

INDUSTRIAL DESIGN OPPORTUNITY IDENTIFICATION
The Practice of Design Entrepreneurship

September 1991

Keith Hanna
The Faculty of Environmental Design

Supervisor: J. O'Grady
Advisor: W. Ed McMullan



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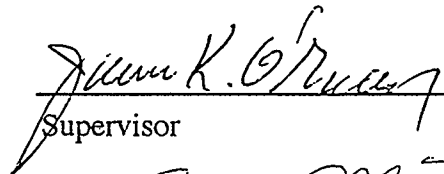
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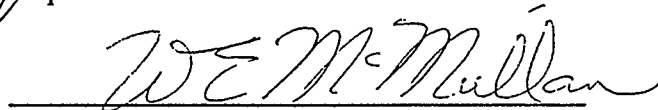
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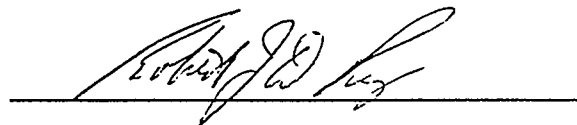
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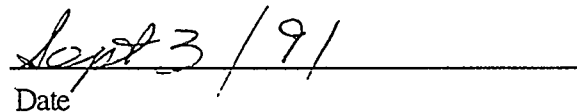
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Supervisor







Date

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ABSTRACT

Industrial Design Opportunity Identification is a model for professional new product development consulting practice appropriate for entrepreneurial regions such as Alberta. The Alberta Government has identified the importance of innovation in the maintenance of prosperity for its citizens.

The essence of the model is a process of innovation based on elements of both design and entrepreneurship methods, processes and attitudes. The design dimension contributes to the formulation of the innovation, while the entrepreneurship dimension contributes to the execution of the innovation.

The Opportunity Analysis is one of the service products derived from the model. This service product provides entrepreneurs with a cost-effective and comprehensive analysis of the market, technical and economic factors of the opportunity. Thirty-two opportunity analyses have been completed for clients. A follow-up study of fourteen client projects revealed a high rate of customer satisfaction and impact.

An analysis of problematic areas in the thirty-two projects provided a definition for the design of a more general model. A version of the model was subjected to a jury review which led to further refinements.

This project explored, was the product of, and endorses the philosophy of creative development through revolution between the dogmatic and the pragmatic. The ideas developed in the thesis have evolved through a design process integrating analysis and synthesis, exploiting the power of iteration and the synergy of joining with theory the value of experience.

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PREFACE
Crafting Strategy

PURPOSE

In 1985, while registered in the Faculty of Engineering, I designed and successfully developed a new product, manufacturing and distributing it. The experience sparked a passion for developing new products and left me dissatisfied with the prospects of engineering. I then came upon the possibility of gaining an industrial design education.

Design Entrepreneurship is a term which appears in the University of Calgary calendar describing the programme of studies leading to a Master's Degree in Industrial Design:

"The programme attempts to build on the values and expertise available within the Faculty and the Western Canada region. It will address the needs of the limited industrial base and small scale industries that exist in the Western provinces and the applications of appropriate technology within this context. It will also encourage the development of design entrepreneurs capable of innovation and leadership in regional industry of this scale."¹

There appeared to be at least two necessary elements of being a design entrepreneur, suggested by the above calendar statement: innovation and leadership. Also, the statement implied some sort of relationship between the industrial designer and business, especially the entrepreneurial venture.

This Master's Degree Project is the culmination of five years of my development as an entrepreneur and industrial designer. It is both a definition of the concept and an expression of my personality and attitude. The gauntlet of "Design Entrepreneurship" was thrown down to me in 1986 when I began my design education. During 1988-1990, I worked full-time for an entrepreneurial industrial design consulting business, and I took entrepreneurship courses in the graduate business faculty. In 1990 after the collapse of the company I had been working for, I began my own consulting firm which offers more substantive service support to new ventures. My ideas are thus borne of both a dogmatic and pragmatic approach. Practice has evolved from theory; theories have emerged from practice.

Henry Mintzberg published a landmark essay in the Harvard Business Review in 1987.² Called "Crafting Strategy", the article likened the development of strategy to the potter's crafting of artifacts: the potter is intimately aware of his capabilities and aspirations for the future; as the artifact takes form it is modified to reflect new possibilities and is occasionally torn down and rebuilt on better footing. A ramification of this article is thus that strategy (in all its forms as objectives, plans, tactics) can emerge as well as being the result of purposeful deliberate planning. My proposition has emerged from my consulting work but

is also the product of hypothetical work. As in any designed product, the current proposal is the product of many iterations, and from here it will continue to iterate as it is focussed by continued practice.

The purpose of this Master's Degree Project is to define and present a viable conceptual strategy or model for one form of industrial design practice in Alberta. Whether this proposed practice is the most appropriate for Alberta and whether the model is applicable to other regions shall remain questions for further work.

SCOPE

This document presents an integrated, timely and powerful *concept* of industrial design and entrepreneurship practice. The concept unites many disciplines: industrial design, product development, entrepreneurship, marketing, engineering. As such an integration is substantial, the proposal is presented in a level of detail consistent with the state of the model's development and appropriate within the limits of an MDP. The focus of research is on primary but informal mechanisms of information collection, although considerable secondary information is utilized. No definitive answers are presented, rather the work attempts to lend credence to the concept and identify further areas and requirements for development. The validity of the proposal is considered from both the commercial and theoretical perspectives.

I do not consider this Master's Degree Project a thesis in the strict social sciences sense. Rather, just as my colleagues undertake and document substantial design work on *tangible* new product concepts, I will be presenting the results of substantial design work on an *intangible* new product concept: a service. This approach balances an intellectual theoretical approach with a practical executive approach.

