

# Product Design and Innovation: Exploring Breakthrough Products

(Breakthroughs: A Method and A Madness)

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## THESIS ABSTRACT

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1. Methodology

This paper has been an iterative rather than a breakthrough process. We approached the topic of product design and innovation with notions of what it meant and how good designs were created. Our purpose here has been to provide some understanding of the complexity of the issues surrounding breakthrough product designs. We redefine a variety of terms that are used liberally in the field to provide some sort of precise understanding of our perspective. This thesis is not meant to be read in the traditional paper format rather, it has digital collateral (CD-ROM, zip disks) that are the true product of our research.

2. Introduction

- Dictionary
- Frameworks
- Interviews/Anecdotes
- Our Vision/Viewpoint and Conclusions

Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5
<b>Underlying theme 1: Meaningfulness – Art should be close to people</b>				
A general discussion of breakthrough products and what are perceived to be the success factors for them. The notion that risk versus reward models may not be the best way to think about them; nor is the "luck" model	The effect of behaviorist models, and difficulty of evaluating aesthetics using behaviorist models	The value of design and aesthetics – human factor elements	Stories and differences between design firms and in-house product design	The role of meaning in good product design

## **Chapter One**

The approach we have taken assumes the following structure: We begin with a discussion of breakthrough products, and a dictionary of design terms which will create an understanding of the common vocabulary used throughout this thesis. The second chapter is a survey and discussion of existing thought and literature in the design and management field. In the third chapter, we share the results collected from interviewing a variety of firms and people all of whom have either designed, written about, or exhibited breakthrough products. Our purpose here was to better understand how design people think about and approach the act of designing. We say design people because designing is not limited to the archetypal industrial designer nor is it limited to people who draw, paint or otherwise mold objects from their hands. Designers include: people who design everyday things, and people who design intangibles-- like VH1-- where the designers and product managers take latent needs and create products that stimulate fantasy and stories. Lastly, we will offer our conclusions and insights as well as our vision for the future of product design and development.

As we have progressed along the path of this project we have come to a number of realizations about the design process for ourselves and what it means to have partial knowledge or partial information when trying to design to a specification. We have developed a deep and abiding dislike of deadlines but contend that disagreeable thought they may be, deadlines encourage creativity and thus, potentially, great design. It is vital to move towards a shared understanding of what the terms design and breakthrough actually mean. We discovered repeatedly that people do not share identical

definitions of these words yet, they are used with great abandon. For example, an article we read on the topic of product design and innovation employed the term innovation 76 different times in a less than 1000 word article—it strikes us that not only is this excessive but it indicates a certain lack of precision. We have created a micro-dictionary, if you will, of terms that we employ throughout this document and, though it is possible that you will disagree with our definitions, we hope that by providing a crib sheet, the reader will spend less time mulling over contentious word choices and more time mooting our ideas.

### **PROBLEM STATEMENT and IMPORTANCE:**

It is our purpose to address the issue of how to successfully conceptualize and design breakthrough products. While much of the literature in the field addresses innovation and how to promote innovation within an organization, far less has been devoted to the issue of breakthrough product design. We believe that breakthrough products can be created in a systematic fashion. Breakthrough design is a learned behavior, something that once mastered can be repeated ad infinitum, rather than a one-time only, stab-in-the-dark. This at least, is the hope we hold for our vision of design. By no means is there any one perfect formula or one perfect way to accomplish the same goal. Like the college basketball player perfecting the skyhook or the slam dunk, there has simply got to be a lot of failure before the perfect result—however, practice and learning will eventually result in peak performance and, we hope—breakthroughs.

## **WHY STUDY BREAKTHROUGHS?**

The importance of innovation to corporate strategy and design should not be underestimated. Numerous researchers have reaffirmed the importance of new, breakthrough products to the success of corporations. Glenn House of Atreve Software, speaking of the importance of product design to a startup, emphasized that they live and die by their products and that the opportunity to design new products occurs only once. This presents product designers with the classic dilemma: "You thought you understood them fairly well. You read their answers on market-research forms and peered at them in focus groups through one-way mirrors. When they said they were "satisfied" or "very satisfied" on survey questionnaires, you went to bed happy at night. Why then did they defect, one by one, to your competitors? Why, oh why, did your customers hand you such a nasty surprise?"<sup>i</sup> The end result of either faulty strategy or bad design is a disaster both for the company and for the customer. The problem with focus groups is that human nature dictates that people tell you what they think you want to hear and concurrently, ticking boxes off on a sheet of paper that define "satisfied" or "very satisfied" is simply not an accurate method of assessing customer needs and desires—at least not accurately. Shared meaning breaks down in such situations satisfaction is one of those dodgy words that eludes precise definition.

Our contention is that it is simply not enough for your customers to tell you that they are happy. They may or may not know the degree to which their needs are being met and most people will fill out a survey or questionnaire at best, haphazardly. Customers we have to

acknowledge do not often ponder their degree of happiness, at least not their “product” happiness. For example, the Apple Newton, as a product was not terribly successful. Its lack of success can be attributed primarily to the customer base. Customers did not know what to do with the product, it had never occurred to them that they needed an electronic organizer. The Palm Pilot, on the other hand, was a tremendously successful iteration/innovation because customers had been educated to the benefits of the hand held electronic organizer. It should come as no surprise that a vast quantity of designers and engineers from the Newton crossed over to help design the Palm Pilot. (NOTE: this is the first sign of a breakthrough product. The person with the vision cannot let the idea go and will follow it anywhere to see it succeed.). Increasingly, product development has become a major differentiating factor in competitive strategy. Intense international and local competition, fragmented and demanding markets, and diverse and rapidly changing technologies create a world where no one, let alone a product manager can ignore the competitive imperative to constantly improve products and processes. This imperative runs across all industries, from medical products to entertainment products. Further, as product development cycles have shortened, companies must generate more and faster product development cycles with fewer resources. Consequently, there is an interstice, a gap, where a designer with a vision and the right environment and sound fiscal backing can make a stunning debut. For example the equally silly and ingenious Topsy Tail .A true breakthrough product provides strategic opportunities by creating a distinct, competitive advantage that is difficult to emulate. We say difficult to imitate because a breakthrough is, by definition—disruptive to the status quo. Thus by its very nature it is nie impossible to be the

doppelganger for a breakthrough. The authentic breakthrough—be it concept, design, or object-- stands alone above the market melee.

Astute strategic decisions can turn basic advantages into tremendous core competencies. For example, turning a simple breakthrough product into a new product platform upon which your corporate engine runs or, further, by exploiting technological innovations before competitors can---all provide advantages. Finally, translating these advantages into a cost/scale and market share advantage can turn competitive competencies generated by these breakthrough products into an unscalable mountain on the corporate playing field. This broad spectrum, Gattling Gun model has been employed effectively by companies as diverse as Honda, Sony, Philips, Quantum, and the Limited.<sup>ii</sup>

There are many products on the market which have an ephemeral hold on the consuming public. These product offerings have the longevity and the excitement value of a "hula hoop" or the "pet rock." At the time they seem mighty inventive, breakthroughs they are often hailed. The reality is that they pique a notoriously jaded audiences interest for a day, an hour, a year and then fade into the background with the rest of the dross. These are the product equivalent of Andy Warhol's notorious "fifteen minutes of fame" they are inescapably short-lived. The fragmentation of markets has only served to further push companies to produce something new and gadgety for a public that is always hungry but does not know what it wants to eat. The only lasting way to capture this audience is to either create or ride the wave of a paradigm shift. It is only by fundamentally changing the manner in which people go about their

daily life or think about the things they do that a company can hope to deliver lasting value via a product offering.



## **DICTIONARY**

There is a dearth of precise vocabulary to define and discuss the concepts that we have been researching. We have found that each interviewee and each writer and each designer had a slightly different way of defining a word, a thought, a design. This seemingly semantic issue skews an already complex and intangible subject as each use of the word breakthrough means something slightly different to each individual—be they thesis partners, co-designers or academics. This skewing or rather this distortion of definition is a matter of some significance that we would like to address in our paper.

The first step towards a better understanding of how a breakthrough product is developed is to have a shared vocabulary and a shared understanding of the ideas and frameworks and language commonly used in design. It is through this shared field of meaning that we can begin to draw more general conclusions about the process of product design and innovation; and it is through this process of defining, that we will come to understand how breakthroughs are created and which environments and factors host the richest, most fertile soil for their development. In the course of this investigation, it became apparent that there are many terms in the world of product design that are thrown around haphazardly and that, in order to have a meaningful discussion, these terms need to be defined or at least understood in the same context as an author is employing them. Thus, a new dictionary of product design and development:

## **INNOVATION:**

### *Dictionary*

*To innovate (Latin - innovatus, pp of innovare to renew, in + novare from novus-new) - to introduce something new, to change, revolution, insurrection.*

Defining innovation is not easy either it can be defined in terms of context, process, people, and product, or corporate behavior. "You might say, then, that innovation is a style of corporate behavior that's comfortable with, even aggressive about, new ideas, change, risk, and failure. And it must permeate a very wide swath of an organization in order to make a difference."<sup>1</sup> Innovation than is the taking of a conglomeration of components, past product history, consumer needs, focus group responses, design requirements, lead user push, and marketplace pull. Innovation is not a breakthrough. Fundamentally, an innovation is that which improves upon an idea, a concept, a product, which already exists and thus, endemically, cannot be considered a breakthrough. Take medicine, for example, "breakthroughs" happen all the time but the reality is that a true breakthrough, such as Jonas Salk's cure for Polio, happens very, very rarely and, furthermore, what happens more frequently can best be described as iterative innovation.

