group concluded on their first workshop. It was agreed that each participant would share a possible solution scenario based on the Principal Intent during the next session. As InnoHub was functioning as the Integration Agent for this CfC, the groups would discuss the solution with InnoHub prior to the second workshop and InnoHub in the meantime, would prepare the necessary materials for the workshop. This initial discussion with InnoHub was only done briefly in a conceptual manner. Details on how to achieve these concepts were to be worked out during workshop, which marks the start of Phase 2: Exploration.

Based on discussions with the relevant participants and using the Principal Intent as the cornerstone, InnoHub started preparing the enablers to Phase 2. The [How] questions were prepared for the Focal Ideation Tool.

The objective for this phase is for the CfC to generate numerous ideas and collating them in addressing the Principal Intent.

8.4.1 Focal Ideation Tool

Some examples of [How] questions prepared for the Phase 2 are listed below. They are prepared based on initial discussions with relevant parties and also based on the Parameters Handles that were highlighted in Phase 1. The easiest basis to start deriving these questions is to identify potential gaps that the group might fall into or could also be blatant issues or problems that the group is trying to resolve. For more information on drafting the [How] questions, refer to the guidelines found in Chapter 7.1 Focal Ideation Tool.

- [How] can we provide assurances to the patients?
- [How] can we not disrupt a patient's everyday lifestyle?
- [How] can we bring doctors out of the hospital?
- [How] do we incorporate the solutions into existing infrastructure?
- [How] do we facilitate security?

As with the objectives of the **Phase 2: Exploration** = "**Ideating + Collating**", the Focal Ideation Tool was concentrating on the ideation aspect of it. With the long list of ideas generated, the group proceeded with the collation sub-phase of it.

8.4.2 Affinity Diagram

Using the Affinity Diagram, the group was able to identify sub-themes that were supportive of the Principal Intent. The sub-themes identified were healthcare ideas focusing on three areas in the healthcare domain: **At the Hospital**, **At Home** and **At the Clinic**. With these sub-themes in place, they were then able to create their main theme of Healthcare Anywhere.

Figure 8-3 The three healthcare domains for Healthcare Anywhere

8.5 Outcome

The final outcome for this CfC was very well received. Based on the key theme of Healthcare Anywhere, the group was able to put together a series of user scenarios depicting the life of a heart patient named Bob Hart. In the series of user scenarios, Bob managed to receive healthcare from all aspects starting from the hospital bed right to his home. Healthcare Anywhere, as it was aptly named, managed to identify situations whereby Bob will require healthcare and application scenarios were created around those situations.

The following diagrams illustrate the few scenarios of Bob. For each scenario, a working demonstrator was built to communicate Healthcare Anywhere to everyone, both inside and outside of the CfC.

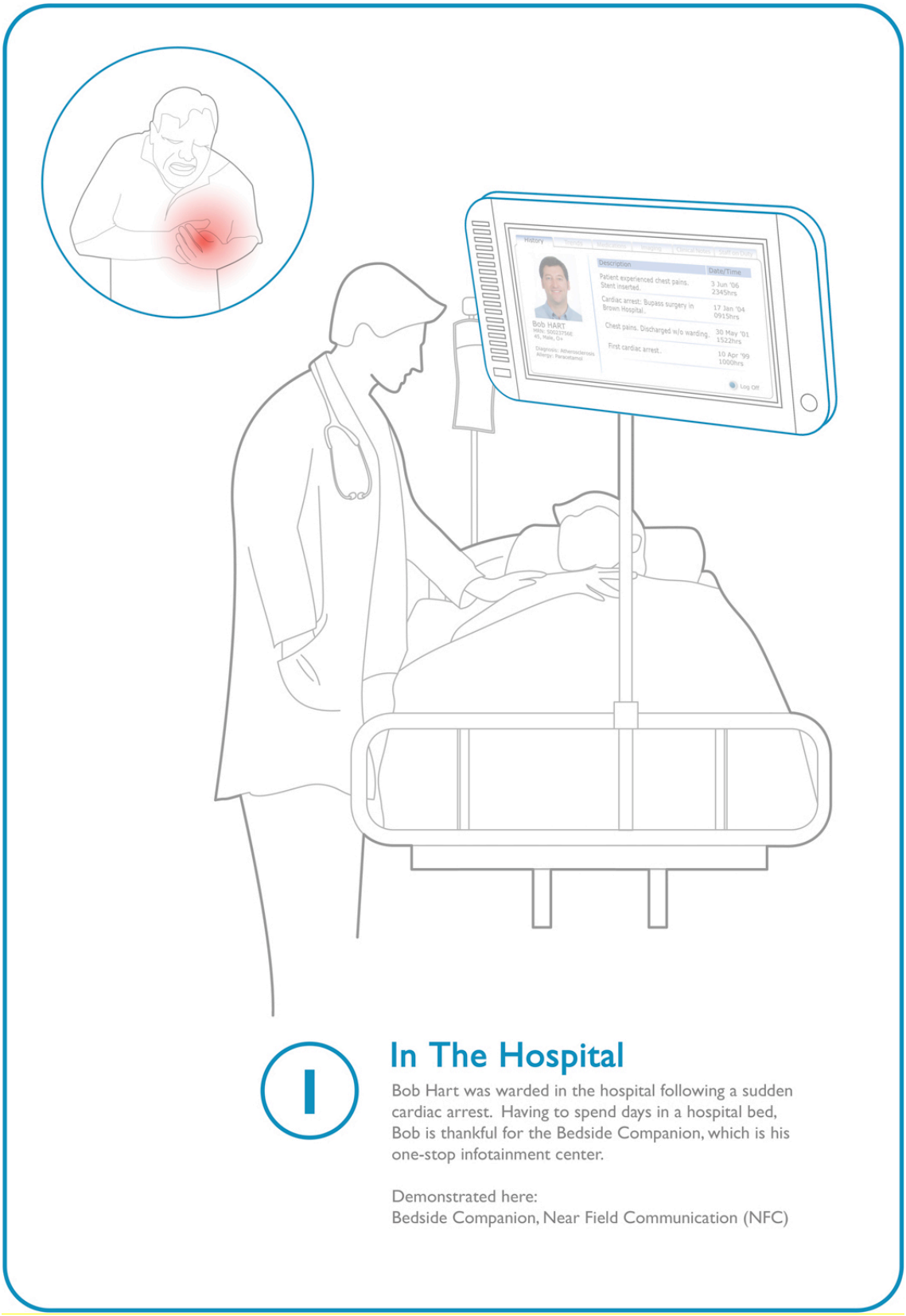


Figure 8-4 Bedside companion

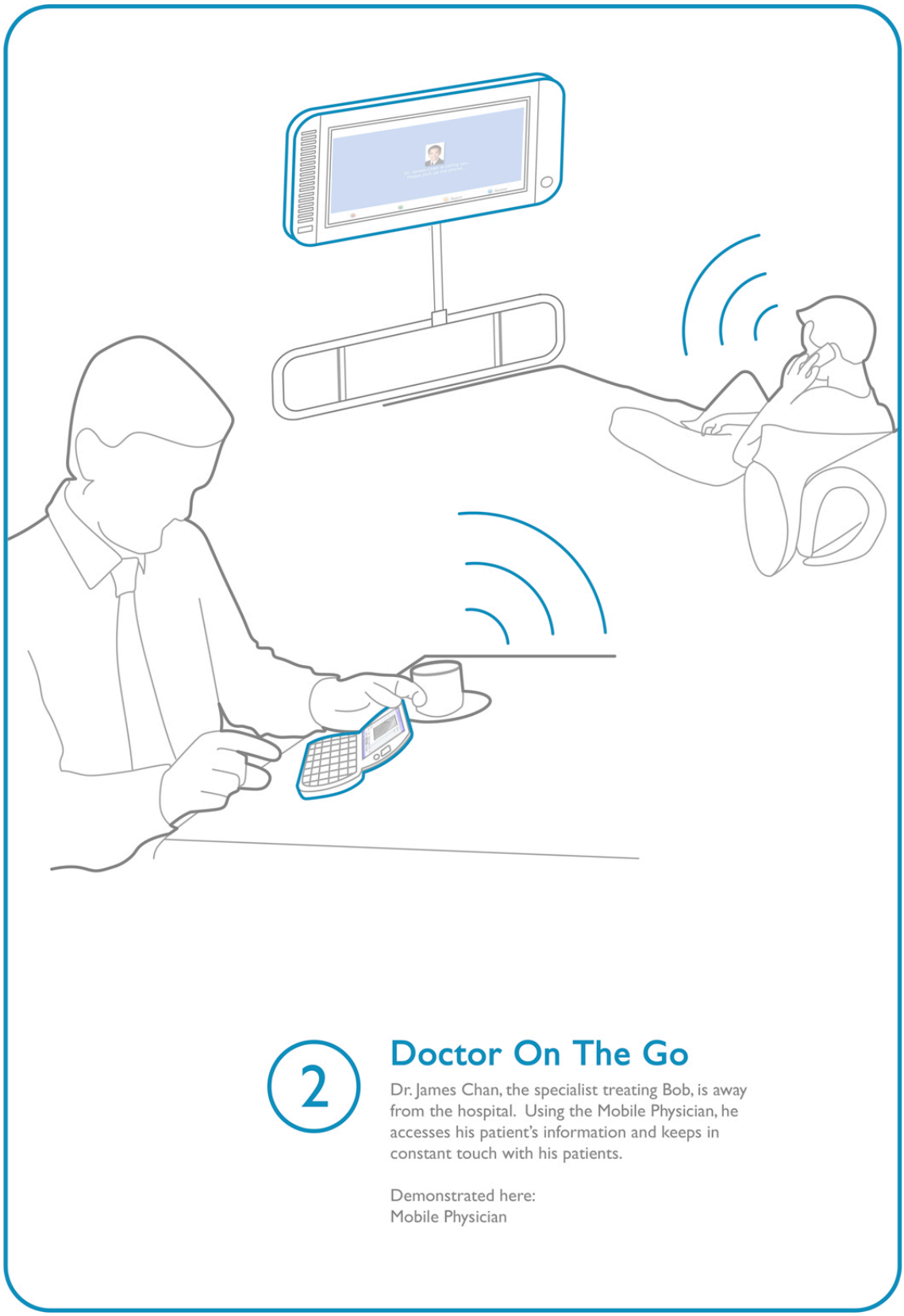


Figure 8-5 Mobile Physician

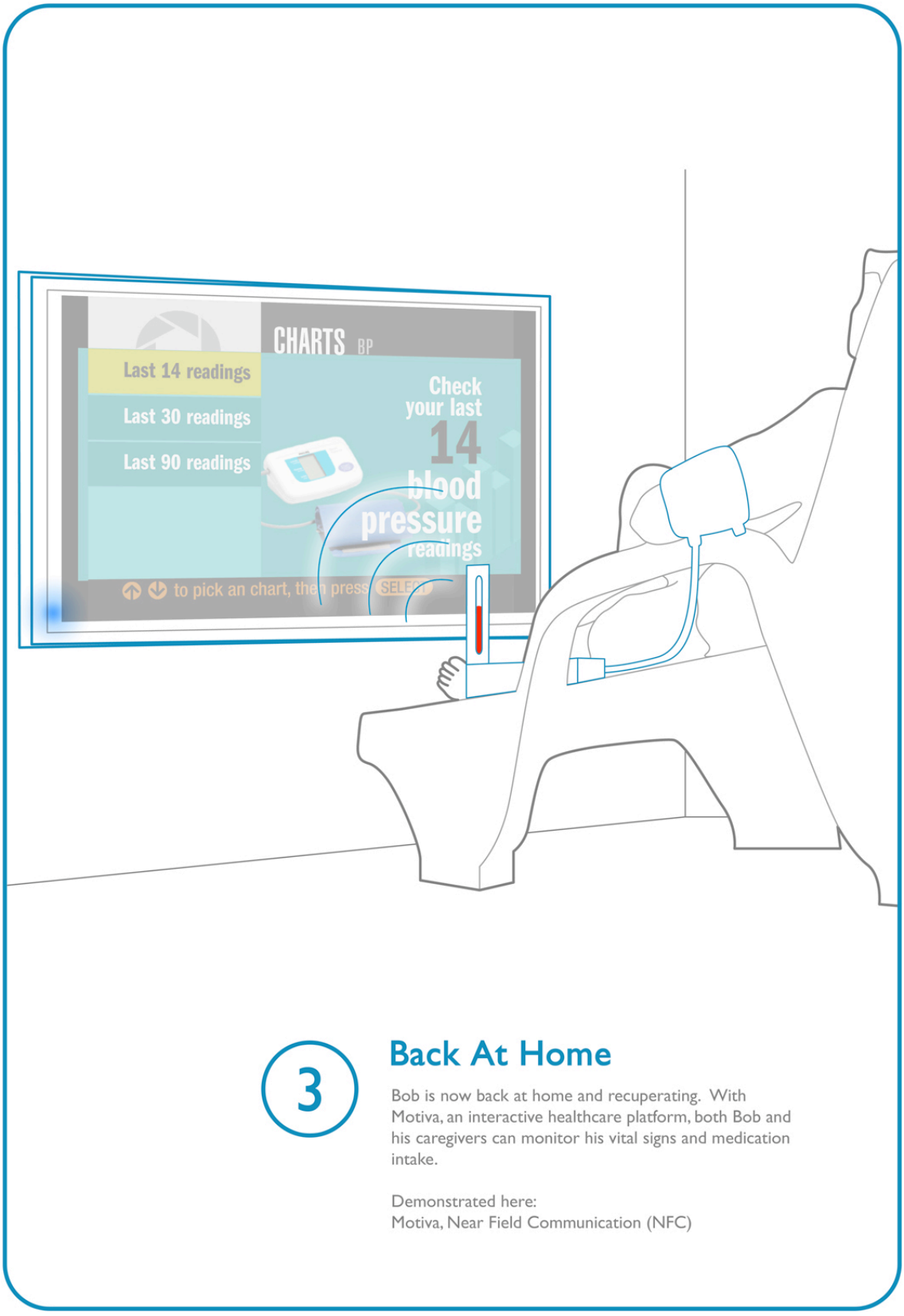


Figure 8-6 Motiva patient

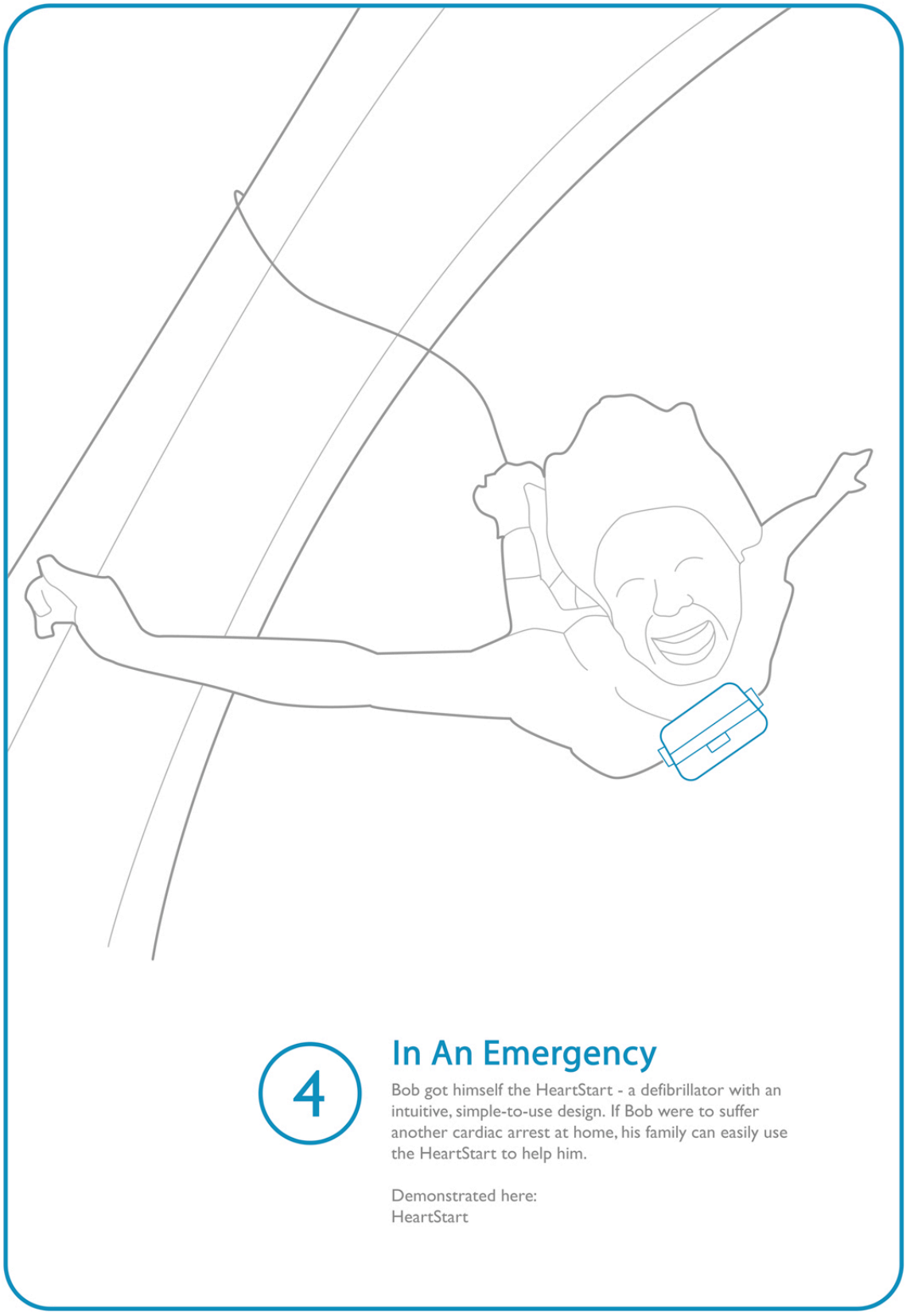


Figure 8-7 HeartStart

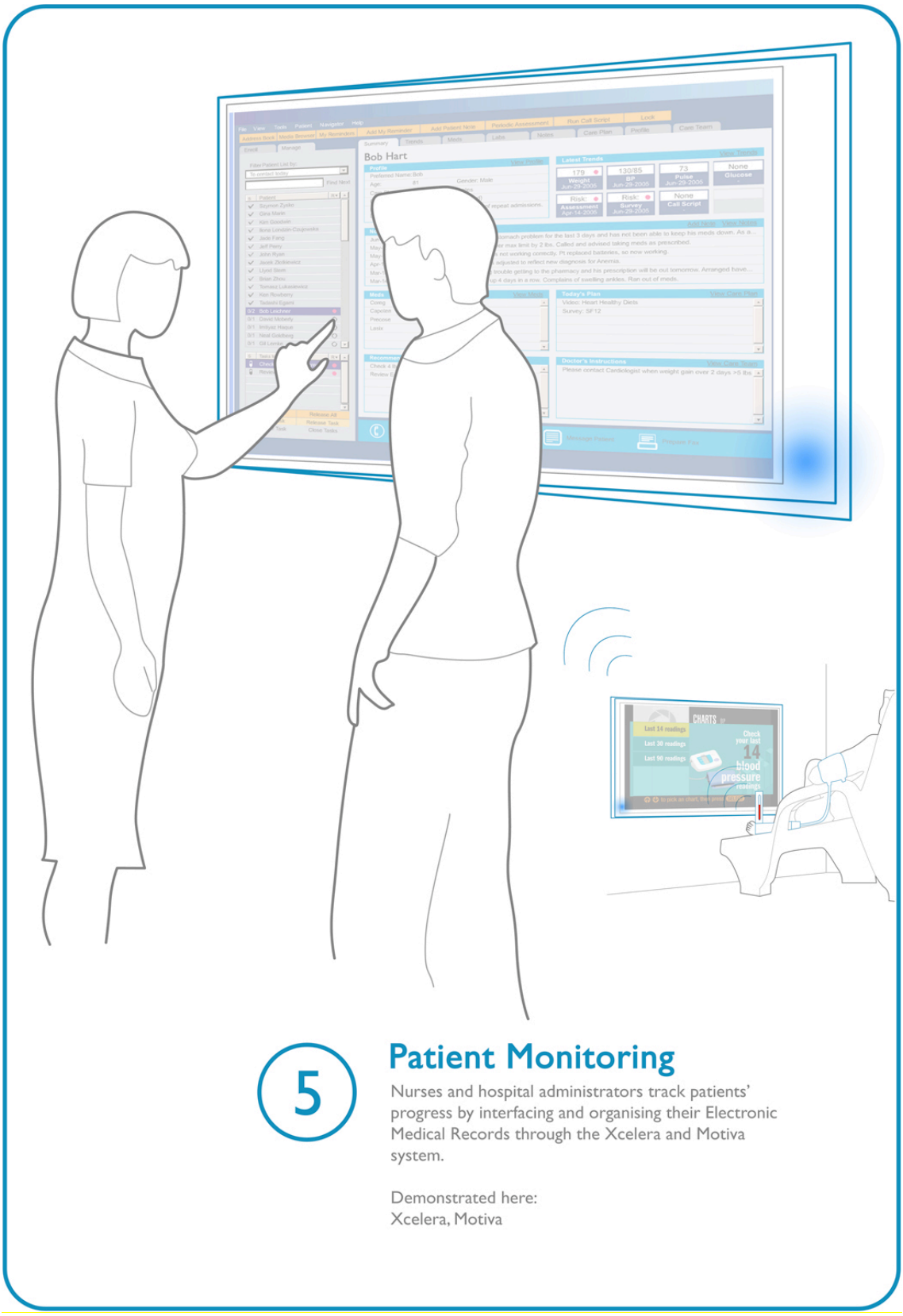


Figure 8-8 Motiva hospital end

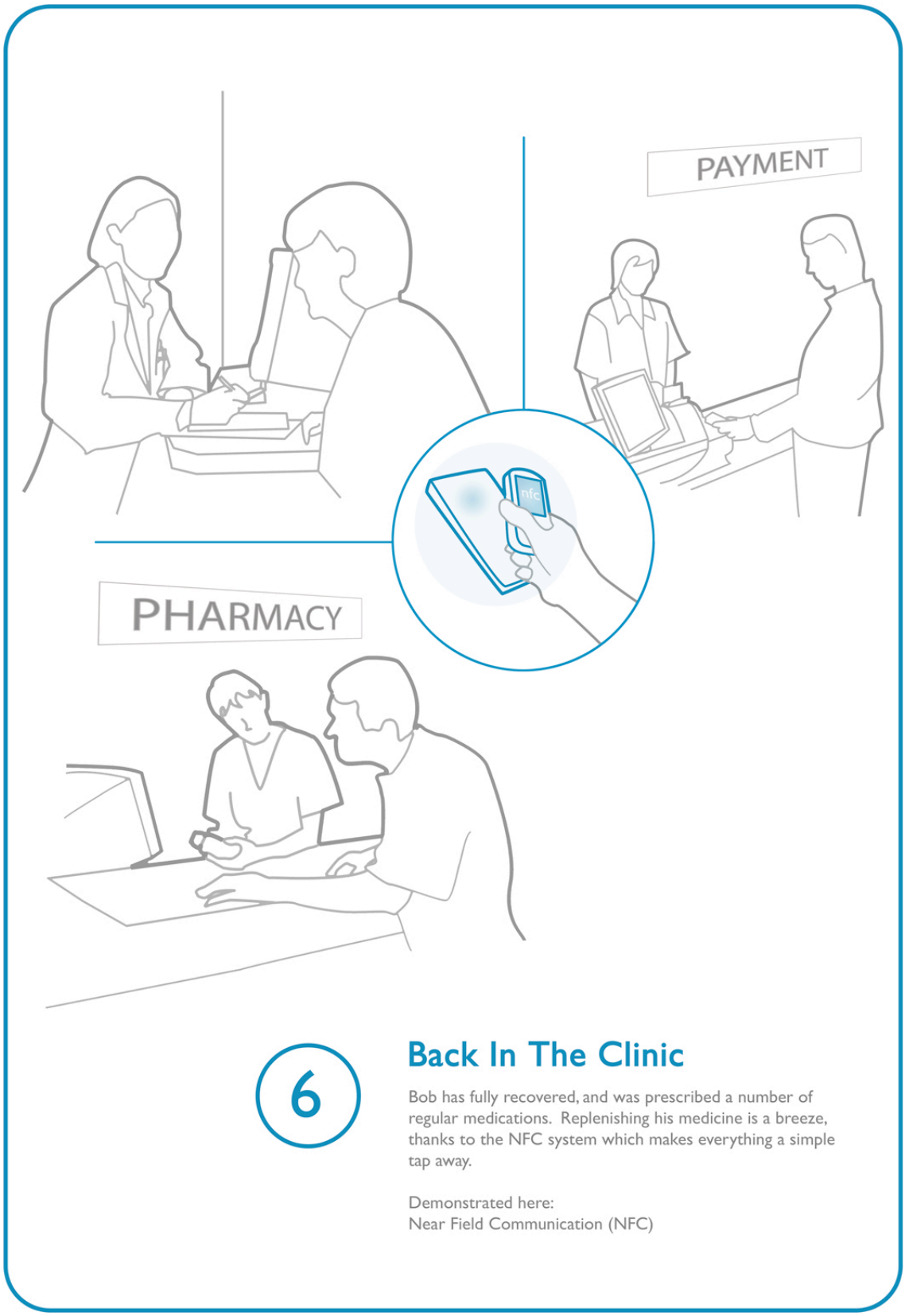


Figure 8-9 Clinical applications

8.6 Discussion

To date, **Healthcare Anywhere** has been presented to various healthcare groups in the region and also to the Ministry of Health (MOH) in Singapore. It was also presented to external vendors who are seeking to develop some of the solutions. One company had expressed interest in developing the solution with Philips InnoHub.

Internally, each product division is developing their application solutions based on the Healthcare Anywhere Theme by themselves. Mainstream Display Solutions is putting the Bedside Companion on trials in Europe. Connect Health is further developing Monitoring solutions and Motiva is currently on trials in the States starting from May 2007. The Medical Systems team in Tokyo is exploring applications in several hospitals with their universities.

Another key reason to facilitating the fast development of the project was due to the fact that the team adopted an Intent-Driven rather than a Consumer-Driven Approach to defining the scenarios. Much of the information needed to drive the project forward was attributed to the team's intention on providing the various healthcare scenarios rather than waiting for the consumer findings should it adopt a Consumer-Driven Approach.

All these were made possible because the Integration Agent's role, which was taken up by the InnoHub in this case, was able to facilitate and rope the relevant stakeholders together to present a more holistic picture in delivering healthcare solutions to the public domain.

In fact, the Healthcare Anywhere project went so well that a video was made out of Bob's life and the different demonstrators were shown in the video. The video can be found together with the submission of this paper.

9 Case Study: DAP Innovation Support

9.1 Research Objectives

This case study explains the framework of an Innovation Support program that was conducted for Philips Domestic Appliance and Personal Care (DAP) Singapore by Philips InnoHub. A similar workshop program was conducted for DAP in the precedent year prior to this case study but that was used as a developmental control for refining the tools, in particular the Focal Ideation Tool. This case study illustrates the second program that was conducted after the refinement of the tools and the process. As such, this case study demonstrates the results of an action research method.

9.2 Case Study Background

Philips Domestic Appliance and Personal Care (DAP) Singapore is focused on the Garment Care and the Health & Wellness domains. Together with Philips InnoHub and the National University of Singapore (NUS) Department of Industrial Design and Department of Mechanical Engineering, an innovation workshop program was initiated to explore into new concepts and application solutions within the Garment Care and Health & Wellness domains. The program was undertaken between September 2006 to May 2007.

Garment Care is a very mature industry by itself. Looking at the product variations and development of Garment Care in the ironing domain, the form of irons have not changed much since the introduction of charcoal irons decades ago.

Health & Wellness however, is a very fresh and new direction that Philips is looking to grow into. Being a market leader in healthcare solutions, developing into wellness will be a sensible move for the company to grow its niche into. Now that consumers are becoming more discerning in taking care of their own health, this is potentially a viable area to explore into.

The program stretches over one year, comprising of two semesters based on the academic calendar of NUS. The groups are supposed to be carrying out their initial studies and conceptualization in the first semester before focusing into making a working prototype in the second.

The project is divided into 2 categories, the Garment Care and the Health & Wellness. There are a total of 4 groups with 2 groups in each category. Each group has a DAP senior engineer attached to them as a coach and their respective project briefs are listed below.

The Garment Care groups are tasked with

- ***Rebuilding the Steam Iron***
- ***System Iron – The Next Generation***

Rebuilding the Steam Iron

For decades, the dominant design of a typical household iron has remained fairly consistent.

- What are some of the reasons behind its consistent form factor?
- Many fabrics and technologies have been introduced to the garment industry over the years. Will this change the way consumers iron their garments?
- Are there any better ways of redesigning the conventional steam iron to a better form?

- By understanding how the steam irons are being used today, how will you rebuild the steam iron with a different and yet more appealing form factor to redefine the way consumers take care of their garments?

System Iron – The Next Generation

- Current system irons comprise of a boiler and an iron, which provides high steam rates for ironing with long autonomy time. What are some of the issues faced by consumers today regarding the usage of such system irons?
- Could the boiler be too bulky for storage or could the iron be improved to increase the efficiency of the system?
- By exploring into these issues and keeping in mind the criteria of the system iron, how will you redesign and develop the next generation of system iron without compromising its performance; bringing ironing solutions to a greater height?

The Health & Wellness groups are tasked with

- ***Foot Massager***
- ***New Experience Massager***

Foot Massager

Daily commuters often experience conditions of aching, tired and heavy feet. In a bid to combat such discomfort, a foot massager is commonly used as a temporal relief. However, we believe that such an approach to finding relief can come as a more holistic form of a feet therapy process.

- How will you enhance the process and concept of feet therapy as a total solution for the feet?
- Could the solution be a fusion between the western and eastern culture of therapies?

- By understanding the different massagers and knowing what triggers the consumers, how will you design a new product concept for foot massagers?

New Experience Massager

The growing demands of today's society are causing many to experience much more emotional, mental and physical strains than it was as compared to yesteryears. In response to such changing environments, consumers are also turning to home-based relaxation devices and new techniques to fight off stress.

By conducting a market scan of the technological sphere, evaluate the potential routes for realization of a new experience massager device.

- What will be the essential elements or features that defines a perfect new experience massager, that is customizable for people from all walks of life?
- By understanding the different interactions of the human experience, how will you design this new experience-massaging device?

Each group was to explore their topics based on the project briefs. Focal Ideation Tool was applicable in this context because it allows the groups to explore their topics in a very focused manner. It was also able to generate many Themes which are useful for DAP's future reference even though the groups were only needed to make a working prototype based on one Theme. The other unexplored themes could be developed during other periods depending on resource availability and also the direction and strategies of DAP.

This program is collaborative effort between:

- Philips InnoHub (Key facilitator and project manager)
- Philips DAP (Program client and engineering coaching)
- National University of Singapore (Industrial Design)
- National University of Singapore (Mechanical Engineering)

9.2.1 Program Objectives

Having the opportunities to leverage on both InnoHub's capabilities of driving innovations and the creative input from the students in the National University of Singapore, DAP was able to have their resource to focus on their current product road-map. They also able to use the program to explore beyond their road-map in identifying potential opportunities that they can utilize on in future.

Hence the main objective for the program is to for the groups explore new concepts and solutions for the 2 categories Garment Care and Health & Wellness. The end outcome will be a working prototypes based on feedback and coaching from DAP's side and also many potential Themes that DAP can develop on in future.

9.2.2 Issues of Contention

The groups have different starting points and knowledge of their topics. This is aggravated by the diversity in the group composition as the groups were made up of a mix of students from both the Mechanical Engineering and Industrial Design faculties. It was important to align the knowledge within each group so that their views and objectives would be more aligned to address the objectives of the program. The groups' knowledge into the two domains were also too shallow to start off in comparison to the years of experience the DAP coaches have. However, this issue could also be used in the context that the mind frames of the groups were not "boxed-up" and were able to think and ideate in a more "freely" manner and it proved so during the application of the Focal Ideation Tool when the groups were put through to answering the "Wow" questions. Nonetheless, the groups spent quite a fair bit of time initially to get acquainted with their respective domains.

9.2.3 Approach

The approach adopted by the groups was a mixture of both consumer research and Intent-Driven approach. The rationale behind this is because the groups' knowledge into the domains were too shallow and hence it was necessary for the groups to conduct their initial fair bit of consumer research to gain more insights into the problems. Meanwhile, the project briefs were worked out together with DAP by the Integration Agent in InnoHub. DAP had their intentions to explore on certain areas within the domains however they understood that their briefs were just Initial Intents and it was necessary to define the Principal Intents and conduct some validation tests with consumers prior to developing the intents further with the groups. Hence the approach that was used was to have a mixture of both and yet having the ability to test and refine the Focal Ideation Tool.

9.2.4 Utilized Tools

Based on the objectives of the workshop, the tools that were used included

- **Purpose Hierarchy Tool** to identify the Principal Intent from the Initial Intent
- **Focal Ideation Tool** in the sessions of ideation workshops
- **Affinity Diagram** in grouping the ideas into Themes

Focal Ideation Tool was used intensively in this program. The groups went through many iterations of the tool in defining the [How] questions and ideation before constructing Themes using the Affinity Diagram.

9.3 Phase 1: Identification

The groups' first tasks were to work out an approach to address the project briefs given to them. The Initial Intent given to each group were of differing nature and hence their approach were slightly different. However, as the groups had to get acquainted with their domains, they conducted their initial consumer research by *(Look)* talking to consumers, *(Ask)* interviewing electronics store salespersons, *(Learn)* benchmarking competitors and also *(Try)* using the products themselves.[41] After their consumer research, the groups conducted their first sharing session within their own domains to align the knowledge of all the members.

This activity is classified under the "Sharing the Basics" of the generic brainstorming approach. There was a need to get the groups initiated to their domains because evaluation from the previous year was that the groups had minimal knowledge of their domains to contribute effectively to their workshop ideation stage, as their ideas were either too far-fetched or difficult to implement within their domain topic.

[41] IDEO method cards, *Op cit*

9.3.1 Purpose Hierarchy Tool

Taking their newly acquired knowledge and their project briefs as Initial Intent, the groups proceeded with the Purpose Hierarchy Tool, identifying the Principal Intent for their topics.

Within their own domains, each group identified a few Principal Intents prior to deciding on one to develop further. The list of the Principal Intents identified after the first application of the Purpose Hierarchy Tool is

Garment Care

- To facilitate ease of ironing over irregular surfaces so as to reduce ironing time
- To eradicate unnecessary volume/space taken up by the iron so as to facilitate storage
- To explore into alternative ironing methods by removing the need of a generic iron

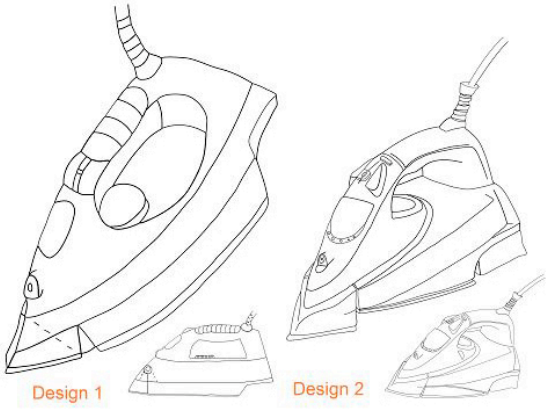
Health & Wellness

- To create a massager that offers spa features to users so as to create value add
- To build a massager that is customizable to fit consumers of different shapes and sizes
- To explore into building a massager into the home environment so that it will not look obtrusive

The decision on which Principal Intent to develop was to be made after consultation and discussions with DAP. However as DAP felt that all the proposed Principal Intents were valid, they suggested developing the Principal Intents further before they can make more valid decisions. Hence the groups went on to further develop concepts based on the proposed Principal Intents and the diagram below shows some examples of their interim development work.

The FlipTip

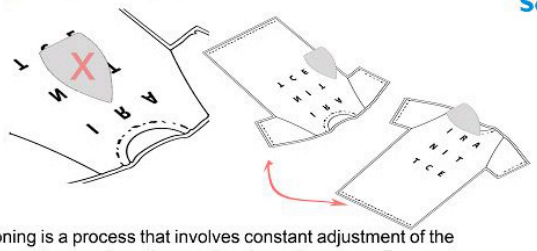
- **Precision Tip for detailed areas**
- **Less adjustments of garments**
- **Less re-ironing**



Concept

The human foot as a machine is an engineering marvel. It is designed to stomp through the most undulating terrains as well as to tip-toe across narrow paths and ledges. The FlipTip draws its inspiration from the tip-toe action of the feet - a precision ironing surface to smooth small areas around intricate designs on clothing.

Pragmatic Analysis

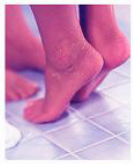


Ironing is a process that involves constant adjustment of the garment as well as the user's grip and posture. Frequent adjustments and flipping of the garment makes the previously smoothed portion wrinkle up again.

Also, users have to be careful when ironing garments with intricate designs. Heat when applied directly to the designs can damage it.

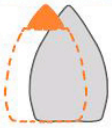
Semantic Analysis

Sharp



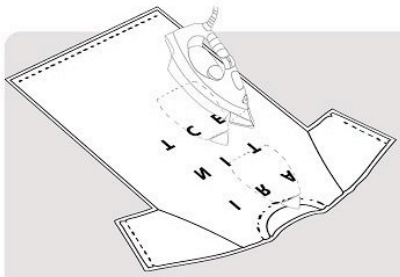
Nimble

Value Added



The FlipTip makes the iron more nimble around tight spots. It shifts the focus of ironing from adjusting of garments to smoothing of creases.

The less adjustments the user makes, the less likelihood that previously smoothed portion will become creased again.

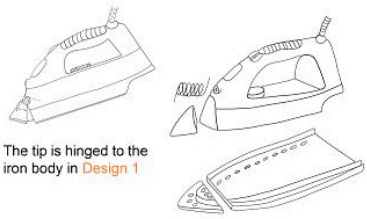


Garments can be more **conveniently pressed** with the **small precise surface** of the **FlipTip** which allows the user to iron around **intricate designs**.

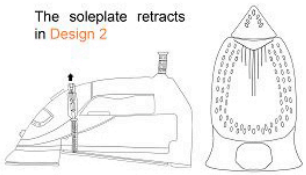
Context

How It Works

The body and soleplate of the iron consists of two halves, the tip and the base. The tip of the iron is hinged to the main body and is flex-able when the user presses on it, creating a precise ironing tip surface. An alternate design involves retracting the base of soleplate upwards, leaving the tip intact for ironing.



The tip is hinged to the iron body in Design 1



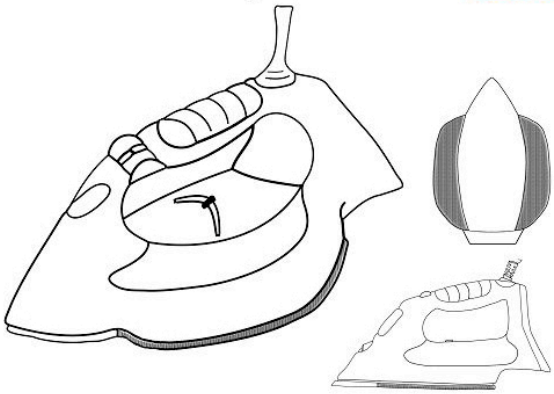
The soleplate retracts in Design 2

Figure 9-1 Concept sketch of the Flip Tip

Rebuilding the Steam Iron with PHILIPS

The Stingray

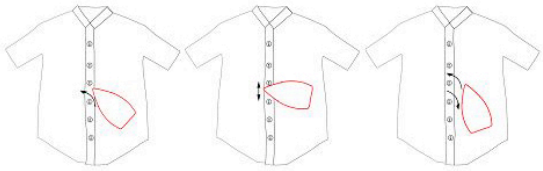
- Mesh Wings irons over buttons
- Large soleplate foot-print
- Tough, rugged exterior



Concept

The Stingray swims with a flying motion, propelled by their large pectoral wings, while their bodies remain relatively flat. It is this graceful movement that inspired the conceptualization of the stingray iron. Imagine being able to iron over buttons, the same way that the sting ray glides effortlessly over water!

Pragmatic Analysis



The conventional way of ironing between buttons is to slide the tip of the iron in between a pair of buttons, slide out, and then slide in between the next pair. The user rotates his/her wrist repetitively coupled with repeated movement of the arms. It makes ironing a tedious and repetitive task, especially when the user has a lot of shirts to iron.

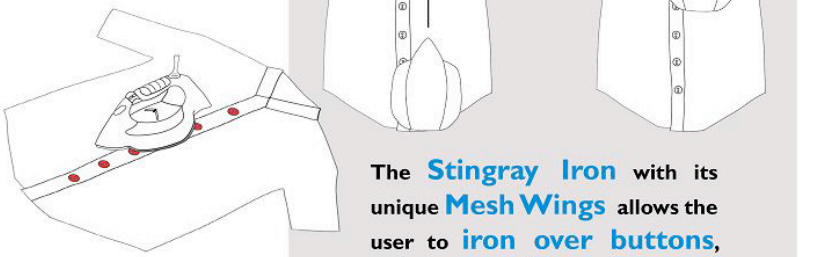
Semantic Analysis

Movement of a stingray

All terrain vehicle

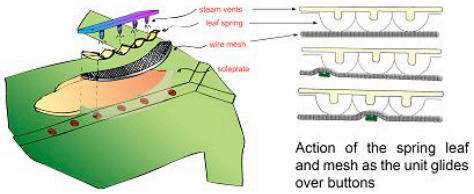
Value Added

The stingray will be the only steam iron in the market that can iron over buttons. Less repetitive motion of the wrists makes ironing less tedious of the consumer.



The **Stingray Iron** with its unique **Mesh Wings** allows the user to **iron over buttons**, reducing repetitive twisting and rotation of the wrist and arm.

How It Works



Action of the spring leaf and mesh as the unit glides over buttons

The soleplate consists of a conventional but narrower base, flanked by mesh-like material at both sides. The mesh region, or Mesh Wings, deforms continuously to the shape of the buttons, allowing the iron to glide into and through the buttons. The shirt can be pressed in one smooth continuous motion, rather than with the repetitive twisting of the wrist.

Context

Figure 9-2 Concept sketch of the Stingray

Note that for this part of the process, the Parameter Handles were not in use here as the objective of the program was to explore and identify developmental opportunities. Parameter Handles will be used only when the group decides to implement and develop the opportunities with the relevant stakeholders that are involved in the process of new product development. Hence without the Parameter Handles, the groups were able to focus fully on just identifying the Principal Intents for the domains.

9.4 Phase 2: Exploration

It took the groups a few sessions to conduct their initial consumer research and understanding their relevant domains before they could identify Principal Intents during the Phase 1 of the entire program. By the time the groups were ready to move into Phase 2, half the semester was over and the groups had only half a semester to execute Phase 2. The timing was planned in such a manner because requirements for the program was to build working prototypes at the end of the year and it was planned for the groups to have ample time in the second semester to refine and build their prototypes.

9.4.1 Focal Ideation Tool

With the Principal Intents, the groups went through a few workshops using the Focal Ideation Tool. Together with InnoHub, each group were explained on the guidelines to draft out their range of [How] questions and with InnoHub's guidance, the groups went about to draft the questions. Here is a list of some of the questions that were drafted during the workshop sessions.

Garment Care

[How] to prevent ourselves from being scalded by the iron?

[How] to iron without ironing board?

[How] to make an iron safer for the clothes?

[How] do we straighten garments without ironing them?

[How] do we iron over garments with buttons, zips, etc. without causing streaks on the garments?

Health & Wellness

[How] do we make a massager discreet in use or storage?

[How] do we create a massager without mechanical or electrical parts?

[How] to make it scalable to various foot sizes?

[How] to provide a massaging session experiential?

[How] to dimension it 10cm x 10cm x 10cm cube?

9.4.2 Affinity Diagram

Using Affinity Diagram after the ideation step, the groups were able to identify a few Themes addressing the Principal Intents.

Garment Care (*Rebuilding the Steam Iron*)

- Fliptip – A special tip on the sole plate designed to iron over buttons
- Water Handle – Storing water in the handle to save space
- Garment Refresher – Ironing without ironing board

Garment Care (*System Iron – The Next Generation*)

- Collapsible Iron – Storage flexibility
- Steamer Case – Ironing without an iron
- Hovercraft Iron – Goodbye to soleplates

Healthcare & Wellness (*New Experience Massager*)

- Modularity – Use as you need
- Massager on the Go – Portability
- Nouveau Materials – Other materials to provide the massage sensation

Healthcare & Wellness (*Foot Massager*)

- "Exhilarating, live" – Dynamic and non-static device
- "Made to measure, on the go" – Customized for the user
- "Now you see it, now you don't" – Discreet at home

With these Themes, DAP was able to give more concise feedback and make clearer decisions regarding the Principal Intents.

9.5 Outcome

Under the guidance of InnoHub, the groups proceeded on to develop their concepts and ideas based on the DAP's feedback. Through refinement and stage gates for the groups, they were able to conceptualize to more specific details and the following diagrams illustrate some of the concepts that were developed during the subsequent workshops.

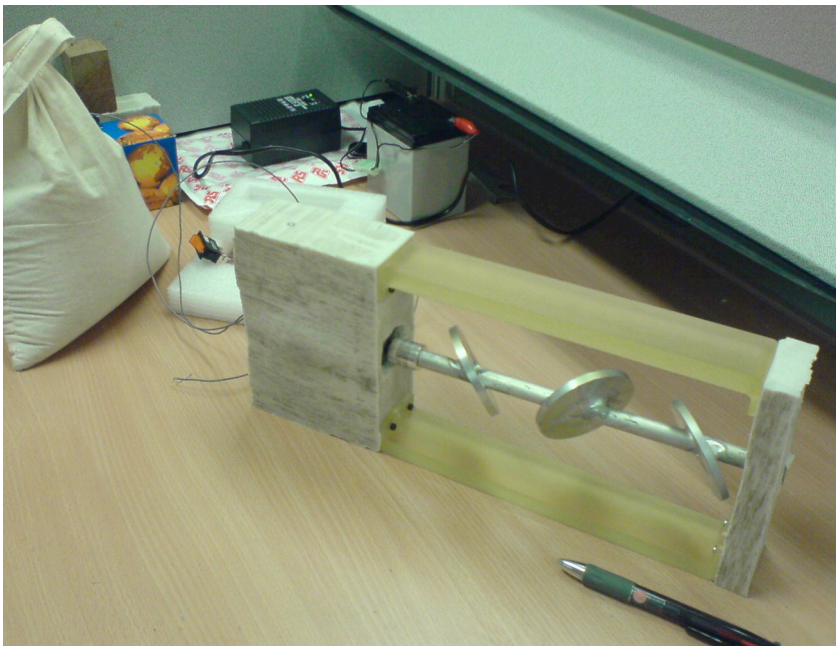


Figure 9-3 Sand Massager

Figure 9-4 Grandiose foot massager

With these concepts presented to DAP, DAP then gave further directions to develop on the working prototype. Together with InnoHub, the groups proceeded on the detailing and the construction of the prototypes.

9.6 Discussion

Each of the prototypes that were constructed was able to address the Principal Intent and the project briefs that were being defined earlier.

Initial feedback of the prototypes were very well received and the DAP coaches were very pleased with the outcome. The prototypes were scheduled for presentation to DAP Marketing Group and the Product Planners in the later half of the year. Intentions for DAP is to identify potential business cases which they can build around the prototypes that were constructed.

DAP was very pleased by InnoHub's role as the Integration Agent and the process ad tools that were being utilized that they are currently in discussions of carrying on a third year of the Innovation Support program.

10 Phase 3: Alignment

More often than not, companies have stopped short in their innovation processes by reaching a standstill after the ideation phase. With too many ideas to explore or a vision too broad, the companies will usually face a resource issue or too many possible permutations of ideas that they can develop. They need to make decisions based on resource limitations and also develop ideas that are aligned to the companies' directions. "**Stitching expectations**" will describe an approach to achieving innovations and yet able to meet up to the expectations of the different ranks and department within a company.

This phase is probably the most important phase in the Intent-Driven Approach to Innovations, because it is the one phase that allows companies to align their intentions to their strategies and visions. With the different ideas that were generated during the initial two phases, this phase allows the companies to decide which themes to pursue given their limited resources while bringing them one step closer to achieving their visions.

The only tool that will be explained in this chapter will be the **Strata Four Tool**. As briefly mentioned in Chapter 4.3.3, this tool plays the important role of digesting problems into implemental solutions for different ranks and departments within a company to take up and run while not digressing too far off from the company's visions and strategies.

This tool will be further illustrated and explained with a high-level case study that involves a company's strategies and how it allowed the company to plan accordingly to address the themes that have been identified.