## **Breakthrough:**

### *Dictionary*

*The forcing of a way through an obstruction, the result of this action, a successful attack on some limited sector of defenses, the opening up of some new way of achievement in scientific or artistic technique, with large consequences*

A breakthrough product offering has, in our definition, the following four components. Without all four aspects, a product may be sensational, radical or desirable but it cannot be labeled a breakthrough - it is merely an innovation or a neat idea. A breakthrough product is an object or a concept that in some fashion creates or re-defines a category. A breakthrough product is immediately accessible to the end user and is universally accepted in a rapid and dramatic fashion. A breakthrough

product changes customer/consumer behavioral patterns—it alters the way people relate to the object and to one another. And lastly a breakthrough product must skate on the edge of the envelope, it must be the spawn or the inducement of a paradigm shift.

**MEANING:** Meaning has a variety of definitions but for us, it goes beyond simply giving an object, a concept, a thing a definition or a role in our world it is, we hope, a word whose fundamental sense is about creating a shared understanding, crossculture, gender etc. Meaning should, in great design be instantly recognizable, instantly welcomed, instantly understood. One should not have to look at an object for twenty minutes, knowing full well its intended purpose but being utterly unable to figure out how it was supposed to work as I was recently so stumped on an airplane flight. So complex was the in-flight entertainment system and so totally devoid of symbols, that all I could do was haphazardly press buttons and hope for success. Meaning should be transferable and accessible instantaneously and in all of its richness.

**PRODUCT:**

A concept, an object, a result. A product can be any number of things but ultimately, a product is the end result of the marriage between thought and action. Can be equated with product offering. We often refer to the product but in actuality we are discussing the product offering which is an all encompassing term. The product offering consists of all facets of a product not simply the physical product and its attributes. The product offering is the combination of product, pricing, communication, and distribution/sales.

**INDUSTRIAL DESIGN:**

Industrial Designers attempt to make ideas into objects for the masses, for cross-cultural assimilation, for ease of use and the aesthetic impulse we all contain for good narrative.

## **NARRATIVE:**

Narrative is at the heart of all great design. Stories are what define an object for a user or a viewer. It is this implicit requirement that makes all designers on some level a storyteller. Stories link us together as human beings and also link us together culturally. Breakthrough designs have universal themes that touch anyone from any place in intrinsically the same way, striking the same cord. Thus, a product without a narrative is not an effective product, it is sterile, lifeless and ultimately not successful.

## **DESIGN/Art:**

### *Dictionary 1*

*Skill, dexterity, or the power of performing certain actions, acquired by experience, study, or observation. Skill in the adaptation of things in the natural world to the uses of human life, human contrivance or ingenuity. Learning or a field of learning, The general principals of any branch of learning or of any developed craft; a system of rules or of organized modes of operation serving to facilitate the performance of certain actions; as, the art of building or engraving, the art of war; the art of navigation:*

*"Art in general consists of the truths of science, arranged in the most convenient order for practice, instead of the order is the most convenient for thought" (J.S. Mill)*

*"All arts, we must remember,, are phases of the social mind. We are so much in the habit of thing of them in terms of art products that we forget that the arts themselves are groups of ideas and acquisitions of skill that exist only in the minds, muscles, and nerves of living men" (F. H. Giddings)*

*Application of skill and taste to production according to aesthetic principles; an occupation having to do with the theory or practice of taste in the expression of beauty in form, color, sound, speech, or movement. Specifically, such application to the production of beauty in plastic materials by imitation or design, as in painting and sculpture.*

### *Dictionary 2*

*The use of the imagination to make things of aesthetic significance, the technique involved, the theory involved objects made by creative artists*

## **Meaning**

*Mean*

*(Latin medianus for that is in the middle) occupying a middle position, occurring between the limits or extremes, intermediate in kind or degree. Occupying a position roughly midway between extremes near the average or norm. Serving as a mean or intermediary. That through which, or by the help of which, an end is attained; something tending to an object desired; intermediate agency or measure; necessary condition or co agent*

*That which is meant or intended; intent; purpose; aim; object; that which is, or is intended to be signified or denoted by act or language; knowledge or understanding. Import and relevance. Significance is meaning often covert rather than ostensible, regarded as of weight or moment.. "Under the obvious import of his stories lay concealed a mystic sense" (Cowper)*

## **SERENDIPITY:**

Luck while at the heart of the matter cannot explain away the repeated success of industrial designers like Ideo and FrogDesign. Serendipity to be a successful element requires that the serendipitous is noticed, appreciated and capitalized on. Serendipity is well defined by the classic breakthrough product, the ubiquitous post-it note. Think back, however and you will remember that like many things that have changed in the last ten years, post-it notes are a relatively new phenomenon. They were created in the labs of 3M—scientist looking for an adhesive—discovered the wonderful not-too-sticky charm of the substance and voila! Post-it notes.. Serendipity at work.

## **Chapter 2**

### Literature Review

#### Frameworks

The literature in product design and development is a huge body of work that stretches over a large variety of viewpoints, ranging from those in management to those of the on-the-ground team, and a large variety of research methodologies. This variety is due to the integral nature of successful product design and development to the vitality and growth of the corporate entity. Viewpoints fell into the following categories:

- Strategy
- Corporate strategy perspective
- Process emergent (Explanations of culture (fostering creativity and learning))
- Action/Actual development
- Product development team
- Organizational structure
- Agency - stakeholder incentives
- Resource allocation (existing customer vs. Potential)
- Customer interaction strategy - voice of the customer
- S curves and innovation strategy: product platforms

Research methodologies fall into the following categories:

- Story collection
- Ethnographic
- Surveys

Analysis methods range from the heuristic to the rigorously analytic - from the consulting-esque to economics to regressions.

Humans make sense of events in their lives through storytelling. Each explanation of product success or failure is a way of telling a story that offers meaning. A story can illuminate why a team succeeded or failed. Thus meaning is information and the basis of future action and is transferred from one group of people to another through the act of narration. In fact, the structure is not so simple in academic research. A group of people act, transactions are evaluated, and sometimes measured and then a group of professional storytellers tell stories about those actions that casts them in a business framework that through historical hindsight, should teach us to build patterns out of random elements in the future. In approaching this storytelling phenomena we will begin by defining each of the story types, or archetypes then, by examining the particular story model or archetype employed, explain our example. We have used Honda as a case study because each element that we wish to address is contained, in one form or another, in the saga of their entry in to the United States marketplace.

In approaching this literature on existing explanations and paradigms for successful models of creating breakthrough products offerings, it is highly illustrative to examine the story of Honda's entry into the American motorcycle market in the 1960s and 1970s. Research was first performed by the Boston Consulting Group for the British government as they lost market share to the Japanese in the motorcycle market. BCG, therefore, created the first explanatory model for Honda's stellar performance in the US. Shortly thereafter, the story was published as recounted by Honda executives who had been instrumental in this success. Key differences in the explanation s will be explored. What is equally, if not more, interesting is the attempts of a group of academics to make sense of and integrate these narrative events into stories and then into matrices or formulae for success and predictability.

## **Strategy**

Strategic stories take the perspective that there are ways to plan, that traditional businesses strategies work. Typically the strategy stories are very focused on forecasting the future based on the past. Also, they rely primarily on certain, well established business frameworks to explain, predict, and determine success.

The other methodology for is that of strategic intent, and strategic focus, rather than of roadmaps for success. We are calling it process emergent.

### **Corporate strategy perspective**

The corporate strategy perspective explains the success of a breakthrough product through traditional frameworks and explanations. Typical explanations and roadmaps for success include traditional economic theory utilized to gain advantage on the competitive playing field such as learning curves, scale advantages, network externality factors, pricing vs. Demand and lowering price to gain market share and reap the competitive advantages come with scale and commitment.

In examining the Honda Story, the BCG perspective is most representative of the corporate strategy perspective.

### **Process emergent**

Pralahad and Hamel define strategic intent as " INSERT STRAT INTENT HERE". Strategic intention, then, provides a guiding vision for employees, a destination, but not a roadmap. How that destination is reached is not known in formulating the strategic intention, instead the roadmap is allowed to emerge as a learning process - where slowly, the process begins emerge as result of strategic intention and the existing culture of the firm that fosters the ability of employees to take chances, and make mistakes, where failure is seen as an experience to learn from rather than a reason



for being fired. Process emergent explanations focus on the culture of the firm as one that fosters creativity, learning, and the ability to make mistakes, without sinking the firm and eventually leading to success.