10.1 Strata Four Tool

10.1.1 Objectives

This tool is massive in nature and that means that it can be used in different ways to support the innovation process within a company. However, it does not diminish the fact that the underlying objective of this tool is to allow companies to hasten and shorten the time of the innovation process. Unlike the tools mentioned in the earlier chapters, this tool is flexible with regards to how the company would like to use it.

It is housed within Phase 3: Alignment because this tool bridges across the different disciplines of the company. From the front-end market researchers to the sales office and right down to the research and development team, this tool allows communications within the different disciplines and facilitates for innovations to happen quickly, hence "**stitching expectations**".

It is called **Strata Four** because it is built around four layers of relationships involving the consumer, the company and the products offering. By mapping these layers of relationships to the engagement process involving the consumer, the company is able to segment their themes generated during Phase 2 into actionable pieces without losing sight of their Principle Intent and as a result aligning closely to the company's strategies and visions.

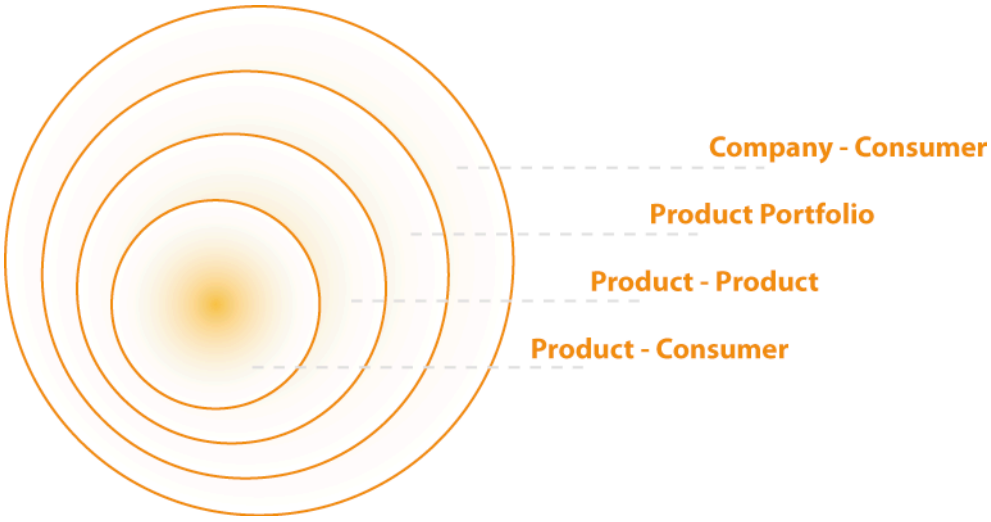


Figure 10-1 Strata Four Tool showing the layers of relationships

10.1.2 Characteristics and Advantages

The flexible nature of the Strata Four Tool in terms of its usage can be listed as one of its key characteristics and core advantages.

Companies can use it to identify specific areas that they are lacking or weak in presently. Similarly, they can also use it to map out their development plans for the future. By addressing these four layers of relationships, companies are able to address key areas to focus their growth on.

The Strata Four Tool has the capability to bridge across the different ranks and departments of the company to create a common understanding or a cornerstone for the different departments to communicate, hence defining everyone's actions and aligning their expectations. By putting their plans into the four layers of relationships, the company is able to identify relevant stakeholders in the respective layer and hence able to move things faster within the organization.

10.1.3 Building Blocks

Four building blocks will be used in this tool, of which three of them have been explained in the earlier chapters. Only the fourth block, which defines the nature of this Strata Four Tool, is new.

- ***Principal Intent***
- ***Themes***
- ***Parameter Handles***
- ***Four Layers of Relationships***

Principal Intent

This is the same Principal Intent that was identified using the Purpose Hierarchy Tool in Phase 1. It is used in this tool mainly to serve as the cornerstone and reference point for presentation of the Strata Four Tool. It is important to have the Principal Intent in place so as to have a common understanding that the themes presented and segmented under the Strata Four Tool are focused on achieving the Principal Intent.

Themes

These themes can reflect two things, firstly the outcome of the ideas to the [How] questions that were being generated. Secondly it could also mean the themes that were generated and identified after collating the ideas. Preferably it is better to use the generated themes rather than the ideas, as the intention of the Strata Four Tool is to help companies segment and digest the bulk size of the issues that they are seeking to address. By having the generated themes, the companies do not have to handle the massive numbers of ideas that were previously generated and with themes; there is more focus for the group. Take note that both are usable so long the relevant parties could manage the results efficiently.

Parameter Handles

These Parameter Handles are those that were identified in the earlier Phases. They are used in this context to identify potential gaps that the companies might face when trying to implement some of the themes under the Strata Four Tool. Depending on the situation, they might be present or absent at the time of execution. However, they should at all times be communicated to the relevant parties implementing the solutions.

Four Layers of Relationship

This is the most important building block of the Strata Four Tool. It has been identified that there are four important relationships involving the consumer, company and the products offering. The four layers of relationships are:

1. **Product – Consumer**
2. **Product – Product**
3. **Product Portfolio**
4. **Company – Consumer**

By aligning the layers of relationships companies will be able to map out their execution plans and identify the relevant stakeholders within each layer of relationships. This is useful for the companies especially when they are identifying the key driver or project manager for each relevant layer of the relationship.

1. **Product – Consumer**

The first layer of relationship is the relationship between the product and the consumer. This layer focuses on how the product interacts with the consumer both implicitly and explicitly. The most influential party involved in this relationship will be the design department for they provide both the industrial design and the user-interface design of the product and these are the primary form of interaction that the consumer will have

with the product. Examples of some of the factors that affect this layer of relationship include:

- Materials and textures
- Graphical user interface
- Product user interface
- Lighting interaction
- Cognitive interaction

The listed factors (though not exhaustive) are examples of how the design department is able to influence the interactivity between the product and the consumer.

2. Product – Product

The second layer of relationship will be between the product and other similar products that can be found in the market. The other products need not necessary be from competitor brands and they can also be under the same brand so long they provide similar features and functions in the perspectives of the consumers. The driving party for this layer will more often than not be the product manager and most likely, they reside in the product development team of the company. Some examples of the affecting factors include

- Predecessor products
- Existing competitors
- Forecast competitions
- Value-added differentiators

By having a good understanding and study into these factors, the product manager will be able to identify the value-added differentiators that the product should have in order to differentiate from its competitors hence positioning the product better.

3. Product Portfolio

The third layer of relationship is the product portfolio of the product offering of the company. It involves the supporting products that the company is offering. It can also be termed as product family. This layer usually affects the perception of the consumer of a company. By having a huge supporting family of products, the perception is naturally stronger than just having a single product. Product planners are the key drivers for this layer as they usually are to map out the product roadmaps for the year in view with the other products that were being planned. With a strong product portfolio, there is consistency in a company's brand name in the eyes of the consumer. Some key factors affecting this layer include

- Product family
- Systems of product
- Complementing functions
- 3rd party products

3rd party products have been playing an increasing role over the years in terms of gauging market acceptance of a product. A quick look at the number of 3rd party Apple iPod accessories will be able to illustrate the leverage power of providing complementing functions. Having 3rd party products also help to ensure sustainability of the product life cycle.

4. Company – Consumer

Last but not least will be the relationship between the consumer and the company. This is the most intangible relationship layer among the four. However, many companies are putting more resources into this area to boost their sales and market penetration of their products. Since the days of using industrial design to create the edge in sales, companies are shifting into brand and design management to increase awareness of their brands.

Being intangible, there are many drivers and some of the key drivers in this layer will involve the corporate communications and sales and marketing. Factors that affect the consumers' perception of the company include

- Media
- Point-of-sales display
- Packaging
- Manufacturing excellence

The list of factors involving the **Company – Consumer** relationship is not exhaustive and there are still many possible factors that will affect this relationship. There are a lot of externalities that will reinforce the company's brand to consumer. What was listed are key areas that the company can focus on internally to create a difference rather than depending on external factors. For the purpose of this paper, it will be listed in this manner to illustrate the driver for this layer.

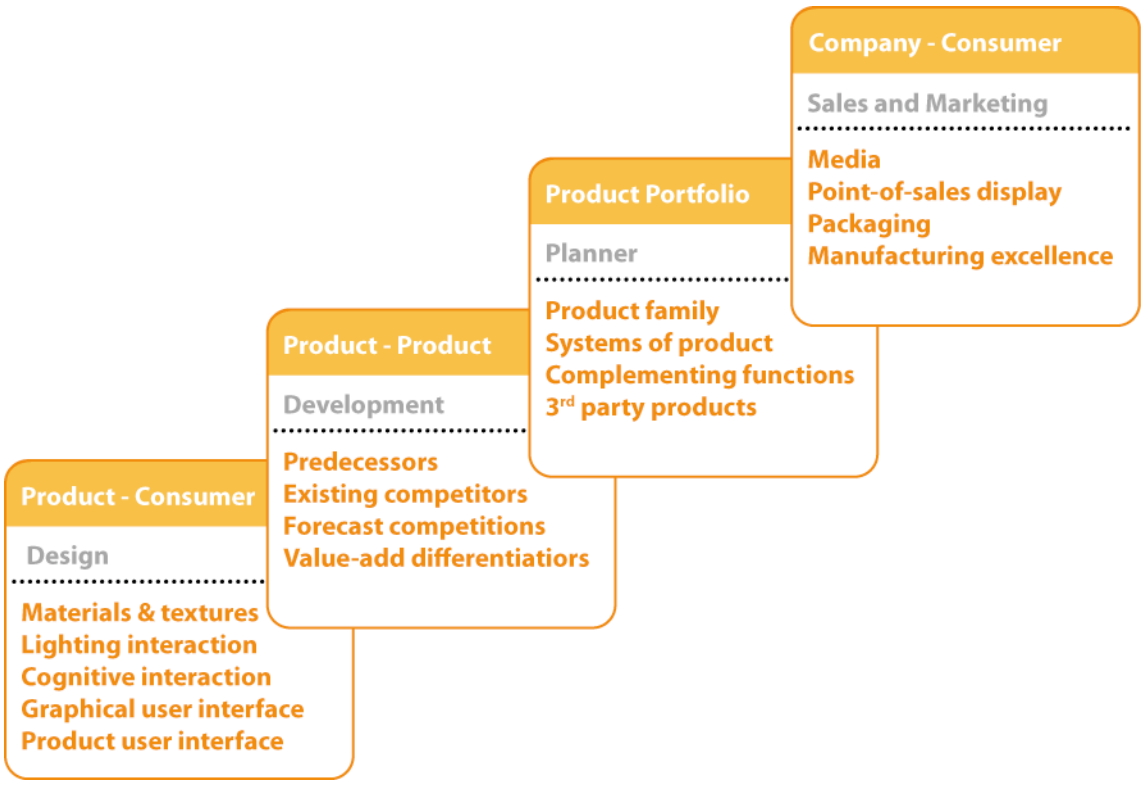


Figure 10-2 Example of the Four Layers of Relationship

10.1.4 Execution Steps

The execution steps for the Strata Four Tool is not as concise as the Purpose Hierarchy Tool nor the Focal Ideation Tool as it has a flexible nature and can be applied by the companies in different forms. However, the most important step is for companies to identify the respective Themes into the respective alignment layers of relationships. This is easily achievable during a workshop with the stakeholders as participants and the Integration Agent as the key facilitator.

This is normally done in a worksheet format and the template should include the following points:

01 **Principal Intent** – this should be identical throughout the workshop

02 **Strata** – this is the layer of relationship

03 **Theme** – identified with the Affinity Diagram

04 **Interaction Links** – derived over a brainstorming session

05 **Possible Action Points** – optional brainstorming session among participants

06 **Driver** – the key stakeholder driver for the Theme

07 **Checkpoints** – dates for follow-up actions to ensure progress

This worksheet serves only as a guideline for participants to formally piece their relevant information together in order to facilitate further discussions while staying focused. Its objective is to illustrate concisely the factors of the themes to the participants. It can adopt different forms and include other components that the group might deem necessary. However, it has to be noted that it is not necessarily good to include too many other components on such a definitive worksheet, as too many factors will distract the participants from being focused and hence losing its objectives. By having a worksheet

and the categories for participants to fill in, it forces the participants to think along the listed categories of the worksheet and keeps it more focused.

The group first identifies the layer of relationship that the Themes fall under. This is done usually during the workshop in a form of discussion. This is an important step for the group to actively take part in, as this step will define the stakeholders and the key drivers in developing and implementing the Themes into the company's strategies. Note that the Themes do not fall neatly onto a layer of relationships at all times. Sometimes, the Themes can be covering more than one layer of relationships and in such cases; the group will have to decide the more dominant layer in order to define the key driver or stakeholder for the theme.

After identifying the respective layers of relationships, the group brings the Theme further by listing out the **interaction links** of the relationship. For example, using the Theme of a

"Self-locating Remote Control"

If the group has identified this theme with the **Product – Consumer** as the key layer, they will then proceed to list out quickly the interaction links between the remote control and the consumer that would enable the "Self-locating" features. This list is actually product specific and the links that will be listed is dependent on the product nature. They are different in different context. The links are non-exhaustive in nature and they should be kept as concise as possible in order to translate them into action points for the group subsequently. Examples of **Product – Consumer** links for the self-locating remote control would be

Light and sound providing feedback

With this list of links, the group can then proceed to work in the action points that are applicable by the group. The list of action points is optional and the group can choose to generate the action points based on the ideas that were consolidated at the workshop or they can choose to work on the action points in their own timeline. Examples of the translated **action points**:

- Use of sound buzzer as an interaction link between the product and the consumer
- Use of light to periodically light up the remote control when it is in "sleep" mode

Figure 10-3 Theme – Interaction Links – Action Points

Other than the Theme and the interaction links, the Principal Intent is also written on the worksheet to serve as a form of "Mission" reminder for the group that will be developing the themes. It is always important to reflect back on the Principal Intent because usually in an innovation process, the original intention gets diluted and lost over time and the group will have a tendency to drift off.

Ultimately, there will be a list of themes and worksheets that are being filled up. These themes should be addressing the same Principal Intent and they should now veer too far off from it. As the themes are being identified onto their layers of relationships, they are being digested into possible implemental segments that the group can carry out in achieving these themes. What remains will be for the group to decide which theme to invest their resource into.

Prior to making decisions, there are a few ways for the group to evaluate the themes. As such, some of the evaluating criteria will be the Parameter Handles listed and most importantly, how much does achieving the theme achieve the Principal Intent? When evaluating these themes, use the Parameter Handles, as they were being reflected on the worksheet to help the group to identify the potential gaps or opportunities that they can tap on. If need be, the Road-Map that was built in Phase 1 can also be used to align the group's possible development target.

A suggested form of how the worksheet can take on is illustrated in the following figures. Each figure should be printed on separate sheets of paper for the workshop participants. For every Theme, the groups fill up all the worksheets and bind them up using the hole on the top right corner. This will allow each key driver to consolidate and hold each Theme with its relevant points.

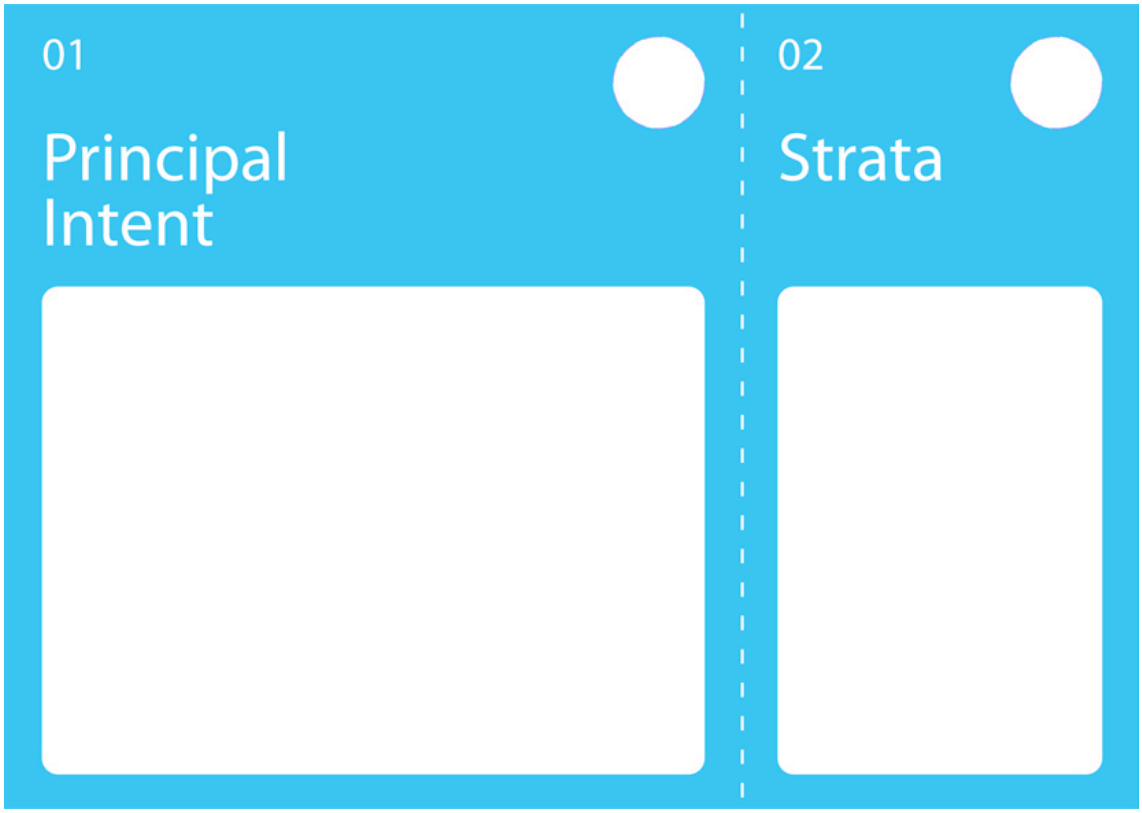


Figure 10-4 The Principal Intent and Strata Relationship worksheet

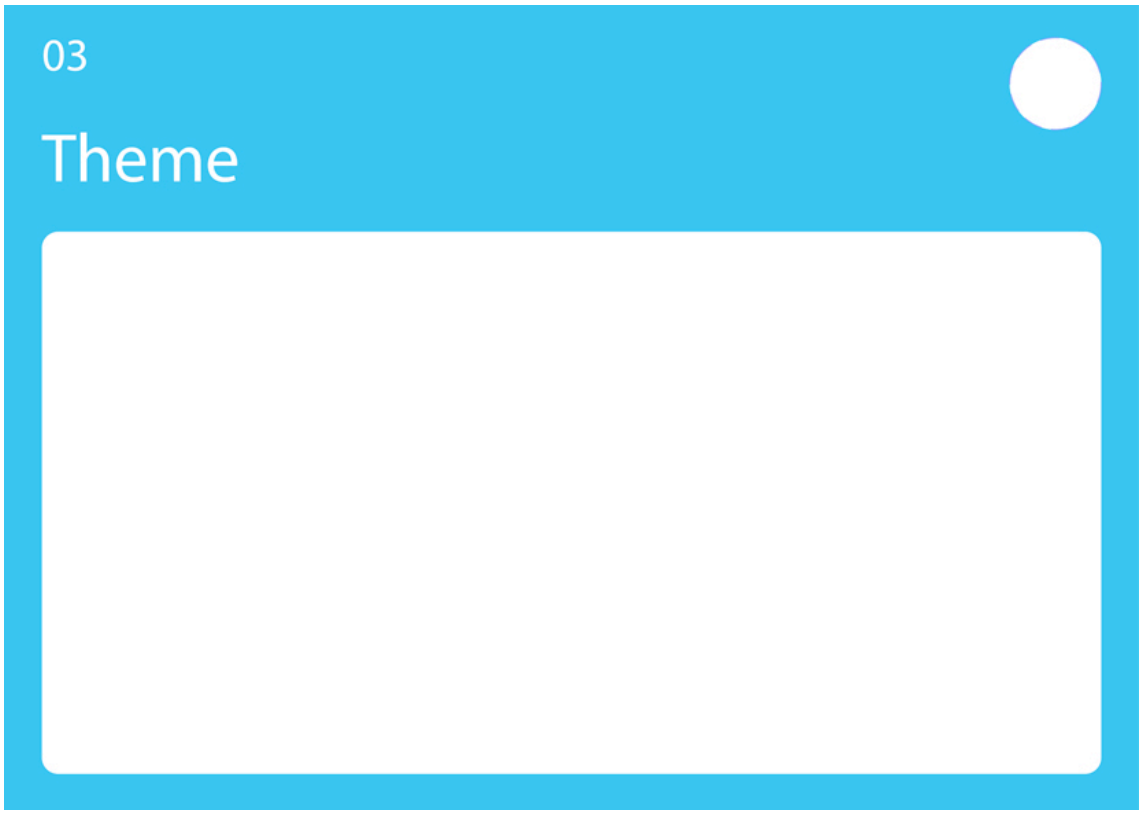


Figure 10-5 The Theme worksheet

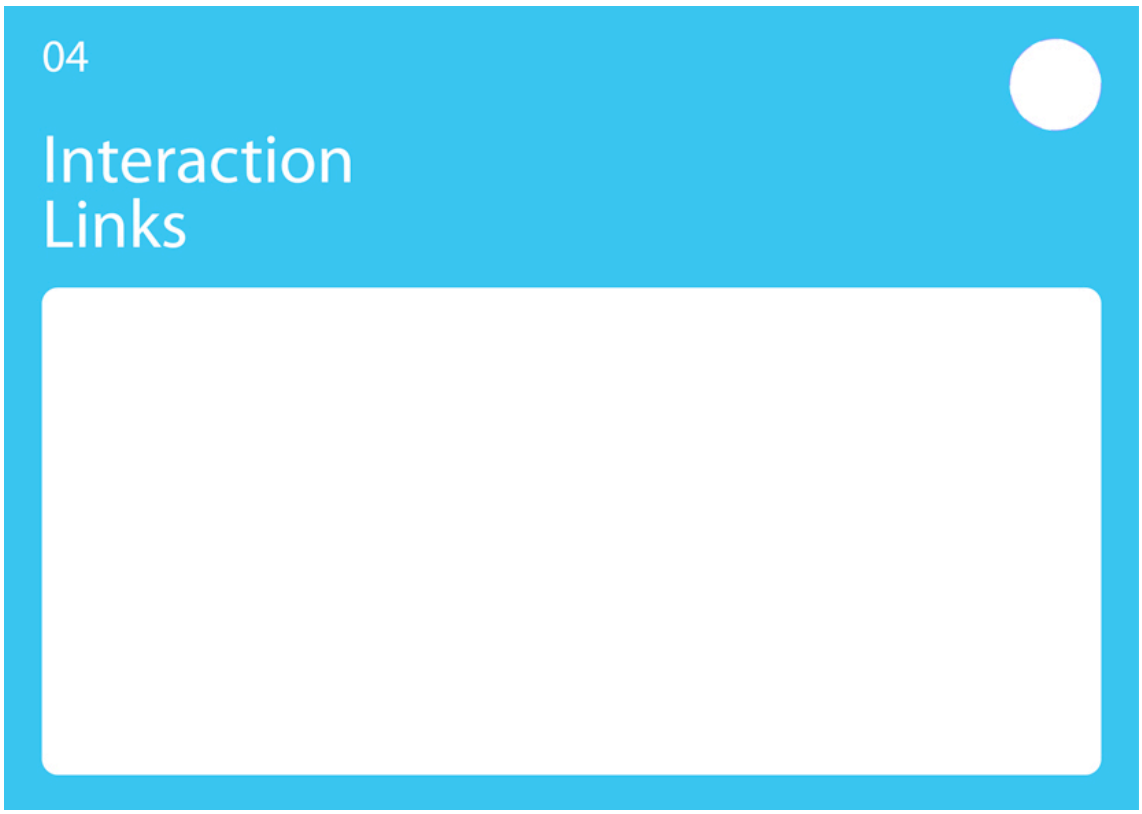


Figure 10-6 The Interaction Links worksheet

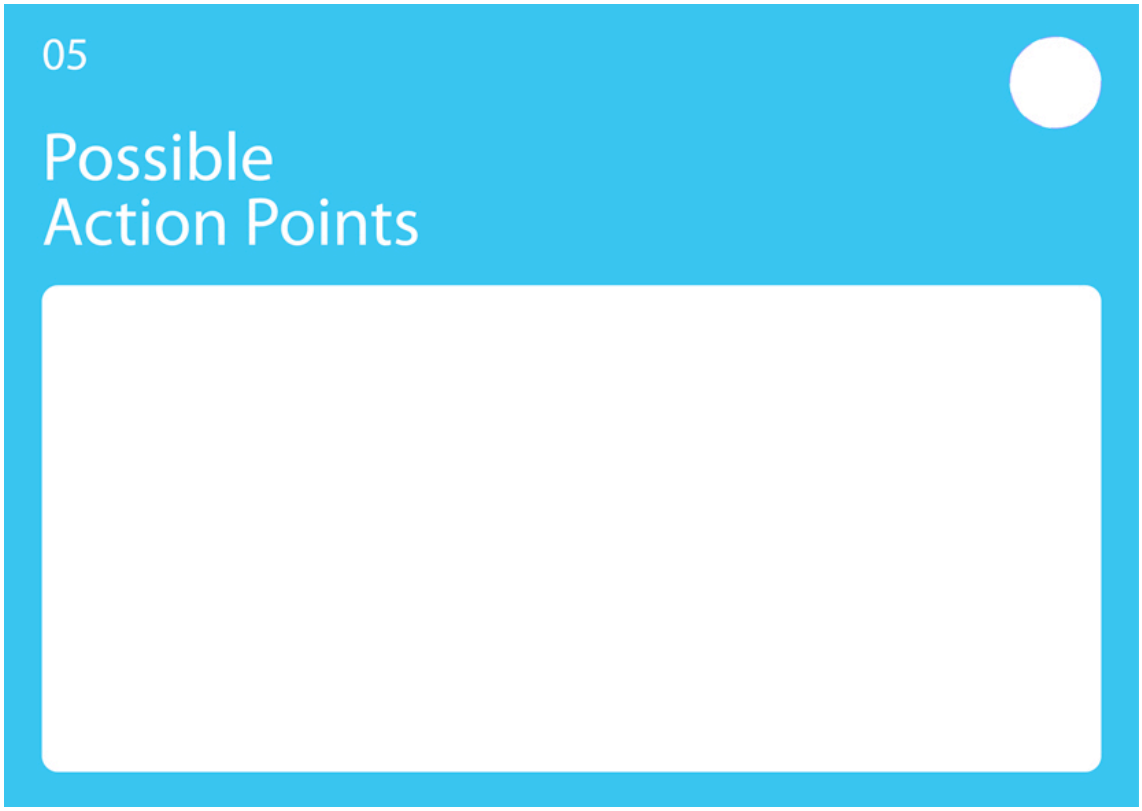


Figure 10-7 The Possible Action Points worksheet

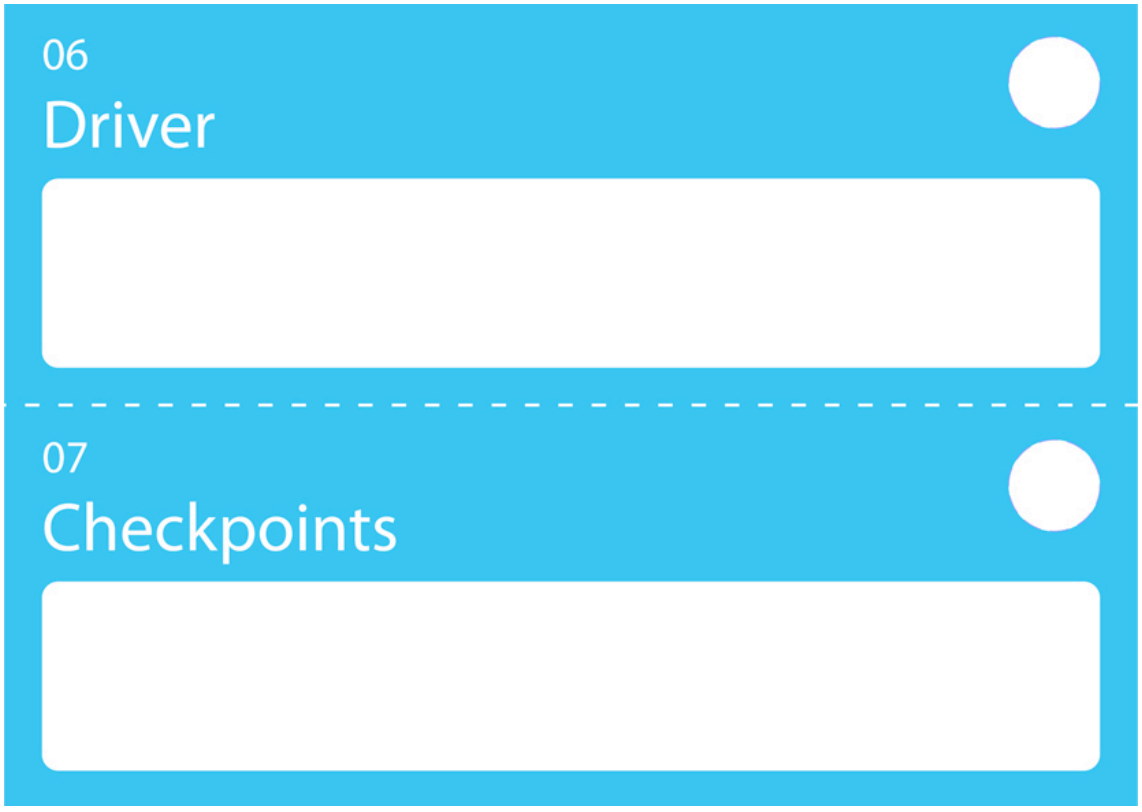


Figure 10-8 The Key Driver and the Checkpoint dates worksheet

10.1.5 Guidelines

It is useful to put a "follow-up discussion date" in the worksheet that is agreed by all parties, as usually such a development plan will collapse without follow-ups.

Only add in other components when really necessary, as more components will distract participants from the focus of the worksheet.

10.1.6 Deliverables

The main deliverable for this phase will be the completed worksheet stating the Principal Intent, Theme, Parameter Handles, defined layer of relationship and the key driver group for the theme.

10.2 Role of the Integration Agent

Being the key facilitator for both Phases 1 and 2, this continuation into Phase 3 as the facilitator will be most apt for the Integration Agent to take up, as he will be familiar with the Principal Intent and the Parameter Handles. As he is cross-trained in the different areas of expertise within the company, he will also be able to transverse between the different layers of relationships smoothly compared to others with a different background and focus in their training.

Hence the Integration Agent is the most suitable person who will be able to play the crucial role of helping the group to identify the layers of relationships that the themes reside on. In this context, he will be the key facilitator to classify the themes, list the interaction links and possibly to define action points for the group. His role does not end at the end of this Phase. Rather, his role has probably just begun, as he will be the unofficial timekeeper to ensure that the developments of the themes are kept to their milestones.

10.3 Case Studies

The case study that will be used for this phase of the approach is based in the flat panel TV displays industry. It was a project initiated by the development team within the flat panel TV displays and their objective was to identify approaches that they can adopt to increase the sales of flat panel TVs.

It was very suitable to adopt the Strata Four Tool as the Principal Intent of increasing sales for flat panel TVs is quite broad and there are many approaches in increasing the sales. In order to have feasible implemental plans, it is best to identify the approaches into themes and place them into the four layers of relationships.

10.4 Summary

The **Strata Four Tool** helps identify and segment the layer that the relevant participants of the workshop are established in. This allows a more concise and focused actionable plans that the parties are able to take on forward to develop and implement. However, even taken in the context of the different layers, all the participants are able to understand what are the action points undertaken by other participants and hence able to strive towards a more integrated approach within the NPD process. Figure 10-9 shows the summary for Phase 3 of the Intent-Driven Approach.

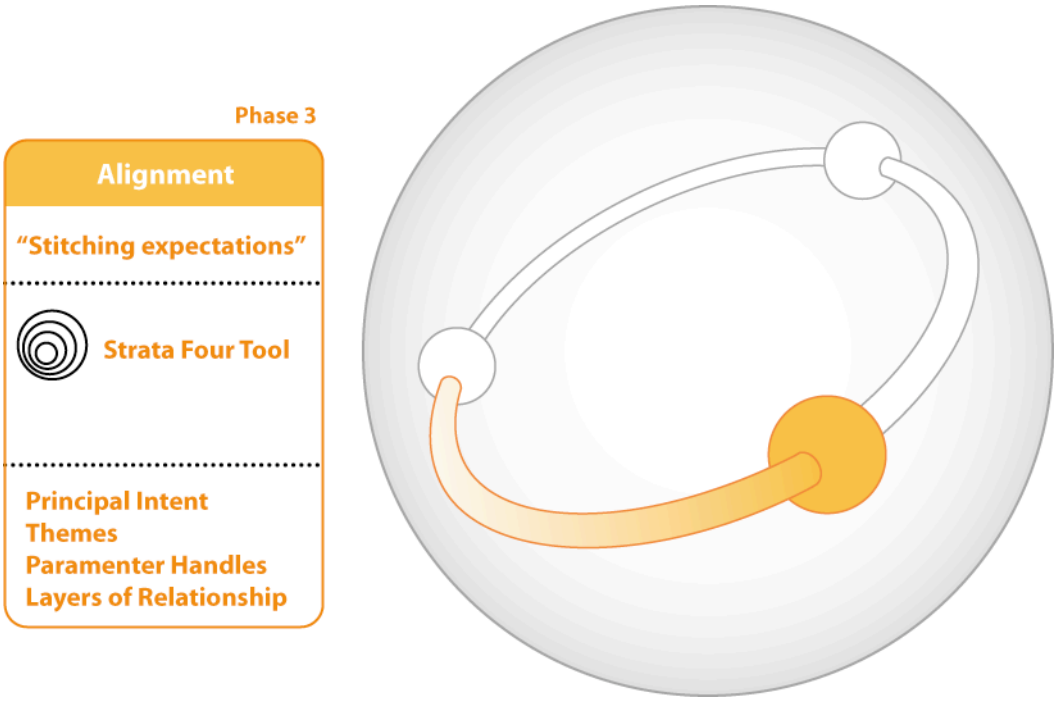


Figure 10-9 Summary of Phase 3: Alignment

11 Case Study: Flat Panel TV Differentiation

11.1 Research Objectives

This is a rather straightforward case study to research and refine the Strata Four Tool as it involves direct relationships between the consumer, the product, the company and its competitors. Direct links of the relationships can be easily identified and explained. Research objectives of this case study are to illustrate both the application and the flexibility of the tool. The final outcome of the study was presented to the client in the format aligned to the Strata Four circles so as to help the client digest their problem into smaller executable solutions. The case study will also demonstrate the cyclical nature of the Intent-Driven Approach that was explained earlier.

11.2 Case Study Background

Philips has been one of the earlier market leaders together with Sharp and Pioneer in producing flat panel TVs. However, recent entry of competitors such has Korea's Samsung and China's Shinco has brought about intense competition within the flat panel TV industry. It is increasingly becoming a price war in the market and rather than engaging in a price cutting action and pitting against the lower-priced competitors, there is an obvious need to 1.) Study as to why and how do consumers buy flat panel TVs and 2.) Initiate a study to explore options to differentiate Philips TV from the other brands.

The Mainstream Displays (MD) group that initiated this project belongs to the development team of the flat panel TVs within Philips and they have limited communications to the Sales & Marketing and the servicing groups. From their end, they

would like to understand if there is anything that they can add to the flat panel TV from the development end to create value add to the consumer.

In a different perspective, it is to identify ways to add value to Philips TV such that consumers do not just use price as a differentiating factor. Hence, the project started with the following key objective:

How can Mainstream Displays (MD) differentiate televisions

from those offered by its competitors?

In the entire TV engagement experience

[Buy] - [Set-up] - [Use], how can Philips deliver a 'WOW' to the customer?

(The TV engagement experience will be elaborated under the "Approach" section.)

The first objective was the initial primary research study with the second objective being the intention to be the follow-up step for the development team to take over.

As this is a multi-faceted project, there are many stakeholders involved in it and they are

- Philips InnoHub (Key facilitator, project manager and content provider)
- Philips Mainstream Displays (Client)
- Philips NSO (Sales and Marketing)

The secondary parties that were involved in the project during the research included the TV Installers, Salespersons and the Store Managers at the Harvey Norman and Courts electronics stores.

11.2.1 Project Objectives

As mentioned earlier, there are two key objectives to this project. However, those objectives are just the starting point for a whole series of activities that is to be implemented after. Clearly, the approach of this project must be conducted with an understanding that there has to be implemental action plans that the Mainstream Displays group can bring forward to resolve those findings.

11.2.2 Issues of Contention

Conducting focus groups (2 groups of 6-7 respondents selected by Philips InnoHub conducted over a timeframe of 2 hours) and having discussions with them will not be enough to identify the reasons as to why consumers buy flat panel TVs. Chances of uncovering a new fact which the project team does not know is low and hence the team needs to be aware that this is a multi-faceted project with information that affects not just the development group but also to other groups.

Another issue is that by just talking to consumers, they will most likely mention pricing as the main differentiator. This will primarily be the consumers' concern to buying a flat panel TV and it should be noted here that the Consumer-Driven Approach here would be undermined. Hence, the approach to talking to consumers will be to veer them away from discussing about pricing but more towards other potential areas which could be value adding that is more Intent-Driven.

11.3 Phase 3: Alignment

This is a project that can cater different approaches. It can be seen as an initial Phase 1: Identification project due to its initial direction seeking nature. "How to differentiate a Philips flat panel TV from its competitors?" could simply be its Principal Intent. However, the team felt that conducting a direct workshop based on this Principal Intent could be too narrow a scope to start. The argument was that the development team has probably been sitting on their desks and was exposed to so much of the Philips TVs that they might not be exposed to what is actually happening in the industry. This might make them unable to sieve out the correct materials to build a good proposition to developing a differentiator for Philips TVs. Hence the team decided the approach to be slightly more open but yet able to align to the company's strategy and vision.

As this project bears close links to the company's strategies and visions, the research intention was to place it under the Phase 3: Alignment of the Intent-Driven Approach.

The main framework that was used within this approach was the based on the layers of relationships

Product – Consumer

Product – Product

Product Portfolio

Company – Consumer

Within these four layers, the factors affecting the relationships were highlighted as shown in Figure 11-1.

Approach

The consumer TV engagement experience **[Buy] - [Set-up] - [Use]** can be rationalized into the following 4 levels:

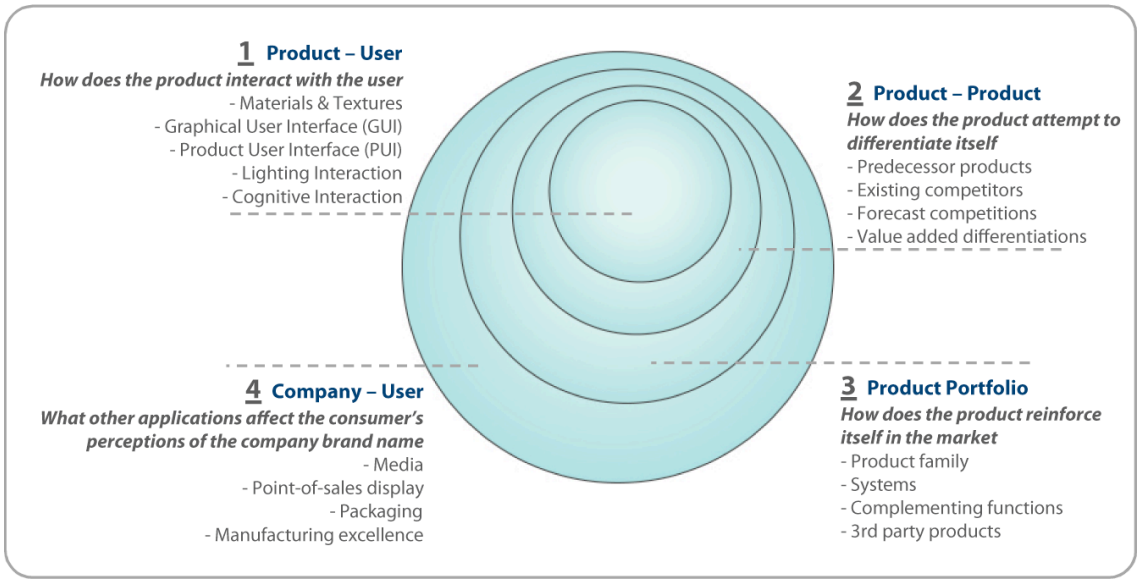


Figure 11-1 The TV Engagement Experience

Based on these four relationships, the entire TV engagement experience was further broken down into 3 key phases.

[Buy] - [Set-up] - [Use]

Under each phase, the different Interaction Links that were involved in each relationship were identified prior to doing a ground study on their influence.

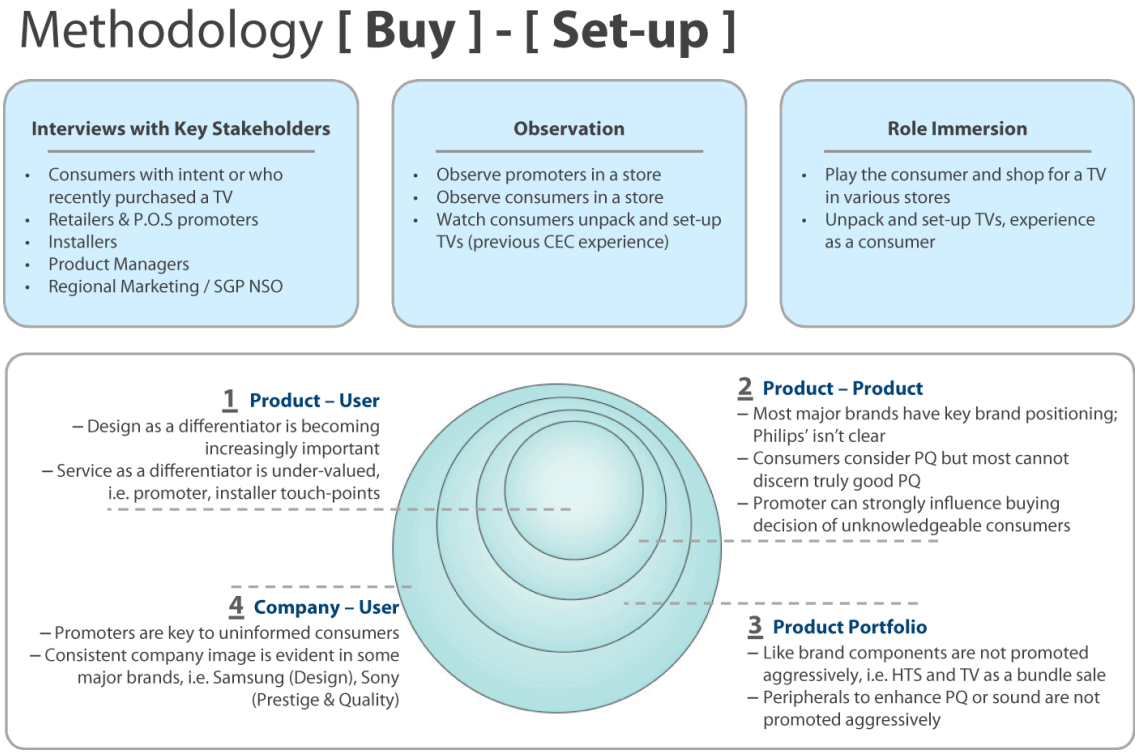


Figure 11-2 Layers of Relationships involving [Buy] – [Set-up]

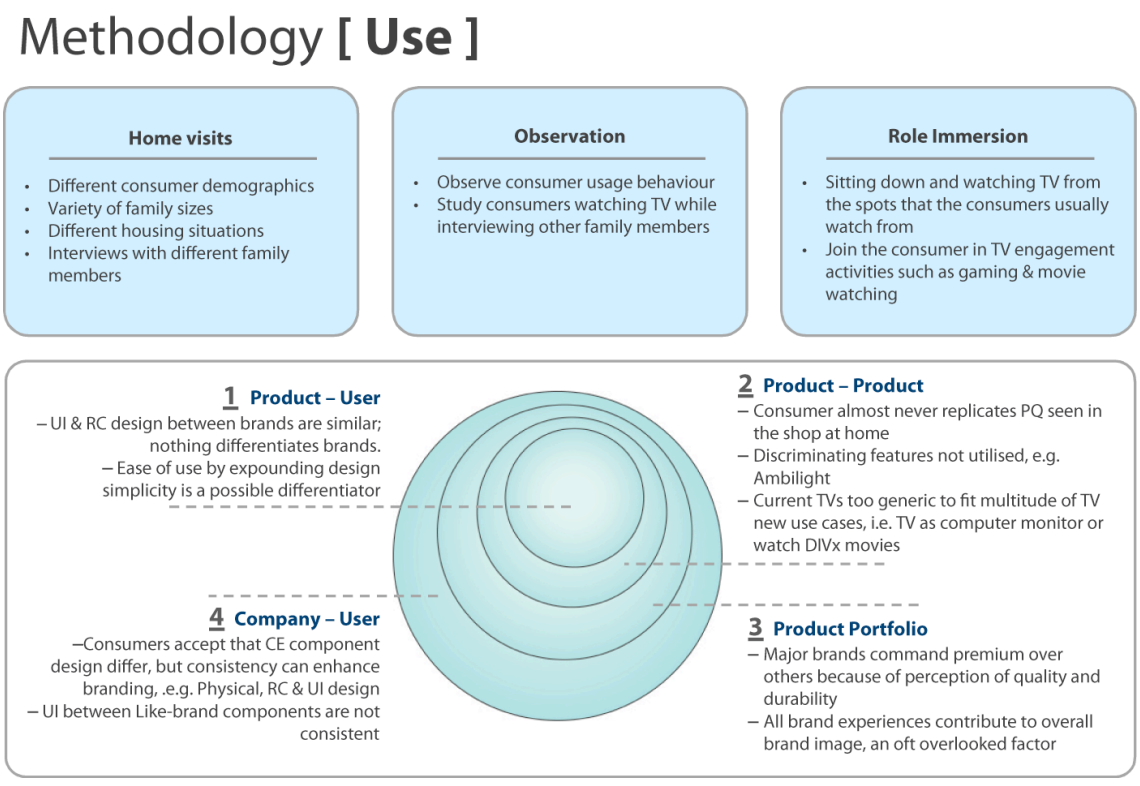


Figure 11-3 Layers of Relationships involving [Use]

Some of the Interaction Links identified under the [Buy : Use] engagement experience could be seen in Figure 11-4.

Elements Of The **[Buy : Use]** Experience

The elements within the **[Buy : Use]** experience can be summarized into the following:

Levels	Buy	Use
1 **Product – User**	- Hardware design (human interaction) - Installation process (delivery and set-up) - Materials excellence (choice of materials)	- Interface design (user interface) - Remote control (main usage) - Cable management (organization) - Cleaning (maintenance) - Packaging (placement)
2 **Product – Product**	- Picture quality (against competitors) - Product features (DNIe, Pixel Plus, etc) - Perceived usages (present and future) - Value added (key discriminator) - Predecessor products (similar series)	- Previous TVs (past experiences) - Value added differentiations - Product promise (deliverance)
3 **Product Portfolio**	- Product family (connection accessibility) - Systems (usability and functions) - 3rd party products	- Product sustainability (quality) - Input devices (other sources) - Complementing functions (adaptability) - 3rd party products
4 **Company – User**	- Point-of-Sales (impact and impressions) - Source video (on-screen presence) - Flagship product (perceived leadership) - Promoters (knowledge) - Media / Advertising (brand consciousness) - Word of mouth (trusted reviews)	- Brand promise - Warranty (assurance of quality) - After-sales servicing (ownership assurance) - Manufacturing excellence (durability) - Packaging (perceived value)

Figure 11-4 Examples of Interaction Links

The more prominent tool as seen from this case study was the usage of the format of the Strata Four Tool. Based on the four relationships, the deliverables could be presented in a much more implemental manner for the development team to bring it forward.

11.4 Outcome

The outcome of this project resulted in many smaller proposed solutions/themes that are presented based on the four relationships. The proposed themes include findings of what are competitors doing, how are consumers using the products and also on how Philips can implement based on their intentions. The most important part of this outcome is the

smaller implemental themes that the company is able to adopt to resolve their differentiating intention.

The tables below listed some of the proposed themes based on the TV engagement experience.