The Honda story as told in the process emergent mode is one about a group of managers coming to a new market with a strategic intention, some resources, and some hypotheses about how to succeed to in that market. However, they proceeded to make a series of strategic bets and learn and grow from those bets. Their strategy emerged over time, enabling them to react effectively to the existing market and met the needs of a new group of customers that no one in the existing competitive field had imagined existed.

### **Utter Serendipity**

Some of our interviews indicated that they thought that “luck” was the determining factor in breakthrough products and their subsequent success. Here the explanation for success is unclear. Managers take a product to market, or conceive of a product, and somehow, perhaps iteratively, a breakthrough product is created. It is very illustrative to turn, once again, to the Honda story in this instance.

Honda managers, interviewed after their success, and after the publishing of the BCG report, told a very different story. They had been given the mandate to go develop a profitable Honda presence in the United States. They were given a fairly minimal budget, mostly dictated by how much the Japanese government would allow them to take out of the country, and in equal proportions, a number of motorbikes. They did not speak English, did not know the United States very well, and had not done much market research. They arrived in Los Angeles, and after much difficulty were able to get some dealers to carry their heavy, more luxurious bikes. However, they had not anticipated the amount of wear and tear that American

customers put on their bikes, and that distances between typical destination pairs tended to be longer. The heavy bikes began to break down frequently, and parts had to be obtained at great expense from Japan. In the meantime, the managers were using the lighter bikes to run errands and to do dirtbiking in the local hills on the weekends. They began to get multiple requests for the lighter bikes. They then began selling them through sports distributors, and sporting goods stores. The "super cubs" as they were called took off and Honda found they had a runaway success on their hands. The story that the Honda managers tell is one of random success, they did not anticipate that the customers they had planned to target would run the product into the ground. Nor did they anticipate that word of mouth advertising would uncover a market for supercubs that had not previously ridden motor bikes. All in all the story as they tell is one of a group of managers muddling around until they go out of business or find a market and a distribution channel.

### **Product development teams**

Product development teams and the factor behind their success or failure is a common thread of research. In most cases the story consists of interviews with multiple product development teams - sometimes up to 200 or 300 different companies - to elicit stories that are then analyzed for the factors that can be casually linked to success of these products. The story that emerges is not too surprising, though perhaps the most surprising and issue of the concern is that the story that emerges is cross national. Factors for success that have been found include low competition in the market, integrated cross functional team, having a proponent in management, good team communication.

### **Organizational structure**

Flexible structure vs. Traditional structure, Flexible corporate structure allows design departments to work more creatively. This in turn fosters the ambience and environment necessary for creating breakthrough product offerings.

### **Agency - stakeholder incentives**

The notion that agency is an effective explanation for breakthrough products - when employees and managers are given the correct set of incentives, in the right ways then, they can create breakthrough products. Take, for example, Microsoft which follows a path of making its employees rich as it, itself becomes richer. The breakdown point is that while they may make their employees rich quickly they also lose them to small start-up ventures and burn-out.

### **Resource allocation (existing customer vs. Potential)**

Clayton Christensen puts forward a comprehensive argument that organizations have a tendency to focus on their existing customers and their needs than to explore the needs of new customers. This results in a tendency towards incrementally innovate products rather than breakthrough products. Further In the Honda story, when managers arrived in Los Angeles they focused on the existing customer set that their competition geared their products to, rather than potential customers. However, they found that they were unable to satisfy the needs of existing customer. Somewhat serendipitously they discovered an emergent set of customers, one whose needs Honda's competitors were unable to meet without destroying their own franchise and their own value proposition by refocusing on a value proposition and a franchise that appeared to be much, much riskier.

### **Customer interaction strategy - voice of the customer**

A variety of methodologies are advocated for understanding customer needs. Understanding and figuring out what customers need is a key factor in success of a product. Products can not be breakthrough unless they meet the needs of customers. However, customer needs, especially those that result in breakthrough products, are usually not obvious.

## **S curves and innovation strategy: product platforms**

The notion that technology matures and is superceded, by a new s-curve. Each s-curve serves as a breakthrough technology platform upon which a portfolio of incrementally innovative products are created.

Traditional risk versus reward models lay out a series of expected returns on an investment. In the case of product design, designers or product managers attempt to anticipate on the basis of consumer research, what consumer's reactions to a product will be. Traditional risk vs. Reward models induce managers to make the decisions that have the highest probability of financial success. This model does not allow or entice a manager to make a risky decision, on the contrary it stultifies creativity by placing insuperable parameters on the design process—how can anyone be creative in the face of a purely numerate judgement system? Rather product managers are induced to make incremental changes to existing product sets rather than to make leap of faith design decisions that may or may not have a deleterious impact on the bottom line. This rigidity results in a variety of consequences: First, once a company has identified a successful product line, they tend not to deviate a great deal from an existing successful portfolio of products. Second, new product innovations tend come from companies or individuals without much investment in existing product franchises. Finally, breakthrough products are seen as substantially risky, and the successful of a breakthrough product is often dependent upon luck.

## **Conclusion for Chapter Two**

There are clearly more frameworks that exist in the world of analysis and we have attempted to cover a sampling of the larger groupings. One can always employ a matrix or a Porter diamond when thinking about a market opportunity or a strategic target. We feel however, that the correct methodology for thinking and writing and developing breakthrough products is first and foremost to understand how they occur. The best analogy we have discovered is one that plunders new science and chaos

theory. Like a fractal, a breakthrough is extraordinarily beautiful and one of a kind. One cannot re-create a breakthrough one can innovate or emulate but to truly understand breakthroughs and how the work one cannot be limited to a static framework. Therefore, we can only extrapolate that like chaos, to grasp the complexity of the act of creation requires a storehouse of knowledge. These frameworks provide a sound fundamental foundation for an exploration of what we call story archetypes. Given these archetypes, it becomes imminently clear which particular method of analysis teases out which particular aspects of the design process. Ultimately, a framework is too rigid to contain such an elastic concept as breakthrough design. We postulate that by studying and understanding the frameworks one can then cache that knowledge and work towards developing a truer perspective. Our belief is that by employing the story archetype model, a researcher will be able to quite quickly form opinions and theses about what aspects of an archetype fulfill their design requirements. In the next chapter we will discuss at length the archetypes that we believe are fundamental to the successful creation breakthrough products. At the very least, these archetypes will provide a template upon which a designer or firm can form their own archetype—the essence of any breakthrough is learning from the past and creating your own future.

## **CHAPTER 3**

### **ARCHETYPES:**

Peter Lawrence, director of the corporate design foundation, when asked about his favorite design success stories focused on, the Herman Miller chair the Aeron. Why is it a breakthrough? Because you have a visceral response to it, you see it or happen upon it and it is like nothing you have ever seen before but it is compelling none-the-less. He considers quibbling over definitions somewhat wasteful but acknowledged that it was vital to understand collectively. We contend that it is that very fount of creativity that we are attempting to , in some way codify. An adaptation of an existing product is not a breakthrough although a breakthrough has to have some criteria, we suppose you could say that it has to hit six out of ten hurdles to qualify for breakthrough status.

Lawrence says that good design focuses on the user, is user driven, is approachable. For example, the initial cell phone, the palm pilot—Starbucks all of these product offerings I one way or another managed to change the way we, as humans, think and do certain things like make a phone call, set a date or have a morning cup of coffee.

The main problem is that breakthrough design can only be generated by what might covertly be termed “deviant” behavior within a corporate context. Therefore, deviance from the mean needs to be encouraged to create the creative foment necessary to the design of a breakthrough. You need to achieve a pattern out of a random series of elements but you need to have a vision that is radically new.

**Netscape:**

Netscape has a no consistent design methodology. In practice, design methods are decided on a group by group basis. This allows for tremendous flexibility but can also hamper them in terms of consistency and quality control. They feel that breakthrough products are merely a function of luck. Each design process is both competitive and individualistic. This is not an environment for the deep thinker who needs time to mull over an idea or one who has a passion for a particular concept unless they are willing to compete with all the other designers for attention and budget.

**Broderbund:**

Publisher of digital media ranging from education, entertainment to productivity. Their model for design is not consistent. Rather, they employ design houses that are doing software development and cherrypick the best of the crop. They get very involved in the design process once they have made a commitment to a firm—then it is a large multi-talented team environment. However, the product concept part of the process is outsourced. They refine ideas rather than develop them internally. Guiding principles are ease of use, to make it fun, interesting and compelling. Different styles for different customers. The challenge is to incorporate powerful and complex features in an intuitive manner. Kid picks is a great example of a deviant passionate software designer who was cherrypicked by Broderbund and with his child designed a brilliant and successful piece of software for Broderbund.

Design challenges tend to be related to the lack of clarity in terms of process, leaders emerge over time. The general sense we felt was that there was a desire for more formality in the system. However, in order to develop breakthrough products you have to have passion and Broderbund's employees have that—they think what they do is great.