[Buy] - [Set-up] - [Use]

[Buy] - [Set-up] - [Use]

Buying Experience Needs

Need	Observations
Empowering Consumers	• Many consumers lack HDTV knowledge • Consumers confine their TV use to specific, familiar functions • Gamers are keen to optimise TVs (1080p) for new game consoles
Active In-Store Demos	• Samsung PQ demonstrated using static pictures with high depth of field gives a WOW • In-Store TV signal universally bad • Promoters requesting for usage and demos features to sell • Current Philips video source not optimised to sell MFD TVs
Comparison Shopping	• Comparisons and contrasting are done constantly • Very often, features shown are brightness, contrast and backlight • Promoters use extreme picture settings to boost PQ above normal levels
Design Customization	• Consumes are requesting different colours • Perception of having no choice on design • "Will compromise PQ for Design" (As long as PQ is satisfactory) • Design is easily seen (more so on couples shopping) • Samsung providing next level design link – interiors (Think IKEA)
Good Deals	• In SGP, offers and give-aways are key to attract consumers • Promotional vouchers, e.g. supermarket vouchers, are desired • Price is an important factor and heavily influences decisions • Extended warranties of up to 5 years provided by retailers

Figure 11-5 Proposed Themes for [Buy]

[Buy] - [**Set -up**] - [Use]

TV Set-Up Needs

Needs	Observations
Placement Guidance	• No prior experience in wall-mounting • Installers frequently recalled to remount TVs • Wrong height and unsightly cables are a common complaint.
PQ Realization	• Consumers almost never able to replicate the PQ seen in store • Ignorance of cable connectivity and how to optimise PQ settings on the TV to blame.
Connectivity	• Consumers expect easy connection of existing devices to new TV • Typically connect new TV with original or supplied cables; frustration when connectors differ or are insufficient.
Simple Delivery/ Transport & Set-up	• Consumer can wait up to a day for both delivery and installation • If consumer carries and sets-up, likely to face problems or compromises with sub-standard solutions

Figure 11-6 Proposed Themes for [Set-up]

[Buy] - [Set-up] - [**Use**]

Usage Experience Needs

Need	Observations
Computer Compatibility	• Consumers are increasingly replacing TV with PCs as the primary source of entertainment. This trend is most evident among youth. • TVs are common in bedrooms and are usually very closely placed to a PC. • Family PCs are located close to TVs in the living room.
Viewing Angle / Height Adjustability	• TV viewing angle and height are often not optimal. • Table standing TVs are typically immobile • Wall mounted TVs cannot be turned.
Simplification of Remote	• Consumers frequently highlight the complexity caused by numerous remote controls. • Most use limited buttons on each RC.
Better 'Multi-TV' Connectivity	• Primary TV has a cable box while others TVs only receive free-to-air channels. Cable programmes recorded to be watched on another TV at a later time • When DIVx content is downloaded, consumer burns content on a disc before watching on a DVD player connected to a TV
Cable Management	• Cable management is very much an "out of sight, out of mind" issue. • Consumers typically hide messy cables behind devices • Problems encountered when new connections need to be made
Line-of-Sight Remote	• Remote control operation was affected when consumers placed speakers or decorative items in front of the TV.

Figure 11-7 Proposed Themes for [Use]

11.5 Discussion

As the framework used for the project was based on the four layers of relationships, there are many proposed solutions or themes that were applicable to different teams within the organization. Specifically to the development team, they have their own proposed solutions. There are other solutions that could help on differentiating the Philips flat panel TV that are more inclined towards other teams such as the sales & marketing teams in the organization.

In fact, part of the project was presented also to the regional sales team and based on the findings and the proposed solutions; they were able to make implemental changes in their areas.

It was through the discovery that these themes could be applicable to other departments that resulted in the final refinement of the Strata Four Tool to be able to segment the proposed solutions or themes to the relevant key drivers to take charge.

Hence from the application of the four layers of relationships, the Strata Four Tool was refined to add in the key drivers part in a worksheet format for the team involved in the workshop.

12 Discussions, Conclusion and Further Study

This concluding chapter will look into the evaluation and the findings of the Intent-Driven Approach.

12.1 Discussions

Initial discussions and presentation of the tools to relevant people in the industry received very good feedback. The key finding from the discussions was that there is an overwhelming number of tools in the market now to drive innovations and with the add-ons and modifications to these tools, the entire process of NPD becomes very complex.

12.1.1 Process and Outcomes

Adapting to a more established Consumer-Driven Approach allowed respondents to correlate easily to the Intent-Driven Approach. This allows them to link the rational of the Intent-Driven Approach and hence they could associate easily to the integrative nature in comparison to the complex nature of the entire NPD process.

The outcome of the **action-research** also helped to define the boundaries of the integrated NPD process. This allows a clear and defined segmentation of the phases within an integrated NPD process.

12.1.2 Phases and their Tools

Respondents welcome the segmentation of the NPD into clear phases with their nature defined. In that light, the simple nature of the tools presented was very attractive to the respondents. Feedback from the industry people cited that they like the simple nature of the tools and they find them effective to implement and the ability to achieve the outcome within a short timeframe is the most attractive aspect of the Intent-Driven approach.

Quoting one of the female respondents, she mentioned "*The entire template and guidelines to the approach made implementation much easier.*" Without the templates, participants might not be able to focus on the issues and there might be too much other unnecessary information to be filtered out. This could be taxing on resources at times.

Another feedback regarding the tools is that the respondents like the flexibility of the tools, being able to be applied in different phases of most of their projects. No matter which phase of the project that they are in, respondents could see possible tweaking to the tools to allow them to implement the tools to serve their purposes. Hence the guidelines mapped out serve as a good direction for them to use as a base for modifications.

12.1.3 Barriers to Implementing the Intent-Driven Approach

There are a few barriers to implementing the Intent-Driven Approach and they include:

- **Identifying the context and the timeframe of the NPD process**

The company needs to recognize and identify the phase that they are in. Be it the Identification, Exploration or the Alignment phase, it is essential that the company is clear which phase of the NPD process they are in so as to utilize the right tool more efficiently to move their development forward.

- **Poorly defined Principal Intent**

The Principal Intent is the most crucial start for the approach and a poorly defined one will create more barriers as the process unfolds in the different phases. However, this can be resolved by revisiting the definition of the Principal Intent in any point within the NPD process by the team.

- **Lack of an Integration Agent role**

The Integration Agent plays an integral role to holding the project in check just like the project manager, only that the key difference is the progressive facilitation aspect that the Integration Agent covers. It is important that the company assigns a person or task force to take on this role to ensure that the integrative nature of the NPD process takes place.

- **Segmenting action points onto the Strata Four Tool**

The entire objective of the Intent-Driven approach is to ensure that the company is able to align its innovations to its strategies and visions and to make these innovations happen. With application ideas for innovation, the company should be able to segment these action points onto the four layers of the Strata Four Tool so that the relevant stakeholders within each layer are able to take charge and implement the ideas.

12.2 Conclusion

The conclusion for the Intent-Driven Approach was that the approach is direct and effective. However, the paradigm and perception of the Consumer-Driven Approach is still very strong in many and it has established itself as a mind frame approach to innovations. A good blend of both the Intent-Driven and Consumer-Driven approach will be most ideal as one will serve as a "purpose" tool while the other can serve as a "validation" tool respectively.

Both approaches have their benefits and gaps that can be utilized by a company depending on its intentions. The application context by a company for both approaches can be based on the framework of a **SWOT** analysis table. Should the company wishes to identify its own **weaknesses (W)** and external **threats (T)**, adopting a Consumer-Driven Approach might gather more input as they will be conducting relevant consumer research and getting their feedback on their both their brand, products and also that of their competitors. Conversely, it might be easier for the company to adapt the Intent-Driven Approach should they wish to identify their **strengths (S)** and their **opportunities (O)**. By identifying the Principle Intent, they will be able to explore various opportunities within their strengths. This can be illustrated in Figure 12-1.

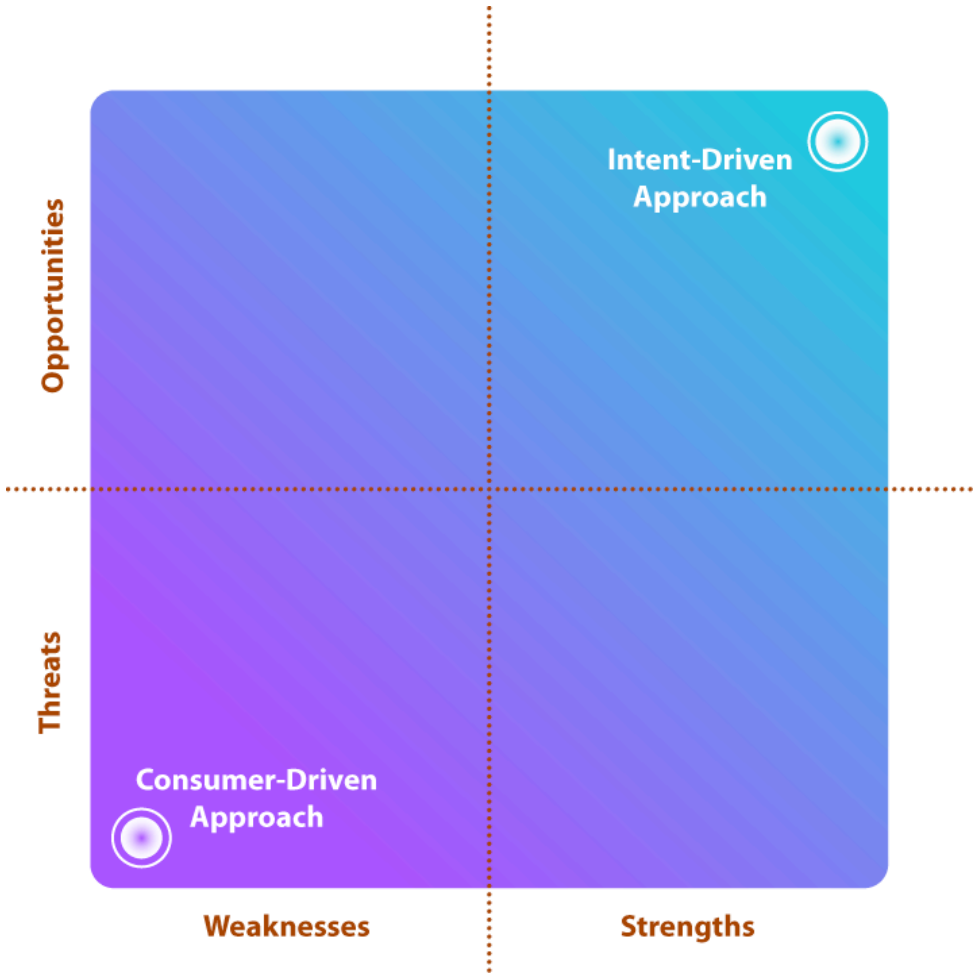


Figure 12-1 Application context within a company for both approaches

The tools for the Intent-Driven Approach are flexible and able to be used in any phase of the NPD process. Even though they were explained to be within the phases of the approach, the tools are flexible to be used on an ad-hoc basis within any phase. This flexible nature of the tools made them a strong characteristic and has the potential to expand beyond the realms of new product development in possibly into other realms.

Both generative and evaluative, the tools were considered to be simple to execute and the results were convincing despite the simplicity. However each tool has their respective advantages and disadvantages and a summary of the tools can be found in Table 12-1.

	Advantages	Disadvantages
Purpose Hierarchy 	Helps to define the root of the problem or solution in a much clearer perspective. Is useful for companies to use as a check-back and validation tool when they verify their solutions with the Principal Intent	Participants might not be able to put a stop to identifying the Principal Intent and hence spend too much time revolving around a similar intent Integration Agent should know when to call for an end to the definition of the Principal Intent
Road-Map 	Allows a good overview perspective for participants with different backgrounds to have a common visualization of a timeline of events	Unless participants have lots of information to populate the Road-Map, it might be a timeline with minimal information for participants to refer to This can be resolved by carefully planning out the proper Parameter Handles
Focal Ideation 	Keeps the ideation focused for a broad spectrum of participants Allows the Integration Agent to subtly put in questions that challenges the minds of the paricipants that could yield real innovative solutions	Integration Agent must play an active role with the workshop owner to define the series of questions that build up the tool Definition of the [How] questions can be quite time-consuming
Affinity Diagram 	Allows collation of huge amount of ideas generated and helps to group them into manageable groups that participants are able to carry forward to develop	The initial divergence of ideas during the idea generation stagemight have generated potential independent solutions These strong solutions could be overshadowed by the Themes created when the ideas were grouped together Integration Agent should take care to highlight these solutions in similar manners to the Themes

Strata Four 	Facilitates the proposed solutions into implemental action lists for small task forces This segmentation not only allows easy implementation but also allows results to be seen quickly when the actions were executed This will create a momentum within the general group to want to make things happen, as resultsare usually encouraging for them to progess forward	There must be enough autonomy for the task forces to be able to carry out and implement the proposed solutions As such, the endorsement from the higher management must be high and encouraging Any failures from the actions should be seen as experience learnt rather than stopping the entire project as stopping the project might put a halt to future innovating strategies

Table 12-1 Summary of advantages and disadvantages of the tools

12.3 Further Study

The summary provides an overview in highlighting the gaps in each tool and based on the disadvantages, each tool can be further developed to make it better and more applicable in different context.

Part of the Strata Four Tool regarding the worksheets is still as a proposal approach to refining the tool. As such, it has not been proven nor research as a toolset for companies to use as an implementation guideline toolset. Hence, as much as it is a proposal, it will need to be tried and researched.

However, drawing inferences from other workshops using templates as guidelines to move the workshops' contents, such a template tool set is usually quite effective as it serves as a common communication platform for individuals and teams to align their thoughts.

For further studies, the Purpose Hierarchy Tool and the Focal Ideation Tool could be used in contexts other than in NPD. Research could be conducted for the tools to be applied in other areas for development.

"Just having the *'Know-how'* is not enough,

You must be able to translate them into *'Knowledge'*…"

- Dr. Yen Ching Chiuan

References

Anderson-Connell, LJ, et al. (2002) A consumer-driven model for mass customization in the apparel market, *Journal of Fashion Marketing and Management*, 6(3), 240-258

Baden-Fuller, C. (1995) Strategic Innovation, Corporate Entrepreneurship and Matching Outside-in to Inside-out Approaches to Strategy Research, *British Journal of Management*, 6(S1), s3-s16

Baxter, M. (1995) *Product design: a practical guide to systematic methods of new product development*. London: Chapman & Hall.

Berton, PR, et al. (2007) When customers get clever: Managerial approaches to dealing with creative consumers, *Business Horizons*, 50(1), Jan-Feb, 39-47.

Billington, J. (1998) Customer-Driven Innovation, *Harvard Management Update*, Jul,7-9

Biography of KAWAKITA
<http://www.rmaf.org.ph/Awardees/Biography/BiographyKawakitaJir.htm>

Brassard, M. (1998) *The Memory Jogger: A Pocket Guide of Tools for Continuous Improvement*. United States of America: Goal/QPC

Chakarian, E. (2007) Philips IPS-Monitor Innovation Study Presentation Singapore: Monitor Group

Christensen, C.M. and Raynor, M.E. (2003) *The Innovator's Solution*. United States of America: Harvard Business School Press

Christensen, C.M, Cook, S & Hall, T. (2006) What Customers Want from Your Products. HBS Working Knowledge <http://hbswk.hbs.edu/item/5170.html> (cited 20.04.2006)

Dyson History, Engineering & Design Process (Dyson Design Lecture and Workshop), NUS, 01/03/2007 <http://www.arch.nus.edu.sg/guest-lectures/vod/2007/dyson.html>

Facilitating Idea Generation, Creative Thinking Tools
<http://www.cre8ng.com/creativethinkingtools.htm>

Fraley, D. (2003) Innovate safely, *Quirk's Market Research Review*,
<http://www.quirks.com/articles/a2003/20030510.aspx?searchID=849246&sort=9>
(cited 03.04.05)

Gemser, G and Leenders, MAAM (2001) How integrating industrial design in the product development process impacts on company performance, *Journal of Product Innovation Management,* 18(1), Jan, 28-38

Griffin, A. (1996) *The PDMA Handbook of New Product Development*. Second Edition. Wiley

Hamel, G. (2000) *Leading the Revolution*. United States of America: Harvard Business School Press

Harvard Business Essentials (2003) *Managing Creativity and Innovation*. United States of America: Harvard Business School Press

Hoffman, A. (2003) Digging Deeper into "Good Business", DMI eBulletin <http://www.dmi.org/dmi/html/publications/news/ebulletin/ebvoctah.htm> (cited 03.10.2005).

Hong, P, Vonderemblse, MA, Doll, WJ & Nahm, AY (2005) Role change of design engineers in product development, *Journal of Operations Management,* 24(1), Dec, 63-79

Howells, J. (1997) Rethinking the market-technology relationship for innovation, *Research Policy*, 25(8), 1209-1219

Idea Creation Tools <http://www.asq.org/learn-about-quality/idea-creation-tools/overview/affinity.html>

IDEO Method Cards <http://www.ideo.com/methodcards/MethodDeck/index.html>

iMac Selling Well To First Time Japanese Buyers Says Apple 02/18/99 <http://findarticles.com/p/articles/mi_m0NEW/is_1999_Feb_18/ai_53910968>

Kalanje, CM (n.d.) Role of intellectual property in innovation and new product development, World Intellectual Property Organization (WIPO) <http://www.wipo.int/sme/en/documents/ip_innovation_development.htm> (cited 18.05.07)

Langrish, J. (1993) Case studies as a biological research process. *Design Studies*, Vol 14, No.4. 357-364

Leonard, D. and Rayport, J.F. (1997) Spark Innovation through Empathic Design in: *Harvard Business Review on Breakthrough Thinking*. United States of America: Harvard Business School Press

Lojacono, C and Zaccai, G. (2004) The Evolution of the Design-Inspired Enterprise, *MIT Sloan Management Review*, Spring, 45(3), 75-79.

Manjoo, F. (2002) IMac: What's in a Design, Anyway? <http://www.wired.com/science/discoveries/news/2002/01/49652> (cited 20.12.04)

Moschella, D. (2003) *Customer Driven IT*: How Users Are Shaping Technology Industry Growth. Boston: Harvard Business School Press

Page, A.L. (1999) Lasting Impressions of Twenty-One Outstanding Corporate Innovators, Vision, Apr <http://www.pdma.org/visions/apr99/lasting.html> (cited 05.11.06).

Plsek, P.E. (1997) *Creativity, Innovation and Quality*. Milwaukee, Wi.: ASQC

Press, M. and Cooper, R. (2003) *The Design Experience:* The Role of Design and Designers in the Twenty-First Century. Burlington, VT: Ashgate

Prestwood, Donna C.L and Schumann, Paul. A Innovation Strategies. <http://www.asq.org/learn-about-quality/idea-creation-tools/overview/affinity.html>

Schrage, M. (2001) Playing Around with Brainstorming: *Harvard Business Review* Reprint R0103L

Siemens (n.d.), Design strategies for new product development <www.ugs.com/initiatives/docs/br_design_strategies_npd.pdf> (cited 30.03.07)

Sivaloganathan, S. et al. (2000) A hybrid systematic and conventional approach for the design and development of a product: a case study. *Design Studies*, Vol 21, No.1, 59-74

Svengren, L. (1993) Case study methods in design management research. *Design Studies*, Vol 14, No.4, 444-456

Terninko, J. (1997) *Step-by-step QFD: customer-driven product design*. Boca Raton, Fla.: St. Lucie Press.

The PDMA Glossary for New Product Development <http://pdma.org/library/glossary.html>

Ulwick, A.W. (2005) *What Customers Want*: using outcome-driven innovation to create breakthrough products and services. United States of America: McGraw-Hill

von Zedtwitz, M and Gassmann, O. (2000) Market versus technology drive in R&D internationalization: four different patterns of managing research and development, *Research Policy*, 31(4), May, 569-588.

Whalen, PJ. (2007) Strategic and technology planning on a roadmapping foundation, *Research Technology Management*. May/Jun, 50(3), 40-52.

Who will win? You decide. <http://nexgenwars.com, http://www.msnbc.msn.com/id/18348840/> (cited 18.05.07)

Glossary

Alignment	Phase 3 of the Intent-Driven Approach. This is the phase whereby the innovative ideas and company strategies meet and align to one another to help the company move forward strategically.
Consumer-Driven paradigm	Current dominant paradigm whereby many companies are focused heavily on "What Consumers Want"
Dual-Injection	In this paper, Dual-Injection is not used in a manufacturing process context but rather used to describe a stage in the brainstorming process whereby two participants come together to generate and develop more ideas based on what they already have.
Exploration	This is the stage of divergence in ideas. There are many tools that could be used for this stage. In this paper, Exploration is used to describe the Phase whereby companies engage in to generate more ideas based on their intentions.
Focal Ideation Tool	This is a tool used to ensure that participants stay focused on ideating and yet able to think out-of-the-box during a workshop.
Group-Branching	This is the stage of a brainstorming process used by participants to actively discuss and develop on ideas that they have independently generated.
Intent Identification	This is the Phase 1 of the Intent-Driven approach, whereby the intentions and the reasons of innovating are defined. There should be a intent in creating new products and they should be more compelling and forward looking than just asking what do consumers want.
Integration Agent	The person or task force defined to integrate the NPD process in accordance to the marketer, engineer and designer.
Inside-Out	Driven from within the company, Inside-Out means something that is within the control of the company that they wish to deliver to consumers. Examples will include technological road-maps and product launch dates.
Intent-Driven Paradigm	This is the basis of the paper, explaining the need to shift from a Consumer-Driven Paradigm to an Intent-Driven Paradigm, focusing on not **what** do consumers want but rather **why** do consumer want something.

Outside-In	Opposite from Inside-Out, Outside-In defines the elements that the company is not able to influence and is usually dependent on them to have forward directions. Some examples include market intelligence or consumer insights.
Parameter Handles	These are the criteria that define the parameters of a workshop. They are so called Parameter Handles because they are boundary points that can be controlled by a company to a certain extent.
Purpose Hierarchy Tool	This is a tool used to define the reasons as to why a company should create a new product or service. It falls on the basis on **why** a consumer would want a certain product and it helps define this purpose.
Road-Map	This is a visualization tool used to help to align people from different background to have a common perspective on a projected timeline of events.
Self-Storming	This is the preferred initial stage of any brainstorming process whereby participants engage in brain-writing to self-storm their list of ideas before sharing with others.
Setting the stage	A phrase used to bring all participants together onto a common platform before commencing NPD proper.
Sharing the Basics	After setting the stage, it is important for the participants to come together and share their knowledge. As this knowledge is basic information to their daily activities but fresh to many others, this activity is called "Sharing the Basics".
Strata Four Tool	The Alignment tool in the Intent-Driven Approach, encompassing of four layers of relationships which help companies segment the broad concept solution into an applicable and implemental one for the different task forces.
Timeframe	Divided into three different segments, **Direct Implementation, Near Future** and **Visionary**, timeframe helps to map innovations and their tools onto the NPD process for companies.

Appendix A – List of Experts Interviewed

Andrew Loh	Senior Designer, Shimano
BK Ching	Senior Researcher, Philips Electronics
Brian Ling	Design Manager, Nakamichi
Darren Mark Ee	Innovation Consultant, Philips Electronics
Jiang Yong	Senior Engineer, Philips Electronics
Michel Saboune	Design Manager, Creative Design Center, Sony Ericsson
Ng Wan Lynn	Senior Designer, Lawton & Yeo Design Associates
Pierre Kil	Site Director, InnoHub, Philips Electronics
Ping Lim	Marketing Director, Brandz
Quek Chun Beng	Managing Director, Design Insight
Ryan Chen	Senior Designer, Philips Electronics
Stuart Passey	Senior Innovation Consultant, Philips Electronics
Tan Kin Wah	Senior Innovation Consultant, Philips Electronics
Tan Loo Shin	Senior Research, TNS
Yeo Chung Sun	Managing Director, Lawton & Yeo Design Associates

Appendix B – Workshops on Design Application Tools

Introduction

A unified theory of design methodology does not exist, as there is no right or wrong way of approaching design explorations and applications. The applications become increasingly complicated when the design explorations are to be done along a timeframe ranging from direct implementation into visionary. It becomes more vague to set a direction and focus for the exploration and application, as the project nature becomes more visionary.

Purpose of the study

The study is to identify and segment different tools that can be utilized for design applications along a different timeframe. These tools will subsequently be evaluated for suitability and efficiency for the nature of the project in terms of the timeframe usability. As more businesses start to incorporate design in their field, these tools will play an increasingly huge role to maintain efficiency and productivity.

What is Design Application?

Design applications here refer to the activities that can be employed by businesses to facilitate to plan their products roadmap beyond their existing scope. It is so termed as design applications because these are activities that allow the designers involved to dream about future products using both their creative and intuitive self.

What are the Design Application Tools?

These tools are the basis in the methodologies used during the conduct of the workshops sessions. The workshops could take up from a few hours to a few months depending on the scale of the entire project. The tools in use and reflected in this paper are neither exhaustive nor proprietary. As mentioned, there is neither right nor wrong in the applications for the tools, but more of a suitability of the nature on the projects involved. It is encouraged for all to adapt these tools and modify accordingly to the business needs.

There are 2 main forms of tools, directive tools and development tools. Directive tools are used to set directions, usually to facilitate definition of future business strategies. Development tools as the name implies, are used mainly to develop ideas and solutions. These tools usually work within the parameters and the directions of the business strategies.

What is Timeframe?

Different businesses have different rulers to gauge their timeframe. For reference purposes in this paper, time frame will be segmented into 3 phases namely, Direct Implementation, Near Future and Visionary.

Direct Implementation, whereby the results from the design applications are to be applied onto immediate projects. Near Future where there exists some room for lab research and development along the business strategies. Visionary, whereby the results can be very blue-sky and not even necessarily fitting to the businesses' current strategies.

Main steps in running of the Workshops and why?

Although the workshops are of different nature, they are being conducted in 4 to 5 generic steps. These steps have being identified as a systematic approach to first setting the stage for participants and then to cultivate and develop the ideas into strong concepts. The term participants refer to an entity. It could mean participant as a person or participant as a business.

Initialization & Research

This is the step used to set the stage to all participants involved. The background understanding and the objectives of the workshop are being explained. Also being shared around are the backgrounds and specializations of the participants. The initial identification of the obvious problems is also being identified at this step so that everyone will share a common understanding. After which, the participants are tasked into their own areas to conduct their own in-depth research

Sharing the Basics

The 2nd step is so termed as sharing the basics, is for participants to bring back and share their research to build a greater pool of information. This step will also involve a review of the workshop objectives and the problems identified initially. The list of problems will definitely be changed during this step as more problems are added and some could even be cancelled out as they might not be the real problems but are actually only symptoms of the problems.

Self-Storming

With the list of problems and the workshop objectives reviewed, participants work out, on their self the possible solutions for the workshop. Key intention for this step is for participants to immerse into the subject by thinking of the solutions themselves first. Also this step facilitates the build up of a large pool of possible solutions.

Dual-Injection

This is the optional step for the workshop depending on time availability. It allows participants to share their initial thoughts and ideas derived from Self-Storming with another participant. This other participant is preferably from another field, which is

able to provide a radically different perspective. In this step, the two participants will share and develop their ideas further.

Group-Branching

Similar to the earlier step, the intention of Group-Branching is to build a firm foundation under the ideas derived in the earlier steps. Participants will again share their ideas, but this time, develop their ideas into more structurally sound concepts. This is achieved usually by grouping ideas of similar intentions together and identifying similar underlying themes. Once these themes are established, the group will branch out to develop the themes into feasible outcomes that satisfy to the workshop objectives.

Overview of Workshops

4 Workshops of different timeframe requirements were conducted and 6 tools were used in total, with each workshop utilizing 2-3 of the tools. Of the 4 Workshops, 2 were to be in the timeframe of direct implementation, 1 in the near future and 1 under sky vision. An overview of the workshops and the tools used can be seen in table 1-1.

It has to be highlighted that there is another ongoing workshop that is being held at the time of writing that is not reflected yet as the scale of the workshop is very large and it will stretch to about 1-2 years.

		Tools used					
Workshop	Timeframe	Empathic	SCAMPER	Satisfiers	“How?”	Themes	Experience
Philips DAP 1	Direct Implementation	Immediate problems must be identified quickly due to the short timeframe by understanding usability issues		Lateral approach to identifying products sharing similar problems so as to derive possible solutions			
Philips DAP 2	Direct Implementation	Immediate problems must be identified quickly due to the short timeframe	Applied similar methodology of the SCAMPER process		To steer and further develop solutions that seemed to have reached their stagnant points		
NUS Final Year	Near Future				To steer and further develop solutions that seemed to have reached their stagnant points		Applying design solutions beyond aesthetics but to generate positive user reactions
Nakamichi	Visionary					Extrapolation and mapping of current trends into the future for scenarios and solutions finding	Applying design solutions beyond aesthetics but to generate positive user reactions

Table 1-1

*Empty boxes do not mean that the tools were not used during the workshops but merely denotes the tools were not the core focus tools during the workshop. This is because some of the tools have similar overlapping traits and for the purpose of this study, the tools were segmented into their core focus.

Introduction to the Tools

As mentioned earlier, the further the timeframe, the more vague the nature of the project as there are much lesser parameters to explore with. As such, the problems of such projects are usually not well defined. Hence, there is a greater need for directive tools to be applied to these projects. In comparisons with projects of a shorter timeframe, the problems are usually defined and such projects are usually seeking more for solutions rather than directions. In such projects, usually development tools play a greater role than directive tools.

Empathic

The Empathic tool is being built based on the methodology of one of the world's leading design firm IDEO. From the book "The Art of Innovation" by Tom Kelly and the article "Spark Innovation through Empathic Design" by Dorothy Leonard & Jeffrey F.Rayport, it can be seen that the core focus of this tool is for the participant to sink right into the shoes of the users. By doing do, the participants will be able to empathize with the users and henceforth able to understand consumers' wants in a different light. By doing so, creative ideas can be ignited and developed in a "designed for the user in mind" manner. There are countless of ways to sink right into the users' shoes and it is important to understand the core focus is to empathize with users when planning research. This will streamline the research phase for businesses concerned with costs.

SCAMPER

SCAMPER is a well established and recognized tool used for brainstorming. It is actually a checklist of questions that was suggested by Alex Osborn but later rearranged by Bob Eberle into a mnemonic. Many designers apply this technique quite sub-consciously in their nature of work since it is in their nature to seek new solutions to improve life. However, reference to the checklist helps to keep the roaming designers' thoughts in structure.

S=Substitute
C=Combine
A=Adapt
M=Modify/Magnify
P=Put to other use
E=Eliminate
R=Reverse/Rearrange

Satisfiers

In brief, this tool is actually about identifying similar problems and trying to bridge and adapt their current solutions into the projects' problems. While doing so, the 'satisfiers' and 'dissatisfiers' are listed. By doing so, not just the possible solutions are identified but also the cons of the current solutions are identified. This will facilitate the information organization for further development during the workshop. An example of the 'satisfiers' and 'dissatisfiers can be seen in Table 1-2.

Corded	Satisfiers	Dissatisfiers	Cordless	Satisfiers	Disatisfiers
Vacuum cleaner (Home / car use)	Suction power	Bulk	Vacuum cleaner (Room / table / keyboard / Rhoomba	Portability	Suction power
		Cord		Reach / Accessibility	Battery capacity
		Noise		Automation	Noise

Table 1-2

"How?"

The "How?" tool is a series of questions derived from the problems of the project. The questions derived are to start with "How" and are usually derived before the start of the workshop. These questions will be shown to the participants before they start their Self-Storming and the participants will be requested to generate as many solutions to the questions as possible. After which, the solutions are then collated into the "How" segments and initial discussions will be conducted using the "How" as the structure. The intention of doing so is to keep the participants focused on addressing at the problems proper instead of drifting to looking at the symptoms of the problems. It is resource wasting if much of the effort is spent on the symptoms of the problem, as this usually does not solve the root of problem.

Themes

Very frequently trends can be heard from many sources. However, the design application of trends is still very vague and it relies heavily on the creativity and the intuition of the designer to piece the information together. Under this tool, participants are asked to do their own findings of current applications and relate these findings to why are things being applied in these manners. With this application understanding, participants extrapolate and map out the possible path that the applications might take and these paths are developed into possible themes. Compared to the larger trends research, which involves information from different sources, this extrapolation and application relies heavily on the participants' perception to things and their intuition. It cannot be said that the extrapolation will be highly inaccurate in this manner because designers usually have a better grip on perceiving the future and being dreamers, their dreams can be highly visionary.

Experience

Experience here is different from Empathic. Whereby Empathic's intent is to sink into the user's shoes and understanding their issues from there, Experience's intent focuses on generating positive vibes for the users. To generate the positive user experience when they use the product. In this aspect, the participants anticipate the reaction that they want to generate from the users and they go about applying their design to generate the desired reactions. Note that whereby Empathic is more users oriented, it can be said that Experience is more products oriented. These products are usually flag

ship products that differentiate themselves from their existing product roadmaps. They are usually carriers of the business strategies if there are any shifts.

Directive & Development Categories

As can be observed, Trends, Experience and “How?” are more within the category of being a directive tool as they are used when the parameters are vague and the problems are not clearly defined. “How?” can also be under the development tool category with the remaining three tools and used for the developing solutions for the problems.

Workshop 1: Philips DAP 1

Introduction: Exploring New Garment Care concepts derived from Total Workplace Solutions

Philips Domestic Appliances (DAP) in Singapore focuses on garment care and in particularly ironing systems. This is the inaugural year whereby the Engineering faculty from the National University of Singapore is having a collaboration project with DAP to allow the students to be involved with a project of more realism. On one hand, the students acquire greater knowledge in the realms of the industry, preparing themselves for graduation. On the other hand, DAP is able to tap into the young and creative minds to generate a wide range of application solutions for their products. This is particularly a very useful collaboration for both parties.

The core issue here for this collaboration is that the groups must produce a working prototype within a year of development. This tight timeframe puts a very limited cap on exploration possibilities. Working with this limitation, the groups are to explore potential new garment care concepts.

A total of two DAP workshops were conducted on two separate dates with different groups and agendas. As much as they are from the same collaboration project, they are divided in this report as they have different agenda and focus. The first workshop has a more macro overview and objective compared to the second, which is more focused into trying to resolve an issue.

Objectives

The topic that the first group is working on is called “Total Workplace Solution”. Its focus is to explore concepts from the macro viewpoint in the entire process of garment care. It is understood that given the timeframe, it is highly impossible to find a single concept that answers to the entire process. (Fully automating the process will be deemed too far fetch) Thus the derived concepts need not be able to provide a single solution to the entire process so long as they are able to build up a part of the solution that could alleviate the necessary effort by users.

Other objectives include evaluating the results of the workshop based on the tools applied. Although the influence of the tools applied could not be measured in against a scale, traces of the tools will still be significant in the results should the tools be applied positively.

Participants

This group consists of 8 third-year mechanical engineering students from the National University of Singapore led by a DAP Coach who is a Pre-development Engineer from Philips DAP. Majority of the participants are students but they are still very much diverse in their background, with some staying independently overseas and some still residing with their families. Garment Care is almost entirely new to the participants especially for those staying with their families, as they do not handle their laundry themselves. Thus, the immediate challenge is to enable the student participants to

understand the entire process of garment care. The DAP coach, armed with his expertise on the garment care process provides the necessary guidance that Philips would be interested to develop in.

Utilized Tools

As the participants are not as apt in understanding their topic, Empathic tool is the key focus here, for them to sink into the users' shoes as quickly as possible. Satisfiers tool is being utilized in this workshop after the Empathic tool to allow the participants to think laterally and spot possible solutions across the list of questions.

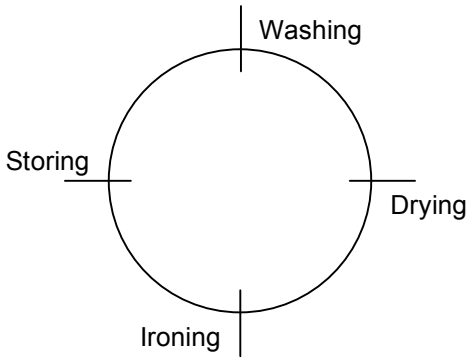
Approach Overview

The workshop was conducted over a span of 2 intensive days. Day 1 was to set the stage and have a common ground for the participants to conduct their research findings. It covers the "Initialization & Research" and the "Sharing the Basics" steps in the generic workshop as mentioned earlier. Day 2 was the ideas development proper, whereby the research information was shared among the participants to start generating concepts that were subsequently developed. This is the creativity portion of the generic workshop, covering the later 3 steps.

Day 1

The participants were tasked to structure the garment care process and they segmented it into 4 key activities coupled with 3 target groups. The key activities are "Washing, Drying, Ironing and Storing" and the target users are "Small Families (2 – 4 members), Large Families (5 or more) and Independents (Business travelers)".

The process was structured in this manner because they are looping activities that are usually carried out by the target groups.



It must be highlighted that although DAP deals mainly with ironing systems, the other activities in the garment care process were included for this workshop so as to trigger the participants to think starting from the macro viewpoint of the entire garment care process. Intention was also to have some ideas generated from "cross-pollination" of the different activities.

Target users were defined broadly into these 3 segments and not more because considering the time available for the workshop, the participants were not able to carry out research into more users. As for the “Small Families and Large Families”, intention was to understand and cover their usage patterns regarding issues like the frequency of carrying out the activities and how are they being carried out. For “Independents (Business travelers)”, it was geared towards understanding that they may be looking into time efficiency yet looking smart and presentable during their meetings especially after a long trip.

Referring back to “Initialization & Research”, the participants identified and shared the obvious problems in the entire process with the target users in mind to build their common understanding before branching out to conduct further research.

The groups were subsequently divided into 2 groups, with one group covering the “Consumers Feedback” and the other “Technology Applications”. The groups were divided into “Consumers Feedback” to understand the immediate problems faced by users that could be translated into direct implementation solutions, and into “Technology Applications” to have an overview of technologies available to users at the moment. It has to be highlighted that both groups were looking at very immediate and direct implementation issues as the workshop’s requirement seeks to produce a working prototype within a year. Each group spent the rest of Day 1 to conduct their research and findings under their own topic.

The “Consumers Feedback” group then visited different locations where the target users were to conduct their research. Places included student hostels, family households and the airport. They observed the usage patterns of these users and conducted interview sessions with them. During the observations, they listed out problems or issues that the users’ were facing while carrying out the activities. And during the interview sessions, they recorded the problems that the users could reflect. It was observed that more problems were identified during the observations than the interviews because sometimes the users could not articulate their problems. For some of the problems faced, users had worked around them and had already accepted the problems. Their solutions had merely become a habit that they were already executing subconsciously. Of course the usage patterns could not be observed for the group conducting the research at the airport. The group hence set down to interview the business travelers and aircrew to have a better understanding of their usage patterns and preferences when they travel.

The “Technology Applications” group meanwhile conducted their research at places such as Laundromats, electronics stores and also the Mecha-tronics department in the National University of Singapore. At the Laundromats, the group was looking at industrial solutions that were applied for the entire process. They were studying the technology behind the machineries that were used to carry out the 4 key activities. This was done so to find possible industrial applications that could be scaled to fit a domestic home environment. The group then proceeded to electronics stores, looking at different

electronic appliances that either performs similar functions as the activities in the garment care process or having similar features with existing garment care products. For example, they were drawing relations from the steam iron to the face steamer and analyzing how the steam could be generated from the different products. Intent of this study is to list the pros and cons of the different products in the market that had an already perceived users acceptance. At the Mecha-tronics department in the National University of Singapore, the group was given a run through of the capabilities and limitations of mecha-tronics today. Past and current projects undertook by the university were being introduced to them, letting them understand how actually could mecha-tronics be applied. This visit allows the "Technology Applications" group have a better understanding into how one could apply such technology into the garment care process, especially when handling delicate fabrics.

The "Consumers Feedback" act is also known as the Empathic tool application, understanding the users and truly sinking themselves into the users' shoes and representing them during the workshop. On the other hand, the "Technology Applications" group executed the Satisfiers tool, drawing relations from similar products and identifying their pros and cons and trying to apply the pros onto what could be the problems listed by their counterparts.

After the research towards the end of Day 1, both groups consolidated their findings separately among themselves to prepare to share this information with the one another at the beginning of Day 2.

Day 2

At the start of the Day 2, the participants spent some time reviewing the workshop objectives and the problems defined in Day 1. This is to refresh and prepare them for the research findings that they will be later. It is during this time that they make refinements to the problem definition if there is. After clearly defining the main problem and key issues, they then proceeded to share their findings.

The "Consumers Feedback" group started sharing their findings first, listing out the issues faced during the execution of the activities in the garment care process. While they were presenting their list of findings, the "Technology Applications" group will start Self-Storming, writing down some possible solutions that they deemed could be applied to the issues presented by the "Consumers Feedback" group. After the first group had shared their findings, they switched roles and the first group then conducted their Self-Storming based on listening to what the technologies have to offer.

Once both groups were done with their "Sharing the Basics" and "Self-Storming", they partnered a member of the opposite group and started "Dual-Injection", whereby they discussed with one another in greater details their solutions that were generated earlier. This allows them to share their expertise and ideas from one another's perspectives.

Finally, with the shared ideas, the partners presented their developed solutions to everyone. “”Group-Branching” as it is called. Participants were able to contribute their ideas in this manner in a more focused and efficient approach. Ideas of similar intention or functions were then grouped together. That is known as the grouping phase. Branching was executed then the groups were then divided into 3 sub-groups regardless of their previous grouping. In their group, each of them took on the grouped ideas and developed them into key concepts.

Parameters

The key concepts were developed based on few of the parameters defined earlier. First was the nature of the activity that the concept seeks to resolve. Next was the target user group that the concept was targeting. Last but not least, was to estimate the dimensions of the concepts should they be placed within DAP’s intention of it being a domestic product. With these parameters, the concepts were developed based on the features and how will such features be able to facilitate the target users alleviate their activities, achieving part of the Total Workplace Solution. By doing so, the initial objectives of the workshop were kept in constant check without the participants drifting too far away.

Outcome

At the end of the workshop, the participants came up with 3 concepts each catering to one of the activities in the entire garment care process. The first concept was an ironing system designed for small families who iron their clothes 1-2 times a week. It allows users to decide whether to iron quickly on-the-go using the vertical board (Their research findings found out that vertical ironing is 70% faster) or should the users want to take their time and watch TV while ironing, they can switch the board into a conventional horizontal board. This concept was catered mainly for the different lifestyles of families who have different habits when it comes to ironing. The second concept was a drying system that has adjustable height to cater to different volumes of clothes to dry. Users can then leave their clothes in the dryer and retrieve them only when needed and the clothes are organized neatly in stacks within the dryer. Another feature that this dryer boost is that it is energy efficient due to the adjustable size. This concept was targeted at families of different sizes and it covers both the Drying and Storing activities in the process. The final concept was targeted at business travelers who are required to look presentable at times. It is a portable clothes refresher that the users can use on themselves even with their shirts on. The gist of the idea was adapted from the devices that are used for hair straightening. Running off battery power, the device can become wireless and be recharged using car chargers, etc.

Conclusion

It can be observed that the key concepts generated were possible concepts for direct implementation for DAP in terms of their strategies and technology perspective. As mentioned earlier, objectives for the workshop was to generate concepts that forms part of the "Total Workplace Solution" instead of automating the entire process. It must be highlighted here that although it is not in DAP's plan to do dryers, the concept was still being developed. This is because in the course of running a workshop, it is always beneficial to allow a 'side-track window' to keep the participants' brains open so that they do not get 'locked-up' into just a single aspect. Doing so kept the participants focused on searching for the "Total Workplace Solution" instead of just the ironing system in this case.

By redefining the Parameters for the participants before they proceed to generate key concepts were also beneficial as that functioned as a milestone check to remind the participants the objectives and what was needed as the outcome of the workshop.

By utilizing the relevant tools, results that cater to both the workshop objectives and the timeframe application were derived.

At the time of writing, it was not known which key concept will be further developed and how will the DAP coach modify the concepts to facilitate the production of a working prototype within the year. With reference to the purpose of this study, these are the tools used to help a business generate future products in alignment to their strategies.

Workshop 2: Philips DAP 2

Introduction: Exploring Wireless Ironing System

In comparison with the DAP 1 workshop "Total Workplace Solution", this topic, "Wireless Ironing System", is much more focused. As mentioned, "Total Workplace Solution" has a more macro overview than "Wireless Ironing". Although the scale of the workshop is different, the timeframe of generating concepts that falls under the Direct Implementation category stays the same. This topic is also very focused as Philips DAP (Singapore) strategizes mainly in ironing systems. Therefore, this topic is very real to both DAP as well as the students. Even though there are already wireless irons selling in the market, the sales are still not picking up for some reasons. Another area to be improved on is the performance of the wireless iron. At the moment, as ironing removes heat from the sole plate and that causes the iron's effectiveness to drop, the iron thus has to be recharged frequently while in use.

Objectives

With the topic already clearly defined, this workshop seeks to explore the different possibilities of having a wireless ironing system that does not compromise performance and yet offers a better solution than the current product range. Thus, the objectives of this workshop is to find a solution that is able to balance between performance and yet able to provide features to the users that appealing to users which could help improve sales.

Just as the first workshop, objectives for this workshop is to evaluate the tools applied and integrate them better into the main steps of running the workshop. The tools have been modified to fit into the agenda of the workshop to ensure the track of the participants' solutions is in focus.

Participants

This is a larger group compared to the earlier study. This group consists of 14 third-year mechanical engineering students from the National University of Singapore also led by a DAP Coach who is a Pre-development Engineer from Philips DAP.

Utilized Tools

Despite the time constraint for the workshop, 3 tools were utilized here. Traced of the Empathic tool was being utilized during this workshop, although it was more sublime in this workshop than the previous. Another more obvious tool was SCAMPER. Participants were introduced the checklist of substitution, combine, adapt, modify/magnify, put to other use, eliminate and reverse/rearrange for their proposed solutions to see how each of the solutions could be further developed or improved. They were shown application examples of the SCAMPER on how ideas were developed and how they could be applied.

The "How?" tool was also utilized in this workshop to keep the participants very focused on developing the wireless ironing system. It is actually a list of "How?" questions that is

designed to spur the participants' brains. The list of questions covered ranges from the basic questions to drive solutions to 'wow' questions to drive 'beyond the box' thinking. The list is designed prior to the running of the workshop proper by the facilitators and the DAP Coach. This list of question can be found in Appendix B1. How and why the questions were phrased in the manner was also explained in the appendix. More details will be covered under the Approach Overview later. The key point to note when designing the list of questions was to use a broader term for the topic to be brainstormed rather than sticking to just the workshop topic alone. This facilitates the participants to think broadly for search for solutions rather than having their thoughts 'boxed 'up.

Approach Overview

Due to time constraints, this workshop stretched over a span of 3 days. The participants only met up for half a day on Day 1 for the "Initialization and Research" steps and the entire day on Day 3 for the workshop proper. The participants spent Day 2 on self-research. As this topic is more focused than the "Total Workplace Solution", the participants were explained on the key fundamentals of an iron and they were being introduced to the 'anatomy of an iron' by taking apart an iron and studying the components within it. They had even gone through the ironing process by using both the wired and wireless ironing. Other than just those activities, the participants had gone through patents scanning to search for similar ideas, which could be of potential conflict of interests to Philips. These were done prior to the Day 1 of the workshop. In this aspect, the participants had already started using part of the Empathic tool subconsciously.

Days 1 & 2

As per the generic steps in conducting a workshop, the first step was "Initialization & Research". Participants listed the initial problems perceived by users as to why they feel the wireless iron is still unpopular and having poor sales off the stores. They also shared the problems that they faced while ironing. The participants were then given the SCAMPER list and tasked to spot products, during their self-research before Day 3, that could be apply along the SCAMPER list for solution ideas. Hence, the stage was set for the workshop proper to run. They were also encouraged to take a visual diary so that they could come back and share their findings on Day 3. During their self-research, the participants visited electronic stores, looked at different irons, spoke to sales executives and surfed the Internet for a better understanding of the workshop topic.

Day 3

On the day of the workshop proper, the workshop objectives and the problems definitions were recapped and reviewed. This is to orientate and focus the participants to the workshop agenda prior to starting the brainstorming.

The participants then "Shared the Basics" by spending some time presenting to one another their findings. Some of the findings include quotes from the sales executives, saying how the executives were pushing sales for wired irons and denounced the effectiveness of wireless irons. Some even mentioned that at the point-of-sales, the

wireless irons were placed at the bottom of the shelves. Other findings include product features/differentiators irons of different brands explaining the mechanisms of the steam irons, the enhanced projection angle for steam, the sharp tip at sole plates, etc.

The SCAMPER

During the “Sharing the Basics” session, the participants also spent some time to recap on the SCAMPER checklist. This checklist was attached to a board visible to the participants to serve as a brain trigger/teaser for the participants during their brainstorming phase. These words could be applied from the Self-Storming to the Group-Branching steps so they must be visible to all during the brainstorming phase. It must be noted that even though actual contribution of the list to the ideas development could not be measured, the list indeed provided a positive brain trigger/teasers to the participants based on their feedback.