**FrogDesign and Ideo:**

FrogDesign and Ideo are both consultation firms. They are the hired guns of the design world and are extremely methodical about their design processes. They make great design by getting their hands dirty and rolling up their sleeves to really understand what it is that is driving the client.. They spend a lot of time learning the history of a company and a product in order to be effective at reengineering its design. They set up a specific rooms that are designated for the product. It is fee for service model. The concern one might have for this model of design is that it creates a high rate of turnover amongst design staff. People get burned out very quickly in such intense environments. Both management at Ideo and FrogDesign acknowledge the difficulty of having such a high pressure system but also pointedly made efforts to keep work fun and exciting for employees. You go do something new and different you are continuously brainstorming and ultimately, people just cannot do it very long.

**VH1**

At VH1 and MTV the design process tends to be more of a Pralahad and Hamel, Process emergent sort of force. The impending doom of a deadline plays a tremendous role in generating new ideas on a daily basis. One great example of the process emerging behavior was in the development of VH1's new campaign—The Stories Behind the Music. They tried a variety of re-imagining and iterating with the idea and did not pursue one vision blindly. VH1 allowed themselves to make some mistakes but ultimately focused on the fact that storytelling is a lost art and by telling the stories behind the music they could provide satisfaction for their customers who craved the stories.



**PIXAR:**

They have a vision where they create a look and feel that is their own. It is not a flexible environment. There are designers and programmers and there are very a very structured methods of dealing with interactions between them. They have already created their breakthrough product, their very nature is breakthrough, just like Disney was fifty years ago. Pixar has developed a new kind of world by utilizing digital vs. analog to create a new reality.

We have looked at a few models of product design and development. These archetypes range for the controlled to the chaotic but the successful model always, ultimately depends upon the quality of the idea. In order to design a breakthrough product offering, be it a concept, a toy, a program or a shoe, the person with the passion needs to find or develop a model that works best for them on an individual basis. Our point in going through these models is not strictly to say one should do it in the manner of Netscape or in the manner of Ideo but rather to say—these ideas and methodologies exist and, for the most part have proven to be successful. Take the elements of these models and adapt them to your own idea and develop your own methodologies for design. The point of the process is to develop you own individual story in order to enable you to develop, consistently, quality products that challenge the prevailing paradigms.

## **ROADMAP FOR BREAKTHROUGHS:**

Here are our checkpoints for successful design:

- Read your history—then throw it all out.
- Does the product have an immediately apparent narrative? Does it let the user know immediately what it is meant to do and how it does it?
- Don't restrict yourself to focusing on market success, focus on customer happiness
- Focus groups: Do they hate your product? Do they fail to understand your idea? Good. You are halfway to a breakthrough.
- Are you creating or riding the wave of a paradigm shift?

If you are not meeting resistance from any quarter than you are not developing a breakthrough product offering. By their very nature they are disruptive. Disrupt!

## CHAPTER 4

In design as in life, everyone is looking for the magic bullet, the holy grail, the simple panacea that can make “you larger or make you small or make you anything at all.” However, given that whiff of a panacea, does any corporate chief think that the competitive advantage will last? We assert not, rather there is no formulaic destiny that can be hit upon when trying to decode the mythology of a breakthrough product. And, even if there were, there would be no means of preventing others from following suit and thus the advantage is lost after all. A breakthrough is specifically that which exists because of a gap that was not previously exploited or an idea whose time had not yet come. We repeat, there is no formula. We think that this is perhaps the single greatest failing of both the academic and corporate realms in discussions of breakthrough products; the former is looking always for a matrix upon which to prostrate an idea and the latter is looking for a competitive advantage that cannot be replicated but yet, one that is as simple to reproduce as  $A + B = C$ . The fact of the matter is that there is no one framework for success in creating breakthrough products. There is no formula, there are no rules, and there is no guarantee. In order to successfully and (hopefully) repeatedly produce breakthroughs one must take risks and follow the endeavor with great zeal. Creating a breakthrough product requires patience, luck, serendipity, if you will, and zeal. An ability to learn, to try strategies throw them out if they are not working—know when to cut your losses but also understand that the majority of breakthrough products were initially not understood by the customer they were intended for e.g., post-it notes. Above all else, if you are a designer, a firm, a person looking to create the next pet rock, hula hoop or perhaps, combustion engine, you must do so without focusing too much attention on the bottom line. It is in the bottom line where many a

potential breakthrough has died a quick death in light of negative marketing numbers or wary investors.

We hasten to add that there are many more failures than successes and that there is no strict methodology for being the right product at the right time in the right place—hence the serendipity factor—we do assert however that any product or concept that has a preponderance of what we would term( and do categorize later on) the “right stuff” has a far greater chance of winning the product wars than one that fails to meet our criteria.

Common elements abound in each instance of breakthrough product development. We can begin by considering our definition of the breakthrough product offering. First, it is based on a disruptive technology. Second, A different understanding of one's environment

“...entrepreneurial success is found in the strategies that link the company and its environment. New and/or different links between the firm and its environment are usually the product of an inclination to test -- and sometimes ignore --conventional wisdom about how things are done, as well as an entrepreneurial mindset that empowers the execution of untried ideas.”

Technologies that disrupt the status quo that make people think differently about a product offering or, even more importantly, about the way they work, live and play are breakthroughs. “A new business concept that responds to emerging demographic and social trends enhances the likelihood of success. The growing number of elderly people creates the potential for entrepreneurial strategies that serve their particular needs. The focus on personal health and fitness gives rise to a range of strategic initiatives, from personal exercise trainers to weight loss clinics. Anti-smoking laws and related public policy information campaigns have spawned products and services to help people abandon cigarettes. The rapid computerization of the international workplace created the need to train workers to operate continuously enhanced information systems.”<sup>1</sup>

### **Belief is half the battle**

Believing that you can create a breakthrough product is certainly the launching point for many a product designer. However, the vast majority of people who have attempted to create a breakthrough product did not set out telling themselves that they wanted to create a breakthrough product. Rather, these breakthrough designers had an idea, or a vision and followed that vision blindly and relentlessly.

### **Fostering serendipity**

We have already established that there is, sadly, no means of forecasting which product is going to be successful. Therefore, one way of creating the right environment for a breakthrough to develop is to foster situations that will allow whimsy and serendipity to flourish.

### **Risk, Risky, and Riskier**

Developing ideas and products is a risky venture. It is vital to spread finances and talent around and not put all of your resources towards one key product offering. The statistical evidence is alarmingly against the systematic creation of a product breakthrough so a fair amount of R&D should be spent on innovation rather than a winner takes all product design. The reality of the numbers indicates that your first idea will either fall flat or be mediocre and possibly your second or third as well—some designers never design a breakthrough perhaps due to the design, the consumer or bad channels of distribution. We emphasize that simply having a great design is not, in and of itself, sufficient to break--through. It also means that you should not put all your resources into the first iteration of your product. Design professionals, or nascent product guru's need to accept that failure is part of the learning curve and that it is an important aspect of the growth experience.

### **Learn, learn, learn**

Often through the design process a designer will fixate on a particular aspect of the design—wrong. Allow yourself to move off of an idea or a particular piece of the overall design when you feel yourself becoming frustrated or fixated. Learn from these experiences and analyze them. The critique process is extremely useful because it forces a designer to view with greater objectivity his or her process and results. You **will** get it wrong before you get it right: that means that until you figure out exactly how the breakthrough product offering should work you must try alternatives and rigorously, not heuristically, analyze the pros and cons.

### **Take a Vacation when you run out of gas**

Fundamentally, what drives breakthrough products is the zealot's heart and soul, both of team and individuals. When teams get tired or bored or run out of enthusiasm, while they can continue to create interesting and possibly very innovative products, the chances that they will produce a breakthrough product are very slim. Designers need to be fresh. Move on!! Take a vacation!! Play!!

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## **DICTIONARY**

There is a dearth of precise vocabulary to define and discuss the concepts that we have been researching. We have found that each interviewee and each writer and each designer had a slightly different way of defining a word, a thought, a design. This seemingly semantic issue skews an already complex and intangible subject as each use of the word breakthrough means something slightly different to each individual—be they thesis partners, co-designers or academics. This skewing or rather this distortion of definition is a matter of some significance that we would like to address in our paper.