The “How?” differentiator

The sequence of activities carried out was similar to the first workshop. However, for this workshop, the differentiator is in addition of the “How?” tool into the Self-Storming step. Here, instead of getting the participants to do their Self-Storming during the presentation phase, they were tasked to do so only after the “Sharing the Basics” together with the list of “How?” questions.

This Self-Storming phase allows the participants to find solutions in a driven context by providing as many solutions as possible to the list of “How?” questions. They recorded their solutions in using post-it pads and categorized them according to the questions. After the Self-Storming, the participants paired up for Dual-Injection. They discussed in pairs their ideas and developed further, writing down more ideas that were generated along the way onto the post-it pads.

Ten boards were placed around the workshop each bearing the question/subject found on the “How?” questions list. When the pairs were done with their solutions, they stuck their post-it pads onto the categorized boards accordingly. A resulting large pool of ideas, each group providing solutions to the “How?” questions were generated and categorized.

Group-Branching took place after, in which the participants went through the ten boards one by one looking through all the ideas that were generated. Armed with more post-it pads, they came up with more ideas and developed them further. The participants then broke up into 3 sub-groups and each to develop their key concepts based on “Wireless Ironing System”.

Parameters

The parameters for this workshop is much more defined than the “Total Workplace Solution”. Most importantly, it must be a wireless ironing system that does not compromise on its performance and yet able to create value for the users. The concepts must be able to provide similar, if not better, features that the existing wireless irons are equipped with. Of course, the parameters also include the technical constraints of producing a working prototype within a year.

Outcome

The 3 concepts that emerged finally at the end of the workshop were surprisingly very different in nature but yet were able to satisfy the parameter of not compromising the performance of the iron.

“Extended Autonomy”, as the participants named it, has a lemon-shaped sole plate, allowing users to iron their clothes in omni-directions. It is so shaped to provide the users high maneuverability when ironing compared to the current shape whereby users can only iron bi-directionally. Currently, users put the iron to stand when they are setting their clothes on the board. However, since the lemon-shaped sole plate does not allow this act, retractable legs were suggested to keep the iron afloat. This keeps the sole plate hot and away from other surfaces when not in use. To maintain the performance of this iron, the group suggested using both mist and steam for the iron rather than just being purely a steam iron. This is because producing steam will take up energy from the heating element in the iron and this will cause it to cool down very quickly and hence the frequent charging. By mixing both mist and steam, users still get the impression that the iron can function well as a steam iron but yet the energy spent on producing the steam is reduced.

“Pressurized Cordless” solves the energy issue by placing the task of generating steam on the boiler instead of the iron itself. When the user places the iron onto the boiler to recharge, steam from the boiler is being pushed and compressed into the iron. This separates the sole plate from the steam so that energy can be used solely to heat up the plate and not for generating steam. In fact, the DAP coach explained to the participants that such an idea has been patented by Philips few years back but was shelved due to costs reasons after the presentation. They are currently studying into the feasibility options of achieving it as of current date.

The third concept that emerged was slightly beyond an immediate implementation solution. However it solved the issue the other way round and placed the emphasis of the wireless ironing system on the ironing board itself rather than the iron. The board will house induction coils to maintain a constant supply of heat and steam outlets jetting the steam out at high steam rates. The iron meanwhile, is a very slim and sleek iron without any frills. The steam can be controlled by a remote on the slim iron such that when required, users can use the remote for the board to release the steam. Other features include an MP3 player for the user to relax and enjoy the process of ironing.

Although this concept was slightly beyond the timeframe, parts of the idea could be tweaked to make it into a feasible immediate solution.

Conclusion

Even though the concepts generated were focused on solutions that do not compromise the performance of the wireless ironing system, it could be observed that they bear a very strong inclination in creating values for the users. Elements of the "Empathic" tool were quite pronounced although its role was quite subtle in the workshop. The lemon-shaped sole plate to provide maneuverability and yet still being able to iron between buttons, the MP3 player, are features that the participants indicated to include to create value for the ideas and not just settling on having a wireless iron that has superb performance.

The SCAMPER checklist bears a certain influences over the concepts generated, considering that the 3 concepts each has their own configurations to achieve a similar objective.

The "How?" tool was able to keep the participants focused but yet allows them room generate very radical ideas. It provided a very strong basis to both generate and manage a large pool of ideas. Participants' feedback after the session, that the "How?" tool provided a very strong trigger for them. It also provided good guideline for them to develop their ideas during discussions.

Just like the earlier workshop, it was not known which key concept will be further developed and how will the DAP coach modify the concepts to facilitate the production of a working prototype within the year at the time of writing. With reference to the purpose of this study, these are the tools used to help a business generate future products in alignment to their strategies.

Workshop 3: NUS Final Year

Introduction: Developing Final Year Thesis Directions

This workshop has a different agenda compared to the previous 2. While the previous workshops were seeking to focus on feasible ideas & solutions and narrowing them down into developed concepts, this workshop was seeking to explore further ideas to develop the projects forward. Tools used were geared towards the directive category rather than the development category like those in the previous workshops. This workshop was conducted for the final year students in the National University of Singapore who were still in the research stage for their respective thesis topics. Each student has their own topic and 9 topics were covered in total. They were trying to find key directions to develop their thesis. Even though they had rough ideas of the directions they want to pursue in their mind, they wanted to explore further to ensure that they had tried to cover as much scope as possible before narrowing down quickly. In fact, there were not even directions but just aims that they would to achieve for their topics. Also, the students would like to use the workshop to help them to generate more ideas for them to develop the concepts in later stages. With the 9 topics, the students function as a group developing the topics on by one for the workshop. The list of topics and the aims can be found in Appendix B.

Objectives

Unlike the previous 2 workshops, this workshop does not have very clearly defined topics. The topics were very broad and directions were still rather open. As mentioned, there was only a very broad topic and general aim for each participant. Hence the key workshop objective is to generate more ideas for the participants on their topics.

Another important objective for this workshop is to test the “How?” tool using participants who are out of the concerned topic to help brainstorm on the topics. The 8 participants who do not own the topic or did prior research are considered ‘outsiders’ and getting their involvement in the brainstorming could be creating very extreme but yet strong inspirations for the 9th participant.

Apart from the mentioned objectives, the “How?” tool is being developed and modified from workshop 2 to see if it can satisfy and reinforce the category of a being directive tool as well.

Participants

As mentioned, there are 9 students in this workshop. These students are in their final year pursuing Bachelor of Arts (Industrial Design) in the National University of Singapore. Most of them did a one semester student exchange program with other universities around the world. This is the 4th cohort of graduates from the university.

Utilized Tools

2 key tools are being applied during this workshop. The first is the "How?" tool. As there were many topics and time was very limited for the participants, the number of questions used in this workshop was noticeably much lesser than those used in workshop 2. In the previous workshop, the "How?" questions were prepared prior to the running of the workshop proper by the facilitators and the DAP Coach. In this workshop, the "How?" questions list was designed by the facilitator and the topic owner. Even though the questions are significantly lesser, there is still great consideration put in to the composition of the questions. This will be explained in greater details under the Approach Overview. The list of questions and the topics involved can also be found in Appendix B.

The 2nd tool that was used was the "Experience" tool. As explained earlier, the "Experience" tool focuses on generating positive vibes/experiences for the users. This was a tool subconsciously applied by the facilitator by consistently questioning the participants on the "Experience" that they would like to create for the users by their solutions. Participants also briefly discussed the experiences they wanted to create for the users based on the Product – User, Product – Product, Product Portfolio relationships. This will be further elaborated under the Approach Overview.

Approach Overview

The entire run of workshop was conducted within a day. Based on the participants' feedback after the workshop, it was very intensive but very fruitful for them. The running of the agenda is similar throughout the 9 topics so it will be generically described in this paper. There are short breaks in between the sessions for the participants to refresh their minds before they start on another topic.

It must be mentioned that the highlight for this workshop was not on the running of the workshop proper as to how it was run and the steps underlying it. In fact, the main differentiator to this workshop was the preparation of the "How?" questions. What are the design considerations to the questions?

Designing the "How?" questions

After the workshop in workshop 2, the "How?" questions were being reviewed and modified to identify the classifications and nature of the questions. The classifications were noted and a composition was designed subsequently to ensure that all future question lists would have a similar composition guideline.

Composition Guidelines

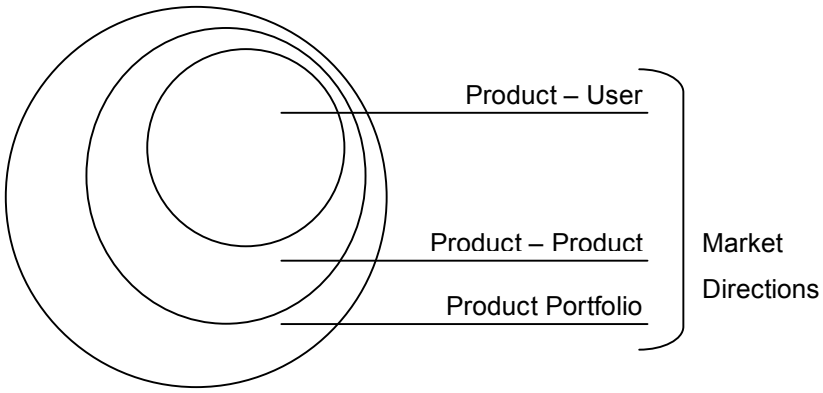
- There will always be questions based on empathic design, allowing the participants to think based on a user-mentality
- There must be a "Wow" question that will trigger the participant to think completely out of the box
- Questions relating to tangible features must be included for the participants to design a tangible solution

- Questions relating to pre/post activities are a bonus for participants to think through the entire workflow while generating solutions
- 'Subtractive' application questions are also a bonus because it makes the participants to think by 'subtracting' elements in their solutions rather than keep adding elements in

Note that the abovementioned guidelines are neither exhaustive nor applicable to all projects nature. They are suggestions of how the "How?" question lists should be composed. The list should be generated prior to the workshop proper with the topic owners and the facilitators. This helps to keep the questions stay relevant to the topic. Another reason why the topic owner should be involved is because the topic owners usually have the background knowledge and is able to articulate the problems while the facilitators help to translate the issues into "How?" questions.

Designing "Experience"

During the workshop, the participants were constantly questioned on the form of experience the want to create for the users with their solutions. However, in contrast with the earlier workshops whereby the participants were engineering students, the design students in this workshop were more apt to understanding the user experience and have a more established mind frame of application. While being questioned on the user experience they want to create, they were able to articulate and draw references from different examples of solutions bearing the relationships explained below.



Product – User

This is the relationship between the product and the user. Mainly covering the product semantics and the aesthetic nature, it looks into the sociology aspect of the consumer with respect to the product. The "Experience" the user gets from the product usually branches off from this relationship.

Product – Product

Here examines into the positioning of the product in its industry with reference to the competitive products around it. It will also examine how product differentiation is being executed at the point-of-sales level. The study of this allows the participants to think about competitive products and also distribution channels if any.

Product Portfolio

The usage of complementary products under the same brand name and 3rd party manufacturers were being discussed. It will examine how these supporting portfolios reinforce the product. This allows the participants to think systematically rather than just producing an one-off solution,

Market Directions

This is the overview of the market directions, understanding how some key directions influence others and how one can tap the information and apply onto the solutions.

Based on these tangents of thoughts, the participants were able to systematically and structurally build and develop their ideas; hence designing the "Experience" they wanted to apply.

Step by Step

Similar to the previous 2 workshops, the participants went through the generic steps of the workshop. However, as there was a tight time constraint in this case, the Initialization & Research was at its minimal, with only the topic owner explaining their individual topics and listing out the problems. They then proceeded on with the Self-Storming to generate as many solutions as possible to the "How?" questions. Similarly as before, they attached their solutions onto panels housing the "How?" questions during the Dual-Injection and Group-Branching to further discuss and develop their ideas. They stopped short after the group discussions and did not go into branching however, as the objectives of the workshop was for them to generate more solutions based on the aim rather than setting directions. The ideas were subsequently brought back by the topic owners to further evaluate and develop them into key directions.

Parameters

Effectively, it cannot be said that there are no parameters in this workshop. However, as mentioned earlier, the further away the timeframe is for any projects, the lesser the parameters, especially for projects that utilize the directive tools. Since the topics involved for the projects are for the Near Future, the parameters for this workshop could be stated at such that so long the aim of the topic could be achieved, the ideas generated are within the parameters.

Outcome

Based on the objectives, the feedback from the participants on the outcome was that they found the workshop to be very useful. The ideas generated allowed them to think out of the box once again especially after getting stagnant at some point prior to the workshop. Quoted from one student "I remembered how fun design could get. Was too preoccupied and tied down by the mundane technical solutions that I could not develop the topic further." On the whole, there were many ideas generated that allowed the participants to 'breathe' again.

Conclusion

Interestingly, even though the participants did not really have a thorough understanding of the topics other than the information provided by the topic owners, they were able to address the questions in very creative manners. Once again, perhaps it was due to their nature being designers who were creatively trained in intuitions and perceptions; they were able to contribute constructive ideas to the topics.

The “How?” tool managed to act both as a refresher tool and a directive tool to the participants. In a way, after being stagnant in their research, the participants managed to find new solutions that could help in achieving their aims for their topics. This tool also helped in generating fresh ideas that were overlooked in the process of research by the topic owners. It was observed that ‘outsiders’ were able to contribute greatly to the topic as well. This will definitely affect composition of brainstorming groups, which will have to be analyzed.

Although the “Experience” tool was used to facilitate the participants to think structurally, it could be observed that the ideas generated were very “How?” focused and only few ideas were on the “Experience” side. The contribution of the “Experience” tool was hence quite minimal in this workshop. More development for this tool will be looked into to see how it can be applied to play its role in design application. Direction as of now is to use this tool as either a possible starting tool or evaluation tool to help evaluate and categorize the ideas generated for development.

At the point of writing, the final directions that the participants concluded with were not known. With reference to the purpose of this study, this is to evaluate the possible directive tools used to help a business generate future products in alignment to their strategies.

Workshop 4: Nakamichi Sound Visions

Introduction: Sound Visions in 2020 – Nakamichi

This is a collaboration project between the Japanese-based sound entertainment company, Nakamichi and the final year Industrial Design students from the National University of Singapore. Nakamichi focuses on the niche home entertainment market and they have a design house based in Singapore. Their design house has won several awards, including an IF award in 2005 for one of their TV designs. This is a Visionary collaboration project to explore home entertainment in the year 2020. The 2 parties have collaborated for a similar project the year before and they have decided to carry on the explorations this year as the results had yield positive feedback from the industry. Since this is a Visionary project, the tools utilized were of directive nature, seeking to provide directions for the projects rather than more into the development phase. The most important element in a Visionary project is the scenarios painting, whereby users are envisioned within the context of using a product in the future in comparison with a technology feature whereby the uses are still unknown. Hence for this project, the participants set out with an open mind frame, exploring options and painting the scenarios of how the future of home entertainment could be like in the year 2020.

Objectives

Simply put, the primary objectives for this workshop was to facilitate the students to generate ideas and design home entertainment systems for Nakamichi in the year 2020.

Another important objective for this workshop was to allow the participants/designers to draw their inferences from market study and extrapolate possible themes from trends. The reason for this is to forge a closer relation between designers and the trends studies. More often than not, non-designers conduct future trends studies. Such studies include user behaviors, technologies, colors & materials, etc. However, it is usually quite difficult for the designer to apply these trends studies directly into their area of work except for colors & materials trends. By getting the participants/designers to draw their own inferences and build their own themes, the information is being geared towards design applications and they can apply the information in a better manner in order to generate product ideas. This can be achieved by identifying themes from the studies and developing scenarios based on them. However it must be mentioned that this paper is not to remove the specialists of trends research to be replaced by designers. This exercise was more of identifying application information that the designer can use for their area of work.

The “Experience” tool was being developed further from workshop 3 and applied as a tool during this workshop for the participants to use as a first step to their market studies. This workshop also helps to refine the tool further. Note that the “Experience” tool might be applicable as an evaluation tool to help categorize ideas and this workshop also allows the feasibility study for it.

By applying both the “Experience” and the “Themes” tool, it is hoped that the participants are able to use the generated themes to set their directions to generate the ideas for their home entertainment systems.

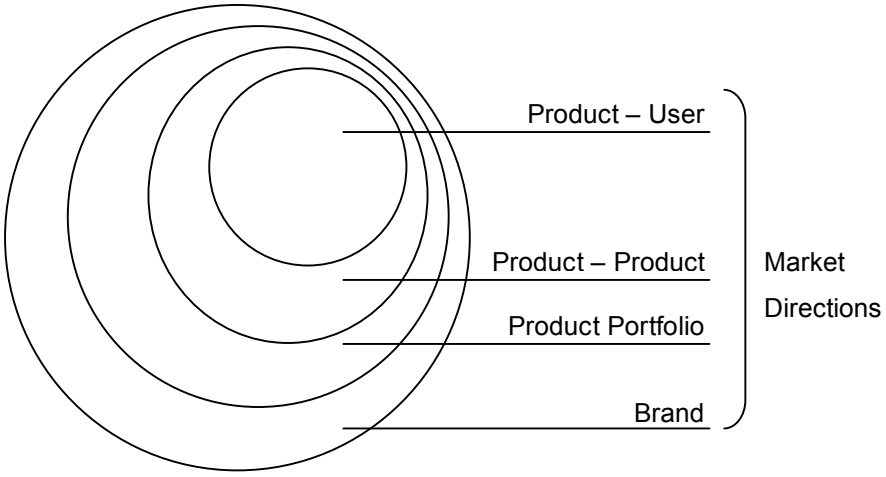
Participants

The participants include the 24 students and the Design Manager from Nakamichi Singapore. The students are allowed either to work as a pair or they can take it as an individual project. The Design Manager, armed with his knowledge on the home entertainment systems provides the expertise from Nakamichi’s perspective.

Utilized Tools

Starting the “Experience” Design

As mentioned earlier, the “Experience” tool was developed to function as a starting tool for the participants to conduct their market studies. The initial 3 levels of relationships were similar to the earlier workshop but a 4th level of relationship, the Brand level, was added to this tool for the workshop. As the topics in the previous workshop did not entail any companies, only 3 levels were used. Since this project involves Nakamichi’s directions and strategies, the 4th level was included. This ‘Brand’ level looks into the total execution of design that builds the brand name. From innovation research to industrial design application and finally to communicative design, it will explore how the different aspects of design come together to build the brand.



Themes from Trends

The “Themes” tool is being applied here after the participants commence on their market studies. Like the generic steps of running the workshop, themes are generated in a similar fashion. However, it has to be noted that the steps are similar but the agenda and focus are very different in nature. This will be covered in greater depth in the Approach Overview. This “Theme” tool will be evaluated for its influence and usefulness at the end of the project. At the moment, what will be covered for this tool is the generation of the themes. The list of generated themes can be found in greater details in Appendix B3.

Approach

This was a half-day workshop. As the number of participants was too huge, they split up into 3 groups of 8 with the Design Manager and the lecturers as group facilitators. Prior to that, the participants have done their market studies based on the “Experience” tool on the 4 levels of relationships. During the session, they presented their findings to one another within their groups. This could be compared generically to the Initialization & Research step. After which, the participants were given a task of listing out some of the market trends of their findings which they felt were strong in defining directions for the respective market.

The facilitators were given the liberty to decide which level of relationship in the “Experience” tool they wanted to discuss and develop on. Interestingly, all 3 groups discussed on different levels.

One group discussed about the entire Market Directions and the trends that one can observe that are affecting consumer behaviors as of now. They discussed on how some directions are also affecting the society and community. After their discussion, they identified some of the stronger agents that were strong in defining the directions.

Another group discussed on the Brand level, generating ideas on features that Nakamichi can explore into for their next strategy in the year 2020. This generation is based on the study of how other brands are defining themselves and how they targeted the market.

The last group meanwhile explored on the Product-User level, exploring and generating ideas on how to generate different Product-User experiences for the users. All these ideas were captured in the form of sketches explaining their features.

After the discussion and development sessions, the groups gathered back and presented their results to everyone. Although the results were different in nature due to the difference in the level basis, grouping together similar ideas from the 3 groups could identify the stronger agents quite easily.

After the presentation, the facilitators evaluated the ideas. They grouped ideas of similar nature together and generated themes out of these ideas. These themes are directive in nature and it is important that they do not possess any tangible outlook. Including a tangible outlook might restrict the next phase’s development. The themes were extracted from the characteristics of the ideas generated earlier by the participants. As mentioned, the list of generated themes can be found in Appendix B3.

Subsequently the participants took the themes and developed their directions based on the themes. This project is still ongoing during the documentation and there are still many materials in procession that could not be included.

Parameters

This project is too visionary to possess any real parameters. The only parameter that could be defined for this workshop is that it should cater to Nakamichi's intention of developing a home entertainment system in the year 2020.

Outcome

The most important part of the workshop objective was to generate themes based on the market studies done by the participants. All in all, 11 themes were generated for the participants to be able to bring it into their second phase for development. The participants were also able to apply the "Experience" tool as a starter guideline for them to commence their market studies. Examples of their research findings will be attached as Appendix once the materials are ready.

Conclusion

By studying into the 4 levels of relationships in the "Experience" tool, the participants were able to place and structure information in a similar manner for discussions and development. The levels also act as a form of considerations that the participants can apply for their design development. This tool however is still in its raw development stage and will have to be further refined for future workshops.

As to how the generated themes influenced the projects, it could not be seen at the moment, as the project has not ended. However the sequence of how the themes were generated was explained and they are similar to the generic steps of a workshop. It must be highlighted again that the themes are directions used to help define a topic prior to running a workshop. Although the steps of generating themes are similar to the steps in generating concepts, their nature is very different. Themes usually are very inference in nature and have no tangible outlook compared with concepts. There is still great room to explore into themes definition and this will also be further researched into.

As mentioned, this project is still ongoing and many materials are still in procession so the final outcome could not be included in this paper as yet. However, it should be highlighted that the intention of this paper is to understand the tools used in this project.

Appendix B1 – List of “How?” questions for Workshop 2

Note

It has to be highlighted that “Garment Pressing System” was replacing the term “Wireless Ironing” when designing the workshop so as to facilitate the participants to think beyond the scope of irons. This is essentially important and deliberate because “How?” questions are supposed to be brain triggers and not to ‘box’ up the mentality of the participants. Note that the words used for the questions are also deliberately geared towards a more extreme end.

1.) How can we make a Garment Pressing System (GPS) that is ultra convenient?

2.) How do we make the GPS a product of desire?

3.) How can we build an ultimate user experience using the GPS?

4.) How can we produce a lot of steam all the time?

5.) How can we make a GPS that cuts down the ironing time to 1/10 of the time?

6.) How can we focus the heat/steam on the garment for 100% efficiency?

7.) How do we prevent the danger posed by heated surfaces?

8.) What can we do to the iron to give users a pleasant surprise?

9.) How to show/hide parts users like/dislike? Thinking about what users dislike, how do we remove these undesirable things?

10.) How can we make the GPC ultra simple to use?

Appendix B2 – List of Topics, Aims and "How?" Questions for Workshop 3

Note

Notice the composition of the questions and how they relate to the guidelines mentioned.

Topic:	Home Fitness Equipment for Women
Aims:	- To create a friendly, sensitive design that communicates the fitness lifestyle as an engaging activity for women
Questions:	- How do you let women have a perfect 'non-working out' fitness experience? - How can you motivate women to use equipment continuously round the clock? - How do you create an ultimate social experience in fitness equipment? - How can you make it look like home ware (not equipment)?
Topic:	Professional Hairwash
Aims:	- To provide solutions for potential business opportunities in haircare
Questions:	- How a user automates hairstyling? - How a user washes without wetting? - How can you wash your hair without water? - How to complete the entire process in 5 minutes?
Topic:	Interactive Medical Kit for Asthmatic Children
Aims:	- To look into the problems of current devices and redesign it
Questions:	- How can you ensure that the children will love to bring it with them every day? - How can you ensure that the children will not misuse the device? - How can you ensure that there is continuous or unlimited supply of medicine? - How can you make the act of this device inconspicuous to the user?
Topic:	Apparatus for Domestic Wastewater Reuse
Aims:	- To make water reuse less troublesome - To encourage people to reuse waste water at home
Questions:	- How can you collect 100% of the water? - How can you store the water? - How can you clean/purify the water to make it hygiene? - How can you use the collected water effectively?
Topic:	Walking Aid for Elderly
Aims:	- To design a walking aid that enhance the lifestyle of the user (elderly with mobility inability)
Questions:	- How can you make the elderly walk without a walking aid? - How do the elderly use the aid considering they are physically weak? - How do you enhance their traveling lifestyle? - How can you make elderly desire to travel more?