The first step towards a better understanding of how a breakthrough product is developed is to have a shared vocabulary and a shared understanding of the ideas and frameworks and language commonly used in design. It is through this shared field of meaning that we can begin to draw more general conclusions about the process of product design and innovation; and it is through this process of defining, that we will come to understand how breakthroughs are created and which environments and factors host the richest, most fertile soil for their development. In the course of this investigation, it became apparent that there are many terms in the world of product design that are thrown around haphazardly and that, in order to have a meaningful discussion, these terms need to be defined or at least understood in the same context as an author is

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employing them. Thus, a new dictionary of product design and development:

**INNOVATION:**

*Dictionary*

*To innovate (Latin - innovatus, pp of innovare to renew, in + novare from novus-new) - to introduce something new, to change, revolution, insurrection.*

Defining innovation is not easy either it can be defined in terms of context, process, people, and product, or corporate behavior. "You might say, then, that innovation is a style of corporate behavior that's comfortable with, even aggressive about, new ideas, change, risk, and failure. And it must permeate a very wide swath of an organization in order to make a difference."<sup>ii</sup> Innovation than is the taking of a conglomeration of components, past product history, consumer needs, focus group responses, design requirements, lead user push, and marketplace pull. Innovation is not a breakthrough. Fundamentally, an innovation is that which improves upon an idea, a concept, a product, which already exists and thus, endemically, cannot be considered a breakthrough. Take medicine, for example, "breakthroughs" happen all the time but the reality is that a true breakthrough, such as Jonas Salk's cure for Polio, happens very, very rarely and, furthermore, what happens more frequently can best be described as iterative innovation.

**Breakthrough:**

*Dictionary*

*The forcing of a way through an obstruction, the result of this action, a successful attack on some limited sector of defenses, the opening up of some new way of achievement in scientific or artistic technique, with large consequences*

A breakthrough product offering has, in our definition, the following four components. Without all four aspects, a product may be sensational,

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radical or desirable but it cannot be labeled a breakthrough - it is merely an innovation or a neat idea. A breakthrough product is an object or a concept that in some fashion creates or re-defines a category. A breakthrough product is immediately accessible to the end user and is universally accepted in a rapid and dramatic fashion. A breakthrough product changes customer/consumer behavioral patterns—it alters the way people relate to the object and to one another. And lastly a breakthrough product must skate on the edge of the envelope, it must be the spawn or the inducement of a paradigm shift.

**MEANING:** Meaning has a variety of definitions but for us, it goes beyond simply giving an object, a concept, a thing a definition or a role in our world it is, we hope, a word whose fundamental sense is about creating a shared understanding, cross0culture, gender etc. Meaning should, in great design be instantly recognizable, instantly welcomed, instantly understood. One should not have to look at an object for twenty minutes, knowing full well its intended purpose but being utterly unable to figure out how it was supposed to work as I was recently so stumped on an airplane flight. So complex was the in-flight entertainment system and so totally devoid of symbols, that all I could do was haphazardly press buttons and hope for success. Meaning should be transferable and accessible instantaneously and in all of its richness.

**PRODUCT:**

A concept, an object, a result. A product can be any number of things but ultimately, a product is the end result of the marriage between thought and action. Can be equated with product offering. We often refer to the product but in actuality we are discussing the product offering which is an all encompassing term. The product offering consists of all facets of a product not simply the physical product and its attributes. The product offering is the combination of product, pricing, communication, and distribution/sales.

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**INDUSTRIAL DESIGN:**

Industrial Designers attempt to make ideas into objects for the masses, for cross-cultural assimilation, for ease of use and the aesthetic impulse we all contain for good narrative.

**NARRATIVE:**

Narrative is at the heart of all great design. Stories are what define an object for a user or a viewer. It is this implicit requirement that makes all designers on some level a storyteller. Stories link us together as human beings and also link us together culturally. Breakthrough designs have universal themes that touch anyone from any place in intrinsically the same way, striking the same cord. Thus, a product without a narrative is not an effective product, it is sterile, lifeless and ultimately not successful.

**DESIGN/Art:***Dictionary 1*

*Skill, dexterity, or the power of performing certain actions, acquired by experience, study, or observation. Skill in the adaptation of things in the natural world to the uses of human life, human contrivance or ingenuity. Learning or a field of learning, The general principals of any branch of learning or of any developed craft; a system of rules or of organized modes of operation serving to facilitate the performance of certain actions; as, the art of building or engraving, the art of war; the art of navigation:*

*"Art in general consists of the truths of science, arranged in the most convenient order for practice, instead of the order is the most convenient for thought" (J.S. Mill)*

*"All arts, we must remember,, are phases of the social mind. We are so much in the habit of thing of them in terms of art products that we forget that the arts themselves are groups of ideas and acquisitions of skill that exist only in the minds, muscles, and nerves of living men" (F. H. Giddings)*

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*Application of skill and taste to production according to aesthetic principles; an occupation having to do with the theory or practice of taste in the expression of beauty in form, color, sound, speech, or movement. Specifically, such application to the production of beauty in plastic materials by imitation or design, as in painting and sculpture.*

#### *Dictionary 2*

*The use of the imagination to make things of aesthetic significance, the technique involved, the theory involved objects made by creative artists*

### **Meaning**

#### *Mean*

*(Latin medianus for that is in the middle) occupying a middle position, occurring between the limits or extremes, intermediate in kind or degree. Occupying a position roughly midway between extremes near the average or norm. Serving as a mean or intermediary. That through which, or by the help of which, an end is attained; something tending to an object desired; intermediate agency or measure; necessary condition or co agent*

*That which is meant or intended; intent; purpose; aim; object; that which is, or is intended to be signified or denoted by act or language; knowledge or understanding. Import and relevance. Significance is meaning often covert rather than ostensible, regarded as of weight or moment.. "Under the obvious import of his stories lay concealed a mystic sense" (Cowper)*

### **SERENDIPITY:**

Luck while at the heart of the matter cannot explain away the repeated success of industrial designers like Ideo and FrogDesign. Serendipity to be a successful element requires that the serendipitous is noticed, appreciated and capitalized on. Serendipity is well defined by the classic breakthrough product, the ubiquitous post-it note. Think back, however and you will

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remember that like many things that have changed in the last ten years, post-it notes are a relatively new phenomenon. They were created in the labs of 3M—scientist looking for an adhesive—discovered the wonderful not-too-sticky charm of the substance and voila! Post-it notes.. Serendipity at work.

## **Chapter 2**

Literature Review

Frameworks

The literature in product design and development is a huge body of work that stretches over a large variety of viewpoints, ranging from those in management to those of the on-the-ground team, and a large variety of research methodologies. This variety is due to the integral nature of successful product design and development to the vitality and growth of the corporate entity. Viewpoints fell into the following categories:

- Strategy
- Corporate strategy perspective
- Process emergent (Explanations of culture (fostering creativity and learning))
- Action/Actual development
- Product development team
- Organizational structure
- Agency - stakeholder incentives
- Resource allocation (existing customer vs. Potential)
- Customer interaction strategy - voice of the customer
- S curves and innovation strategy: product platforms

Research methodologies fall into the following categories:

- Story collection

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- Ethnographic
  - Surveys

Analysis methods range from the heuristic to the rigorously analytic - from the consulting-esque to economics to regressions.

Humans make sense of events in their lives through storytelling. Each explanation of product success or failure is a way of telling a story that offers meaning. A story can illuminate why a team succeeded or failed. Thus meaning is information and the basis of future action and is transferred from one group of people to another through the act of narration. In fact, the structure is not so simple in academic research. A group of people act, transactions are evaluated, and sometimes measured and then a group of professional storytellers tell stories about those actions that casts them in a business framework that through historical hindsight, should teach us to build patterns out of random elements in the future. In approaching this storytelling phenomena we will begin by defining each of the story types, or archetypes then, by examining the particular story model or archetype employed, explain our example. We have used Honda as a case study because each element that we wish to address is contained, in one form or another, in the saga of their entry in to the United States marketplace.

In approaching this literature on existing explanations and paradigms for successful models of creating breakthrough products offerings, it is highly illustrative to examine the story of Honda's entry into the American motorcycle market in the 1960s and 1970s. Research was first performed by the Boston Consulting Group for the British government as they lost market share to the Japanese in the motorcycle market. BCG, therefore, created the first explanatory model for Honda's stellar performance in the US. Shortly thereafter, the story was published as recounted by Honda executives who had been instrumental in this success. Key differences in

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the explanation s will be explored. What is equally, if not more, interesting is the attempts of a group of academics to make sense of and integrate these narrative events into stories and then into matrices or formulae for success and predictability.

## **Strategy**

Strategic stories take the perspective that there are ways to plan, that traditional businesses strategies work. Typically the strategy stories are very focused on forecasting the future based on the past. Also, they rely primarily on certain, well established business frameworks to explain, predict, and determine success.

The other methodology for is that of strategic intent, and strategic focus, rather than of roadmaps for success. We are calling it process emergent.

### Corporate strategy perspective

The corporate strategy perspective explains the success of a breakthrough product through traditional frameworks and explanations. Typical explanations and roadmaps for success include traditional economic theory utilized to gain advantage on the competitive playing field such as learning curves, scale advantages, network externality factors, pricing vs. Demand and lowering price to gain market share and reap the competitive advantages come with scale and commitment.

In examining the Honda Story, the BCG perspective is most representative of the corporate strategy perspective.

### Process emergent

Pralahad and Hamel define strategic intent as " INSERT STRAT INTENT HERE". Strategic intention, then, provides a guiding vision for employees, a destination, but not a roadmap. How that destination is reached is not known in formulating the strategic intention, instead the roadmap is



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allowed to emerge as a learning process - where slowly, the process begins emerge as result of strategic intention and the existing culture of the firm that fosters the ability of employees to take chances, and make mistakes, where failure is seen as an experience to learn from rather than a reason for being fired. Process emergent explanations focus on the culture of the firm as one that fosters creativity, learning, and the ability to make mistakes, without sinking the firm and eventually leading to success.

The Honda story as told in the process emergent mode is one about a group of managers coming to a new market with a strategic intention, some resources, and some hypotheses about how to succeed to in that market. However, they proceeded to make a series of strategic bets and learn and grow from those bets. Their strategy emerged over time, enabling them to react effectively to the existing market and met the needs of a new group of customers that no one in the existing competitive field had imagined existed.

#### Utter Serendipity

Some of our interviews indicated that they thought that "luck" was the determining factor in breakthrough products and their subsequent success. Here the explanation for success is unclear. Managers take a product to market, or conceive of a product, and somehow, perhaps iteratively, a breakthrough product is created. It is very illustrative to turn to the Honda story in this instance.

Honda managers, interviewed after their success, and after the publishing of the BCG report, told a very different story. They had been given the mandate to go develop a profitable Honda presence in the United States. They were given a fairly minimal budget, mostly dictated by how much the Japanese government would allow them to take out of the country, and in

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equal proportions, a number of motorbikes. They did not speak English, did not know the United States very well, and had not done much market research. They arrived in Los Angeles, and after much difficulty were able to get some dealers to carry their heavy, more luxurious bikes. However, they had not anticipated the amount of wear and tear that American customers put on their bikes, and that distances between typical destination pairs tended to be longer. The heavy bikes began to break down frequently, and parts had to be obtained at great expense from Japan. In the meantime, the managers were using the lighter bikes to run errands and to do dirtbiking in the local hills on the weekends. They began to get multiple requests for the lighter bikes. They then began selling them through sports distributors, and sporting goods stores. The "super cubs" as they were called took off and Honda found they had a runaway success on their hands. The story that the Honda managers tell is one of random success, they did not anticipate that the customers they had planned to target would run the product into the ground. Nor did they anticipate that word of mouth advertising would uncover a market for supercubs that had not previously ridden motor bikes. All in all the story as they tell is one of a group of managers muddling around until they go out of business or find a market and a distribution channel.

#### Product development team

Product development teams and the factor behind their success or failure is a common thread of research. In most cases the story consists of interviews with multiple product development teams - sometimes up to 200 or 300 different companies - to elicit stories that are then analyzed for the factors that can be casually linked to success of these products. The story that emerges is not too surprising, though perhaps the most surprising and issue of the concern is that the story that emerges is cross national. Factors for success that have been found include low competition in the market, integrated cross functional team, having a proponent in management, good team communication.

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The story of Honda's success includes that of Shishiro Honda and his competency in building racing engines.

Organizational structure,

Flexible structure vs. Traditional structure, and the leverage it gives individual in the organization

#### Agency - **stakeholder incentives**

The notion that agency is an effective explanation for breakthrough products - when employees and managers are given the right set of incentives, in the right ways, they create breakthrough products. Take, for example, Microsoft.

#### Resource allocation (**existing customer vs. Potential**)

Clayton Christensen puts forward a comprehensive argument that organizations have a tendency to focus on their existing customers and their needs than to explore the needs of new customers. This results in a tendency towards incrementally innovate products rather than breakthrough products. Further

In the Honda story, when managers arrived in Los Angeles they focused on the existing customer set that their competition geared their products to, rather than potential customers. However, they found that they were unable to satisfy the needs of existing customer. Somewhat serendipitously they discovered an emergent set of customers, one whose needs Honda's competitors were unable to meet without destroying their own franchise and their own value proposition by refocusing on a value proposition and a franchise that appeared to be much, much riskier.

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## Customer interaction strategy - **voice of the customer**

A variety of methodologies are advocated for understanding customer needs. Understanding and figuring out what customers need is a key factor in success of a product. Products can not be breakthrough unless they meet the needs of customers. However, customer needs, especially those that result in breakthrough products, are usually not obvious.

## **S curves and innovation strategy: product platforms**

The notion that technology matures and is superceded, by a new s-curve. Each s-curve serves as a breakthrough technology platform upon which a portfolio of incrementally innovative products are created.

Traditional risk versus reward models lay out a series of expected returns on an investment. In the case of product design, designers or product managers attempt to anticipate on the basis of consumer research, what consumer's reactions to a product will be. Traditional risk vs. Reward models induce managers to make the decisions that have the highest probability of financial success. This model does not allow or entice a manager to make a risky decision, on the contrary it stultifies creativity by placing insuperable parameters on the design process—how can anyone be creative in the face of a purely numerate judgement system? Rather product managers are induced to make incremental changes to existing product sets rather than to make leap of faith design decisions that may or may not have a deleterious impact on the bottom line. This rigidity results in a variety of consequences: First, once a company has identified a successful product line, they tend not to deviate a great deal from an existing successful portfolio of products. Second, new product innovations tend come from companies or individuals without much investment in existing product franchises. Finally, breakthrough products are seen as

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substantially risky, and the successful of a breakthrough product is often dependent upon luck.

### **Conclusion for Chapter Two**

There are clearly more frameworks that exist in the world of analysis and we have attempted to cover a sampling of the larger groupings. One can always employ a matrix or a Porter diamond when thinking about a market opportunity or a strategic target. We feel however, that the correct methodology for thinking and writing and developing breakthrough products is first and foremost to understand how they occur. The best analogy we have discovered is one that plunders new science and chaos theory. Like a fractal, a breakthrough is extraordinarily beautiful and one of a kind. One cannot re-create a breakthrough one can innovate or emulate but to truly understand breakthroughs and how they work one cannot be limited to a static framework. Therefore, we can only extrapolate that like chaos, to grasp the complexity of the act of creation requires a storehouse of knowledge. These frameworks provide a sound fundamental foundation for an exploration of what we call story archetypes. Given these archetypes, it becomes imminently clear which particular method of analysis teases out which particular aspects of the design process. Ultimately, a framework is too rigid to contain such an elastic concept as breakthrough design. We postulate that by studying and understanding the frameworks one can then cache that knowledge and work towards developing a truer perspective. Our belief is that by employing the story archetype model, a researcher will be able to quite quickly form opinions and theses about what aspects of an archetype fulfill their design requirements. In the next chapter we will discuss at length the archetypes that we believe are fundamental to the successful creation breakthrough products. At the very least, these archetypes will provide a template upon which a designer or firm can form their own archetype—the essence of any breakthrough is learning from the past and creating your own future.

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## Literature Review

### Frameworks

The literature in product design and development is a huge body of work that stretches over a large variety of viewpoints, ranging from those in management to those of the on-the-ground team, and a large variety of research methodologies. This variety is due to the integral nature of successful product design and development to the vitality and growth of the corporate entity. Viewpoints fell into the following categories:

- Strategy
- Corporate strategy perspective
- Process emergent (Explanations of culture (fostering creativity and learning))
- Action/Actual development
- Product development team
- Organizational structure
- Agency - stakeholder incentives
- Resource allocation (existing customer vs. Potential)
- Customer interaction strategy - voice of the customer
- S curves and innovation strategy: product platforms

Research methodologies fall into the following categories:

- Story collection
- Ethnographic
- Surveys

Analysis methods range from the heuristic to the rigorously analytic - from the consulting-esque to economics to regressions.

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Humans make sense of events in their lives through storytelling. Each explanation of product success or failure is a way of telling a story that offers meaning. A story can illuminate why a team succeeded or failed. Thus meaning is information and the basis of future action and is transferred from one group of people to another through the act of narration. In fact, the structure is not so simple in academic research. A group of people act, transactions are evaluated, and sometimes measured and then a group of professional storytellers tell stories about those actions that casts them in a business framework that through historical hindsight, should teach us to build patterns out of random elements in the future. In approaching this storytelling phenomena we will begin by defining each of the story types, or archetypes then, by examining the particular story model or archetype employed, explain our example. We have used Honda as a case study because each element that we wish to address is contained, in one form or another, in the saga of their entry in to the United States marketplace.

In approaching this literature on existing explanations and paradigms for successful models of creating breakthrough products offerings, it is highly illustrative to examine the story of Honda's entry into the American motorcycle market in the 1960s and 1970s. Research was first performed by the Boston Consulting Group for the British government as they lost market share to the Japanese in the motorcycle market. BCG, therefore, created the first explanatory model for Honda's stellar performance in the US. Shortly thereafter, the story was published as recounted by Honda executives who had been instrumental in this success. Key differences in the explanation s will be explored. What is equally, if not more, interesting is the attempts of a group of academics to make sense of and integrate these narrative events into stories and then into matrices or formulae for success and predictability.

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## **Strategy**

Strategic stories take the perspective that there are ways to plan, that traditional businesses strategies work. Typically the strategy stories are very focused on forecasting the future based on the past. Also, they rely primarily on certain, well established business frameworks to explain, predict, and determine success.