Topic: Car Wash Kit

Aims:
- To create a compact, easy to use carwash tool that can be configured to clean different areas of the car effectively.

Questions:
- How do you clean a car without water?
- How do you perfectly dry/shine/clean a car in 5 minutes?
- How do you effectively remove stains off surfaces?
- How can you remove debris off hard to reach surfaces?
- How can you ensure a continuous flow of water?

Topic: Cleansing Device for Makeup Tools

Aims:
- To investigate how to bring about ease, enjoyment and convenience in the whole process of cleansing makeup tools, while still effectively removes dirt and prolong the life of the tools.
- To conceptualize and realize a consumer product that is not available in the market right now

Questions:
- How do you incorporate 100% hygiene into process?
- How can you remove dirt off brushes in 5 minutes?
- How do you clean and store 10 brushes in one short step?
- How do you apply make up without using tools?
- How can you make washing the brushes extremely fun?

Topic: Laundry Washer

Aims:
- To allow washing of delicate and normal clothes together at one time

Questions:
- How can you wash different types of clothes together in one shot?
- How do you sort clothing before washing?
- How do you perfectly wash clothes without entangling them?
- How can you best gauge the amount of cleaning agent?

Topic: Ladies Dressing Pal

Aims:
- To improve the current domestic storage system
- Categorizing, flexibility & customization for better storage
- To enhance user changing experience and bring better user-product interaction

Questions:
- How do you let them preview what they wear?
- How can you make changing a lighthearted experience?
- How can you make portable a large amount of clothing?
- How can you make changing convenient?
- How do you display your clothes selection?

Appendix B3 – List of Themes for Workshop 4

1. 3 users
   - ⇒ Professional
   - ⇒ Learner
   - ⇒ 1 Stepper

Exploring and catering designs to the different mentality of users.

2. Generation “C”

Consumption => Customization => What next? (Customization vs. Manufacturing)

3. User Empowerment (Life Caching => Nostalgia => Modern Retro?)

What do users want to control?

4. Hidden Technology => Blending into Environment (HFTS + Interior)

Too many technologies around users? Making them sublime.

5. Pre-Interpretation of Function => Making Sound Tangible (Visualizer)

Seeing the sound?

6. Reduction of Clutter => Simple => Loss of Control => Physical Manipulation and Regain Control

Giving users back the feel of being in control.

7. Cassette => CD => MP3
   - ⇒ Instant music
   - ⇒ I create, I control

Art of creation.

8. Home = Entertainment System

Living in an entertainment center.

9. Sound Movement = Sound Focus

Center of attention.

10. Managing Digital Media

Too much information, how do users manage them?

11. Sound Applications in Different Environment

Translating sound.

Appendix C – Product Concept Visioning & Scenario Building

Published for 2006 IEEE International on Management of Innovation and Technology Conference

Targeting the Innovation Roadmap Event Horizon: Product Concept Visioning & Scenario Building

S. J. Passey[1], N. Goh[1], P. Kil[1]
[1]Philips Applied Technologies
Philips Innovation Campus, Singapore

***Abstract*-Identifying new potential product innovations requires working on the horizon of already existing product roadmaps and also ensuring that some credible business case can be made. New innovations often loose momentum due to a lack of resources required to fully explore and develop a concept when such new potential product innovations are not effectively communicated and conceptualized. Hence engagement and effective communication with stakeholders is essential to ensure required resources are maintained. This paper studies how appropriate product concept visioning coupled with multiple scenario building as part of an innovation roadmap can formulate product innovation and provide effective communication with the required stakeholders. Several consumer electronic product concept projects undertaken by a major MNC based in Singapore were analyzed. Critical characteristics of an integrative innovation process were identified and linkages to existing product & technology roadmaps identified. The scope considered is that of convergent innovation where technologies and product features are used in new application areas. Several key roles emerge as necessary to manage such an innovation process. These include concept architect, integration agent and market interface roles and how these can be combined to provide an integrated innovation process. This .process is also used to augment and support the product & technology roadmaps of business units who are responsible for product development and commercialization. The paper concludes that innovation requires pushing existing roadmap boundaries using concept visioning and scenario building. These tools are necessary to identify the market context, including varying and emerging markets and build the business case to justify resources for further development. Too far over the roadmap event horizon and the concept vision can be lost and difficult to communicate, however if the concept does not push the existing roadmap boundaries enough it falls into existing product development pipelines which are already time pressured and resource allocated.**

I. INTRODUCTION

New product development is often characterized by the early parts of the process namely idea generation, product conceptualization and concept selection [1]. A major challenge is for a value chain to have the ability to engage a user or customer community that is a representative target for such new products [2]. New product ideas then invariably leverage on the application of new technology or novel application of existing technology. In addition, within an organizations business strategy such new products should typically be aligned with a roadmap that identifies future business drivers, market opportunities and products to meet those needs while maintaining brand identity.

A. Scenario building

Projecting and building future scenarios can be used as an effective way to align potential instances within a roadmap and attempts to validate what products and services may be applicable at that time. Several authors cite the emerging need and value of scenario futures [3][4][5][6][7]. Van der Heijden, Bradfield, Burt, Cairns and Wright, describe how modern scenario techniques have evolved in recent times [8]. Gausemeier, Fink and Schlake outline how multiple futures are necessary to support scenario planning [9]. This compares with the planning of most enterprises where typically a single forecast plan is used. Gausemeier et al. also describe the related network thinking concept where strategies are constructed on the premises of disconnected environments and influence spheres. Examples here relate to macro environments like markets, geo-political and international trade conditions as well as industry specific trends and technology advances. In this context, a roadmap constructed to highlight possible future drivers in these areas forms an intermediate tool to visualize and address this network thinking and link to scenario futures.

Associated with those scenarios are product concepts that address possible future needs. The term 'innovation road map event horizon' is coined and used to describe that part of the roadmap where product concept innovation can flourish, since there are less constraints in terms of existing product planning and development. This "event horizon" will vary from industry to industry, organization to organization and even product range depending on particular strategies and product life cycles. The roadmap event horizon is also likely to spawn more combinational innovation and cross fertilization between technologies and targeted applications. The development and use of roadmaps has been adopted by several major industry players and also some industry sectors where product evolution and product development is highly coupled and dependent on the merging of numerous technology developments. Examples include Motorola and the semiconductor industry sector [10][11]. Several authors also outline how technology roadmaps can be used to support technology management and align required technology development or acquisition with future needs [12][13][14][15]. A roadmap can also be used to aid in the development of a scenario funnel where many possible future horizons can be identified. The future

spaces identified may not all be at the same horizon point and hence the event horizon may vary for product and service solutions that can satisfy those scenarios. A typical scenario funnel is illustrated in Fig 1.

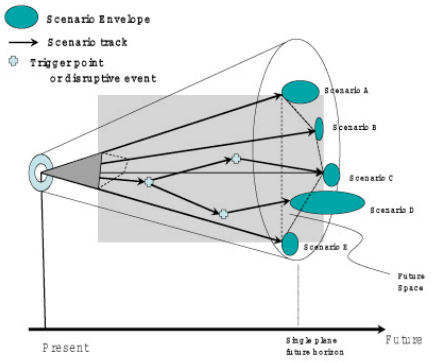


Fig. 1. Typical Scenario Tunnel

B. *Concept visioning*

Concept visioning typically comes by aligning an external opportunity or perceived market demand with an internal driver within the organization, as part of an overall organizational vision. Any possible concepts should enhance and reinforce this vision. Although, customer inputs can be used to validate the acceptance of a product concept, an initial vision will usually be projecting future customer needs.

Saaskilahti, Kuuva and Leppimaki describe the process of product concepting [16]. In a related research project called TUTTI or Systematic Product Concept Generation, future product concept sets are placed in the context of future scenarios. A futures table method for global and theme levels were used to assess criteria and impact [17]. The TUTTI project adopted a concept development process as illustrated in Fig 2.

It is worth noting that user defined concepts tend to take on board what ideal requirements are desired or wanted. Putting such concepts into a set of plausible scenarios can qualify the true needs and modify and manage expectations [18].

II. METHODOLOGY

Two major product development projects within a major consumer electronics MNC were analyzed for critical characteristics of an integrative innovation process and how this process supports existing product and technology roadmaps. In the first case study, a new garment care concept, the product roadmap identified an integration of technologies that could offer an innovative solution to the market. Within the organization, the established product development process was adopted but with particular emphasis on the early stage identification business case analysis. However, to augment and validate the final market offering a series of scenarios and concept visioning exercises were also required. These had to align with the existing product development process but were essential for clearly projecting the final product target market and acceptance.

Here, also, the product is positioned on an existing product roadmap for the business unit. The early stages of the process are characterized as the Orientation Phase, which includes identification, analysis, design criteria, exploration, and selection. The identification stage in turn addresses availability of new technology, market research, consumer behavior and a vision for introducing new product features to meet a targeted or niche market.

To achieve these aspects, scenarios were constructed to assess the integration and potential acceptance of the product. Scenario field analysis starts with splitting up the spheres of influence for the particular target product. Each single influence sphere is used to form a terse description of that scenario. Several concept visions were constructed from a number of possible design outlines. Several scenarios were then built up by considering the range of potential target users, environment and cultural situations. In building these scenarios, projections of the way in which the product may be used are built up. These include two extreme projections and two "middle of the road" or probable projections (trend based).

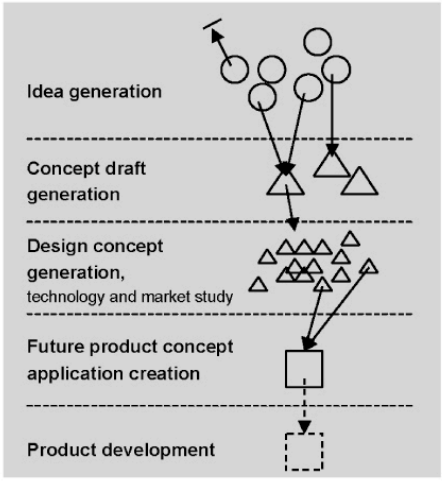


Fig. 2. Concept Development Process
– TUTTI Research Project [17]

The drivers or important possible changes that may take place in the company's business environment can be gleaned from a previously constructed technology roadmap. Each scenario was then assessed with regard to contradiction and plausibility. Internal and external user focus groups are then used to validate or qualitatively assess the robustness of each scenario. In this case, scenarios can prove an effective method for eliciting response and feedback from focus groups. Particular scenarios form the basis for testing and validating a concept vision and specific instances of product concept ideas.

In the second case-study, the target product is focused on a healthcare scenario. The target product is a bedside companion, an electronic device that acts as a personal communicator with specialist medical staff. Wireless high bandwidth data communication enables rich medical information and personalized audio and video links. A number of key stakeholders were a feature of this case, and building a plausible scenario acts an effective way to ensure support and communicate key concepts and interactions. The concept vision was articulated as enabling a patient-centered and hassle-free healthcare delivery. A product concept related to the use of info-comms technology to provide more effective care for patients, in a remote mode. Such a remote, but linked, way of offering personalized interaction and services provides flexibility for healthcare staff and also lifestyle flexibility for the patient under care. The product concept design identified was a personal type communicator which could meet the vision articulated. A roadmap was also in place that projected the possible use of technologies to offer products and services in certain targeted application domains. A roadmap also highlights the potential progressive development of the platform technologies into future additional value added services.

III. Discussion

Several critical characteristics of an integrative innovation process have been identified. Firstly, a concept vision forms the boundaries for how far product design concepts go ij meeting a customer need. In this situation, product concept visioning has to be placed in some initial scope. However, the drivers and market place imperative can be formed and derived from a combination of a technology roadmap and scenario building. The business environment drivers need to be projected over time, and also can be used as part of the scenario building process, especially where future states are evolving and diverging. By definition, a roadmap will enable visualization of what future drivers there are but a more effective representation is to cluster probable combinations that represent future scenarios.

Another characteristic is that for many organizations, the near future product development is to some extent already mapped out with little flexibility for additional innovation. This simply represents the reality of most latter product development processes and associated projects, where a time and resourced pressured project plan is already defined and risk avoidance is a key objective. Hence, the opportunity for innovation and integrating disparate technologies into new product concepts typically has the best chance of adoption at a particular point or horizon on a roadmap. This point, or event horizon, is a fine balance between futuristic projection and near term alignment. Too far over the roadmap event horizon and the concept vision can be lost and difficult to communicate; too early and existing product development projects limits innovation. It is worth noting that product concepts derived as part of the early product development stages can be held in stasis and re-kindled as necessary when certain roadmap triggers warrant the uptake into full product development with a view to satisfying an emerging scenario. Only then can a full business case be validated when there is greater certainty about particular business drivers. Being to early into a target market can be as risky and problematic as being too late.

Certain key roles have emerged as being needed to drive a concept vision and product concept. These include concept architect, integration agent and market interface roles. A concept architect is a creative role and maybe one or more persons who are able to present numerous possible concepts and easily integrate a range a technologies, aesthetics and brand influences. An integration agent role is that of working with a number of different parties, typically as part of a value chain and ensuring common goals, objectives and roadmap consensus. This role is multi-disciplinary and multi-site project management in nature. The concept architect working with an integration agent also offers the opportunity for technology convergence, for example across otherwise disparate business units or organizations. A market interface role is a more traditional one, and is necessary to gather information on target markets and macro environments. Additional research information on target users, market size, market growth rate and market share distribution is also needed.

IV. Conclusions

In conclusion, product innovation requires pushing existing roadmap boundaries using concept visioning and scenario building. These tools are necessary to identify the market context, including varying and emerging markets and build the business case to justify resources for further development. To implement an integrative innovation process with a combination of such tools and techniques, certain key roles have been identified. These roles are also key for communication among disparate parties and stakeholders and to ensure a future roadmap event horizon is meaningful and aligned with the current business vision.

REFERENCES

[1] C. Merle Crawford, C. Anthony Di Benedetto, *New Products Management*. McGraw-Hill/Irwin, New York, 2004, pp.27-31.

[2] Verna Allee, "Reconfiguring the Value Network," *Journal of Business Strategy*, vol. 21, N 4, July-August 2000.

[3] Gina Colarelli O'Connor, Robert W. Veryzer, "The nature of market visioning for technology-based radical innovation," *Journal of Product Innovation Management*, 18, (4), pp. 231-246, 2001.

[4] Matthias Jarke, X. Tung Bui, John M. Carroll, "Scenario Management: An Interdisciplinary Approach," *Requirements Engineering Journal,* Springer London, vol. 3, N 3-4, pp. 155-173, March 1998.

[5] P. N. Finlay, "Steps towards scenario planning," *Engineering Management Journal*, vol. 8, issue 5, pp. 243-246, October 1998.

[6] Philine Warnke, Fabiana Scapolo, "Manufacturing Visions, Scenario Advancement Documentation", *ManVis Report No. 5*, September 2005, Institute for Prospective Technological Studies (IPTS), European Commission, Joint Research Centre.

[7] James A. Ogilvy, Peter Scwartz, "Creating Better Futures: Scenario Planning As a Tool for A Better Tomorrow", Oxford University Press, USA, April 2002.

[8] Kees van der Heijden, Ron Bradfield, George Burt, George Cairns, George Wright, "The Sixth Sense: Accelerating Organisational Learning with Scenarios", Chapter 5, John Wiley & Sons, 2002.

[9] J. Gausemeier, A. Fink, O. Schlake, "Scenario-Management during the early stages of product development," Proceedings of the IFIP WG5.3 International Conference on Life cycle Modeling for Innovative Products and Processes, Berlin, Germany, pp. 158-169, November 1995, Chapman & Hall, Eds. Frank-Lothar Krause & Helmut Jansen.

[10] C.H. Willard, C.W. McClees,. "Motorola's Technology Roadmap Process", *Research Management*, September-October, 13-19. 1987.

[11] International Technology Roadmap for Semiconductors, 2005 ed., SEMATECH, Austin, Texas, U.S.A.

[12] A. McMillan, "Roadmapping agent of change," *Research Technology Management*, 40-47, March-April 2003.

[13] T. Kappel, "Perspectives on Roadmaps: How organizations talk about the future," *Journal of Product Innovation Management*, 18, 39-50, 2001.

[14] P. Groenveld, "Roadmapping: Integrate business and technology," *Research Technology Management*, 40(5), 48-53, 1997.

[15] R. Phaal, C.J.P. Farrukh, D.R. Probert, "Practical frameworks for technology management and planning," *Proceedings of the IEEE Engineering Management Society*, 2000.

[16] M. Saaskilahti, M. Kuuva, S. Leppimaki, "A Method for Systematic Future Product Concept Generation," *Proceedings of the 15th International Conference on Engineering Design, ICED'05*, Melbourne, Australia, August 15-18, 2005, pp. 15.

[17] TUTTI Research project, Helsinki University of Technology (HUT), Finland, http://www.machina.hut.fi/project/tutti .

[18] U.P. Avin, J.L. Dembner, "Getting Scenario Building Right,", *Planning*, November 1002, pp. 22-27.

Appendix D – Attendance of Design Thinking Tools Workshop 2007

Class Title: Intent Identification and Ideas Generation Toolset

Class Dates: 22, 30 March and 12 April 2007

Background: This is a training workshop on Design Thinking Tools conducted for the Ministry of Education (MOE), Singapore. The participants are teachers who are teaching Design and Technology in their respective institutions.

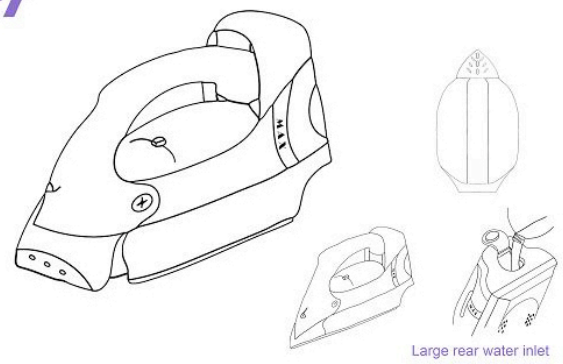
1 Andrew Teo
2 Azizi B Yaakop
3 Goh Guan Hock
4 Hamidah Bte Ali
5 Jalleh Sean Gregory
6 Khew Chee Keong
7 Kwek Hwee Mui
8 Lee Whye Leong
9 Lee Woei Haw Roger
10 Liang Hong Poh
11 Lim Geok Tin Ruth
12 Lim Hwee Chong
13 Ma Lay Hwa
14 Ng Boon Yeow Philip
15 Tai Hui Gyan
16 Terence Ng Kok Chuan

Appendix E – Other Concept Sketches of DAP Case Study

Rebuilding the Steam Iron with PHILIPS

The ExpressWay

- **Unique Flip-n-Glide System**
- **Ironing over buttons**
- **FlipTip for precision ironing**

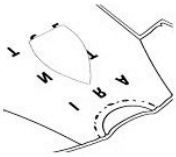


Concept

Expressways are built to move large volumes of traffic quickly from place to place. With this image in mind, the ExpressWay Steam Iron was designed to redefine the conventional approach to ironing. Drive the iron though buttons, instead of weaving in and out between them!

Pragmatic Analysis

The conventional way of smoothing garments involves sliding the tip of the iron in and out between each pair of buttons, which is time-consuming and tedious.



Garments with intricate designs sensitive to heat are difficult to iron.

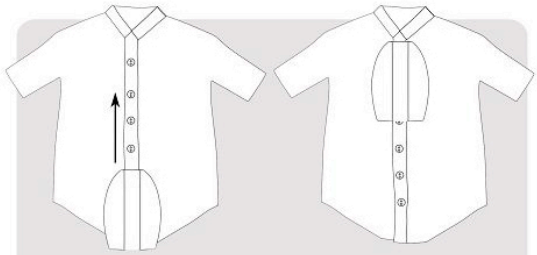
Semantic Analysis

Expressway

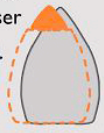
Swift

Value Added

The ExpressWay is able to iron over buttons, making smoothing of shirts less tedious. In addition, the FlipTip design gives the users precision in smoothing small areas of the garment.

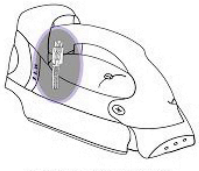


The **ExpressWay Iron** with its unique **Flip-n-Glide System**. The **FlipTip** when activated reveals a special passage, which the user takes to glide the iron **over the buttons**.

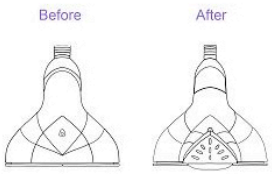


How It Works

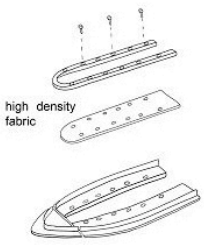
The body and soleplate of the iron consists of two halves, the tip and the base. The tip of the iron extends to the handle of the iron. When the handle is depressed, the tip flips up accordingly, and a locking mechanism holds it in place, revealing a passageway.



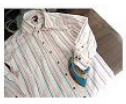
Click-lock mechanism



The passageway runs through the center of the base and is made of special high density fabric, which inflates slightly with steam pressure. The fabric will engulf the buttons, pressing over it as the iron glides through.

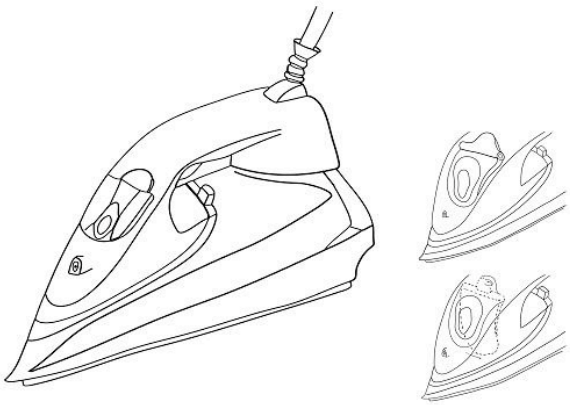


Context



The Speedster

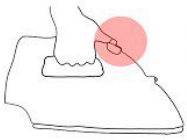
- **Capless water filling system**
- **Pressing on iron triggers Shot-of-Steam**
- **Steam vents designed closer to edges**



Concept

Automatic doors slide open when it detects a person approaching. The speedster opens its doors when it detects water coming. In addition, the SpeedSteam feature and steam vents designed closer to the edges, increases ironing speed and efficiency.

Pragmatic Analysis



The conventional method of activating the steam burst function on the iron requires the user to press on the shot-of-steam button which stresses the thumbs or fingers.

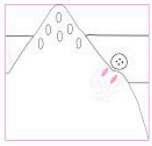
Semantic Analysis

Automatic

Intuitive

Fast

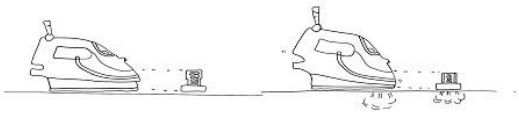
How It Works



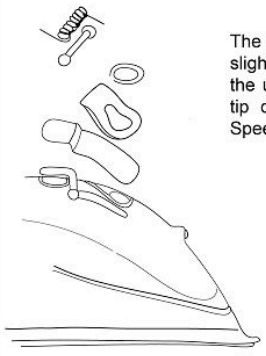
Steam vents designed nearer to the edge help to smoothen areas around buttons.

When iron users encounter stubbon creases, intuitively they either press harder on the iron, activate Shot-of-Steam, or do both.

The Speedster combines both methods into one action – pressing down the iron will release that much needed shot of steam and heavier pressure onto the creases, aiding in the smoothing action.



Pressing down on the iron activates Shot-of-Steam



The back of the iron consists of a slightly flexible plastic. This allows the user to press the spring-loaded tip down, which in-turns activates SpeedSteam (Shot-of-Steam).

The cap of a conventional iron is replaced by a one-way valve mechanism that allows water to flow into the tank, but not out. The internal cover of the mechanism is curved to aid the flow of water as well as to keep the valve open.

Pressing down **intuitively** on the **Speedster Iron** activates **Shot-of-Steam**.

Less hassle and faster refills with **Capless water refill system.**

Value Added

The Speedster is simple to use and intuitive, which allows users to enjoy their ironing experience.

Context