The other methodology for is that of strategic intent, and strategic focus, rather than of roadmaps for success. We are calling it process emergent.

### **Corporate strategy perspective**

The corporate strategy perspective explains the success of a breakthrough product through traditional frameworks and explanations. Typical explanations and roadmaps for success include traditional economic theory utilized to gain advantage on the competitive playing field such as learning curves, scale advantages, network externality factors, pricing vs. Demand and lowering price to gain market share and reap the competitive advantages come with scale and commitment.

In examining the Honda Story, the BCG perspective is most representative of the corporate strategy perspective.

### **Process emergent**

Pralahad and Hamel define strategic intent as "INSERT STRAT INTENT HERE". Strategic intention, then, provides a guiding vision for employees, a destination, but not a roadmap. How that destination is reached is not known in formulating the strategic intention, instead the roadmap is allowed to emerge as a learning process - where slowly, the process begins emerge as result of strategic intention and the existing culture of the firm that fosters the ability of employees to take chances, and make mistakes, where failure is seen as an experience to learn from rather than a reason for being fired. Process emergent explanations focus on the culture of the



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firm as one that fosters creativity, learning, and the ability to make mistakes, without sinking the firm and eventually leading to success.

The Honda story as told in the process emergent mode is one about a group of managers coming to a new market with a strategic intention, some resources, and some hypotheses about how to succeed in that market. However, they proceeded to make a series of strategic bets and learn and grow from those bets. Their strategy emerged over time, enabling them to react effectively to the existing market and meet the needs of a new group of customers that no one in the existing competitive field had imagined existed.

### **Utter Serendipity**

Some of our interviews indicated that they thought that “luck” was the determining factor in breakthrough products and their subsequent success. Here the explanation for success is unclear. Managers take a product to market, or conceive of a product, and somehow, perhaps iteratively, a breakthrough product is created. It is very illustrative to turn, once again, to the Honda story in this instance.

Honda managers, interviewed after their success, and after the publishing of the BCG report, told a very different story. They had been given the mandate to go develop a profitable Honda presence in the United States. They were given a fairly minimal budget, mostly dictated by how much the Japanese government would allow them to take out of the country, and in equal proportions, a number of motorbikes. They did not speak English, did not know the United States very well, and had not done much market research. They arrived in Los Angeles, and after much difficulty were able to get some dealers to carry their heavy, more luxurious bikes. However, they had not anticipated the amount of wear and tear that American

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customers put on their bikes, and that distances between typical destination pairs tended to be longer. The heavy bikes began to break down frequently, and parts had to be obtained at great expense from Japan. In the meantime, the managers were using the lighter bikes to run errands and to do dirtbiking in the local hills on the weekends. They began to get multiple requests for the lighter bikes. They then began selling them through sports distributors, and sporting goods stores. The "super cubs" as they were called took off and Honda found they had a runaway success on their hands. The story that the Honda managers tell is one of random success, they did not anticipate that the customers they had planned to target would run the product into the ground. Nor did they anticipate that word of mouth advertising would uncover a market for supercubs that had not previously ridden motor bikes. All in all the story as they tell is one of a group of managers muddling around until they go out of business or find a market and a distribution channel.

### **Product development teams**

Product development teams and the factor behind their success or failure is a common thread of research. In most cases the story consists of interviews with multiple product development teams - sometimes up to 200 or 300 different companies - to elicit stories that are then analyzed for the factors that can be casually linked to success of these products. The story that emerges is not too surprising, though perhaps the most surprising and issue of the concern is that the story that emerges is cross national. Factors for success that have been found include low competition in the market, integrated cross functional team, having a proponent in management, good team communication.

### **Organizational structure**

Flexible structure vs. Traditional structure, Flexible corporate structure allows design departments to work more creatively. This in turn fosters

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the ambience and environment necessary for creating breakthrough product offerings.

### **Agency - stakeholder incentives**

The notion that agency is an effective explanation for breakthrough products - when employees and managers are given the correct set of incentives, in the right ways then, they can create breakthrough products. Take, for example, Microsoft which follows a path of making its employees rich as it, itself becomes richer. The breakdown point is that while they may make their employees rich quickly they also lose them to small start-up ventures and burn-out.

### **Resource allocation (existing customer vs. Potential)**

Clayton Christensen puts forward a comprehensive argument that organizations have a tendency to focus on their existing customers and their needs than to explore the needs of new customers. This results in a tendency towards incrementally innovate products rather than breakthrough products. Further In the Honda story, when managers arrived in Los Angeles they focused on the existing customer set that their competition geared their products to, rather than potential customers. However, they found that they were unable to satisfy the needs of existing customer. Somewhat serendipitously they discovered an emergent set of customers, one whose needs Honda's competitors were unable to meet without destroying their own franchise and their own value proposition by refocusing on a value proposition and a franchise that appeared to be much, much riskier.

### **Customer interaction strategy - voice of the customer**

A variety of methodologies are advocated for understanding customer needs. Understanding and figuring out what customers need is a key factor in success of a product. Products can not be breakthrough unless they

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meet the needs of customers. However, customer needs, especially those that result in breakthrough products, are usually not obvious.

### **S curves and innovation strategy: product platforms**

The notion that technology matures and is superceded, by a new s-curve. Each s-curve serves as a breakthrough technology platform upon which a portfolio of incrementally innovative products are created.

Traditional risk versus reward models lay out a series of expected returns on an investment. In the case of product design, designers or product managers attempt to anticipate on the basis of consumer research, what consumer's reactions to a product will be. Traditional risk vs. Reward models induce managers to make the decisions that have the highest probability of financial success. This model does not allow or entice a manager to make a risky decision, on the contrary it stultifies creativity by placing insuperable parameters on the design process—how can anyone be creative in the face of a purely numerate judgement system? Rather product managers are induced to make incremental changes to existing product sets rather than to make leap of faith design decisions that may or may not have a deleterious impact on the bottom line. This rigidity results in a variety of consequences: First, once a company has identified a successful product line, they tend not to deviate a great deal from an existing successful portfolio of products. Second, new product innovations tend come from companies or individuals without much investment in existing product franchises. Finally, breakthrough products are seen as substantially risky, and the successful of a breakthrough product is often dependent upon luck.

### **Conclusion for Chapter Two**

There are clearly more frameworks that exist in the world of analysis and we have attempted to cover a sampling of the larger groupings. One can

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always employ a matrix or a Porter diamond when thinking about a market opportunity or a strategic target. We feel however, that the correct methodology for thinking and writing and developing breakthrough products is first and foremost to understand how they occur. The best analogy we have discovered is one that plunders new science and chaos theory. Like a fractal, a breakthrough is extraordinarily beautiful and one of a kind. One cannot re-create a breakthrough one can innovate or emulate but to truly understand breakthroughs and how the work one cannot be limited to a static framework. Therefore, we can only extrapolate that like chaos, to grasp the complexity of the act of creation requires a storehouse of knowledge. These frameworks provide a sound fundamental foundation for an exploration of what we call story archetypes. Given these archetypes, it becomes imminently clear which particular method of analysis teases out which particular aspects of the design process. Ultimately, a framework is too rigid to contain such an elastic concept as breakthrough design. We postulate that by studying and understanding the frameworks one can then cache that knowledge and work towards developing a truer perspective. Our belief is that by employing the story archetype model, a researcher will be able to quite quickly form opinions and theses about what aspects of an archetype fulfill their design requirements. In the next chapter we will discuss at length the archetypes that we believe are fundamental to the successful creation breakthrough products. At the very least, these archetypes will provide a template upon which a designer or firm can form their own archetype—the essence of any breakthrough is learning from the past and creating your own future.

### CHAPTER 3

#### ARCHETYPES:

Peter Lawrence, director of the corporate design foundation, when asked about his favorite design success stories focused on, the Herman Miller

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chair the Aeron. Why is it a breakthrough? Because you have a visceral response to it, you see it or happen upon it and it is like nothing you have ever seen before but it is compelling none-the-less. He considers quibbling over definitions somewhat wasteful but acknowledged that it was vital to understand collectively. We contend that it is that very fount of creativity that we are attempting to , in some way codify. An adaptation of an existing product is not a breakthrough although a breakthrough has to have some criteria, we suppose you could say that it has to hit six out of ten hurdles to qualify for breakthrough status.

Lawrence says that good design focuses on the user, is user driven, is approachable. For example, the initial cell phone, the palm pilot—Starbucks all of these product offerings I one way or another managed to change the way we, as humans, think and do certain things like make a phone call, set a date or have a morning cup of coffee.

The main problem is that breakthrough design can only be generated by what might covertly be termed “deviant” behavior within a corporate context. Therefore, deviance from the mean needs to be encouraged to create the creative foment necessary to the design of a breakthrough. You need to achieve a pattern out of a random series of elements but you need to have a vision that is radically new.

Here are our checkpoints for breakthroughs:

- Read your history—then throw it all out.
- Does the product have an immediately apparent narrative? Does it let the user know immediately what it is meant to do and how it does it?
- Don't restrict yourself to focusing on market success, focus on customer happiness

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- Focus groups: Do they hate your product? Do they fail to understand your idea? Good. You are halfway to a breakthrough.
  - Are you creating or riding the wave of a paradigm shift?
  - If you are not meeting resistance from any quarter than you are not developing a breakthrough product offering. By their very nature they are disruptive. Disrupt!

#### Netscape:

Netscape has a no consistent design methodology. In practice, design methods are decided on a group by group basis. This allows for tremendous flexibility but can also hamper them in terms of consistency and quality control. They feel that breakthrough products are merely a function of luck. Each design process is both competitive and individualistic. This is not an environment for the deep thinker who needs time to mull over an idea or one who has a passion for a particular concept unless they are willing to compete with all the other designers for attention and budget.

#### Broderbund:

Publisher of digital media ranging from education, entertainment to productivity. Their model for design is not consistent. Rather, they employ design houses that are doing software development and cherry-pick the best of the crop. They get very involved in the design process once they have made a commitment to a firm—then it is a large multi-talented team environment. However, the product concept part of the process is outsourced. They refine ideas rather than develop them internally. Guiding principles are ease of use, to make it fun, interesting and compelling. Different styles for different customers. The challenge is to incorporate powerful and complex features in an intuitive manner. Kid picks is a great example of a deviant passionate software designer who was

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cherry-picked by Broderbund and with his child designed a brilliant and successful piece of software for Broderbund.

Design challenges tend to be related to the lack of clarity in terms of process, leaders emerge over time. The general sense we felt was that there was a desire for more formality in the system. However, in order to develop breakthrough products you have to have passion and Broderbund's employees have that—they think what they do is great.

FrogDesign and Ideo:

FrogDesign and Ideo are both consultation firms. They are the hired guns of the design world and are extremely methodical about their design processes. They make great design by getting their hands dirty and rolling up their sleeves to really understand what it is that is driving the client.. They spend a lot of time learning the history of a company and a product in order to be effective at reengineering its design. They set up a specific rooms that are designated for the product. It is fee for service model. The concern one might have for this model of design is that it creates a high rate of turnover amongst design staff. People get burned out very quickly in such intense environments. Both management at Ideo and FrogDesign acknowledge the difficulty of having such a high pressure system but also pointedly made efforts to keep work fun and exciting for employees. You go do something new and different you are continuously brainstorming and ultimately, people just cannot do it very long.

VH1

At VH1 and MTV the design process tends to be more of a Pralahad and Hamel, Process emergent sort of force. The impending doom of a deadline plays a tremendous role in generating new ideas on a daily basis. One great example of the process emerging behavior was in the development of VH1's new campaign—The Stories Behind the Music. They tried a variety of



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re-imagining and iterating with the idea and did not pursue one vision blindly. VH1 allowed themselves to make some mistakes but ultimately focused on the fact that storytelling is a lost art and by telling the stories behind the music they could provide satisfaction for their customers who craved the stories..

**PIXAR:**

They have a vision where they create a look and feel that is their own. It is not a flexible environment. There are designers and programmers and there are very a very structured methods of dealing with interactions between them. They have already created their breakthrough product, their very nature is breakthrough, just like Disney was fifty years ago. Pixar has developed a new kind of world by utilizing digital vs. analog to create a new reality.

We have looked at a few models of product design and development. These archetypes range for the controlled to the chaotic but the successful model always, ultimately depends upon the quality of the idea. In order to design a breakthrough product offering, be it a concept, a toy, a program or a shoe, the person with the passion needs to find or develop a model that works best for them on an individual basis. Our point in going through these models is not strictly to say one should do it in the manner of Netscape or in the manner of Ideo but rather to say—these ideas and methodologies exist and, for the most part have proven to be successful. Take the elements of these models and adapt them to your own idea and develop your own methodologies for design. The point of the process is to develop you own individual story in order to enable you to develop, consistently, quality products that challenge the prevailing paradigms.

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## CHAPTER 4

In design as in life, everyone is looking for the magic bullet, the holy grail, the simple panacea that can make “you larger or make you small or make you anything at all.” However, given that whiff of a panacea, does any corporate chief think that the competitive advantage will last? We assert not, rather there is no formulaic destiny that can be hit upon when trying to decode the mythology of a breakthrough product. And, even if there were, there would be no means of preventing others from following suit and thus the advantage is lost after all. A breakthrough is specifically that which exists because of a gap that was not previously exploited or an idea whose time had not yet come. We repeat, there is no formula. We think that this is perhaps the single greatest failing of both the academic and corporate realms in discussions of breakthrough products; the former is looking always for a matrix upon which to prostrate an idea and the latter is looking for a competitive advantage that cannot be replicated but yet, one that is as simple to reproduce as  $A + B = C$ . The fact of the matter is that there is no one framework for success in creating breakthrough products. There is no formula, there are no rules, and there is no guarantee. In order to successfully and (hopefully) repeatedly produce breakthroughs one must take risks and follow the endeavor with great zeal. Creating a breakthrough product requires patience, luck, serendipity, if you will, and zeal. An ability to learn, to try strategies throw them out if they are not working—know when to cut your losses but also understand that the majority of breakthrough products were initially not understood by the customer they were intended for e.g., post-it notes. Above all else, if you are a designer, a firm, a person looking to create the next pet rock, hula hoop or perhaps, combustion engine, you must do so without focusing too much attention on the bottom line. It is in the bottom line where many a

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potential breakthrough has died a quick death in light of negative marketing numbers or wary investors.

We hasten to add that there are many more failures than successes and that there is no strict methodology for being the right product at the right time in the right place—hence the serendipity factor—we do assert however that any product or concept that has a preponderance of what we would term( and do categorize later on) the “right stuff” has a far greater chance of winning the product wars than one that fails to meet our criteria.

Common elements abound in each instance of breakthrough product development. We can begin by considering our definition of the breakthrough product offering. First, it is based on a disruptive technology. Second, A different understanding of one's environment

“...entrepreneurial success is found in the strategies that link the company and its environment. New and/or different links between the firm and its environment are usually the product of an inclination to test -- and sometimes ignore --conventional wisdom about how things are done, as well as an entrepreneurial mindset that empowers the execution of untried ideas.”

Technologies that disrupt the status quo that make people think differently about a product offering or, even more importantly, about the way they work, live and play are breakthroughs. “A new business concept that responds to emerging demographic and social trends enhances the likelihood of success. The growing number of elderly people creates the potential for entrepreneurial strategies that serve their particular needs. The focus on personal health and fitness gives rise to a range of strategic initiatives, from personal exercise trainers to weight loss clinics. Anti-smoking laws and related public policy information campaigns have spawned products and services to help people abandon cigarettes. The

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rapid computerization of the international workplace created the need to train workers to operate continuously enhanced information systems.” "

### **Belief is half the battle**

Believing that you can create a breakthrough product is certainly the launching point for many a product designer. However, the vast majority of people who have attempted to create a breakthrough product did not set out telling themselves that they wanted to create a breakthrough product. Rather, these breakthrough designers had an idea, or a vision and followed that vision blindly and relentlessly.

### **Fostering serendipity**

We have already established that there is, sadly, no means of forecasting which product is going to be successful. Therefore, one way of creating the right environment for a breakthrough to develop is to foster situations that will allow whimsy and serendipity to flourish.

### **Risk, Risky, and Riskier**

Developing ideas and products is a risky venture. It is vital to spread finances and talent around and not put all of your resources towards one key product offering. The statistical evidence is alarmingly against the systematic creation of a product breakthrough so a fair amount of R&D should be spent on innovation rather than a winner takes all product design. The reality of the numbers indicates that your first idea will either fall flat or be mediocre and possibly your second or third as well—some designers never design a breakthrough perhaps due to the design, the consumer or bad channels of distribution. We emphasize that simply having a great design is not, in and of itself, sufficient to break--through. It also means that you should not put all your resources into the first iteration of your product. Design professionals, or nascent product guru's need to accept that failure is part of the learning curve and that it is an important aspect of the growth experience.

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### **Learn, learn, learn**

Often through the design process a designer will fixate on a particular aspect of the design—wrong. Allow yourself to move off of an idea or a particular piece of the overall design when you feel yourself becoming frustrated or fixated. Learn from these experiences and analyze them. The critique process is extremely useful because it forces a designer to view with greater objectivity his or her process and results. You **will** get it wrong before you get it right: that means that until you figure out exactly how the breakthrough product offering should work you must try alternatives and rigorously, not heuristically, analyze the pros and cons.

### **Take a Vacation when you run out of gas**

Fundamentally, what drives breakthrough products is the zealot's heart and soul, both of team and individuals. When teams get tired or bored or run out of enthusiasm, while they can continue to create interesting and possibly very innovative products, the chances that they will produce a breakthrough product are very slim. Designers need to be fresh. Move on!! Take a vacation!! Play!!

# THESIS PROCESSING SLIP

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