In traditional design terms, this work represents a prototype, which, at the close of this current exercise, will be ready for testing in a commercial arena.

ARGUMENT AND METHODOLOGY

The proposal is presented in two parts. The first considers the theory and practice of the model. The second considers the contextual frame of the model. The macrostructure of the argument is as follows:

PART I

INDUSTRIAL DESIGN OPPORTUNITY IDENTIFICATION

Crafting the Practice

	TOPICS	METHODS
CHAPTER 1 Evolving the Practice	Basic theoretical introduction to explicit and implicit theories of opportunity identification	Literature review
	Introduction to the industrial design model	Case study
CHAPTER 2 Testing the Practice	Description of project results for 14 client projects undertaken	Follow-up questionnaire
CHAPTER 3 Refining the Practice	Further conceptual development of the industrial design model of opportunity identification	Jury review
	Description of additional project results on three substantive client projects	Case studies

PART II

DESIGN ENTREPRENEURSHIP

Crafting the Future

	TOPICS	METHODS
CHAPTER 4 Seeing the Future	Historical industrial design perspectives	Literature review
	Design management perspectives	Literature review
	Design methodology perspectives	Literature review
CHAPTER 5 Capturing the Future	New venture perspectives	Literature review
	Innovation perspectives	Literature review
	Design entrepreneurs	Literature review/ Depth Interviews
CHAPTER 5 Surviving the Future	Alberta context	Literature review
	Global context	Literature review
	Alberta design scene	Literature review/ depth interviews

The objectives of the MDP are:

1. Describe an opportunity for industrial design practice in Alberta.
2. Present a concept in response to the opportunity.
3. Justify the further development of the opportunity.

¹The University of Calgary *Calendar 1990-91* (Calgary: The University of Calgary Press, 1990) 87.

²Henry Mintzberg. "Crafting Strategy" *The Harvard Business Review* (July-August 1987) 66-75

PART I
Industrial Design Opportunity Identification:
Crafting the Practice

INTRODUCTION TO PART I

PURPOSE

The purpose of this Part is to describe the basic concept of Industrial Design Opportunity Identification, to explore the results of projects undertaken and to refine the concept into a general model.

OBJECTIVES

Chapter 1: Evolving the Practice

The objectives of the first chapter are:

1. Describe the basic concept of Industrial Design Opportunity Identification.
2. Describe the theoretical basis of the concept.
3. Formulate a conceptual and linguistic framework.

Chapter 2: Testing the Practice

The objectives of the second chapter are:

1. Describe the testing programme undertaken with the Industrial Design Opportunity Identification.
2. Delineate the model and methodologies underlying the service.
3. Measure the benefits accrued by customers of the service.
4. Define problematic areas.

Chapter 3: Refining the Practice

The objectives of the third chapter are:

1. Refine and articulate the general model of Industrial Design Opportunity Identification.
2. Test the revised concept in a jury review.
3. Identify and describe market segments.
4. Identify and describe potential competition.
5. Identify and define positioning criteria.
6. Synthesize the service products.

CHAPTER 1
Evolving the Practice

THE IDEA OF OPPORTUNITY

Background

The Oxford Dictionary defines "opportunity" as a "good chance, favorable occasion; chance or opening offered by circumstances."¹ Rumbal contends that "an opportunity is an idea that can be exploited profitably in the marketplace,"² and adds that few ideas represent opportunities. That only a selection of ideas will be developed is thus a pragmatic economic reality. It is here that the concept of opportunity cost is apparent. The risk involved with developing a poor idea is thus the loss from not developing a better one. De Bono provides the definition of an opportunity as "a course of action which is possible and obviously worth pursuing".³

If the conventional wisdom holds that "there are no problems, only opportunities", then problems may be positively viewed as opportunities. McMullan and Vesper define a problem as a disparity between existing and desired conditions.⁴ Opportunities are first perceived and then a response is created. In the realm of business, opportunities afford the chance to create a new commercial entity, an entity that provides a tangible or intangible value to a consumer.

Presuming that a problem may be found, and that there is some merit in solving the problem, then the perception and skill of the problem-solver may be evaluated. Principally, in market economies consumers reward the more skillful and more perceptive problem-solvers with their patronage. In the realm of commerce, customers should be the purpose of business activities, either implicitly or explicitly effecting the efforts of the problem-solver.

A market-orientation has been evolving for decades. Whether the consumer leads the business or the business leads the customer, the focus is on the creation of value for the customer. The customer decides what is valuable. The competitor who provides the most value to the customer, wins that customer's business. The physical product or service that the consumers exchange for cash is probably only a small part of the cluster of values they perceive. Products solve a variety of problems.

Industrial Design Opportunities

Modern history is characterized by division of labour, few artifacts are produced by a single individual. The result is that the user has become uncoupled from the maker. So,

people work, earn money and buy the products they need in a specialized system of trade. Products are not made by any one individual or for any one individual.

Industrial design evolved to reunite the severed demands of consumers and the capabilities of industry. Although the majority of products are not created by industrial designers, and probably not all industrial designers (or engineers, business people and entrepreneurs who also design products) are market-oriented, there is an opportunity for industrial designers to become market-oriented. This reunification of maker to user opens up the possibility of more products solving more problems, the result being a strengthening of the role of the industrial designer. As translator of the problems of both the consumer and producer, the industrial designer might be in a good position to recognize opportunities.

Opportunities result from disparities between supply and demand. Consumers may explicitly demand a particular product offering, *pulling* a response from the producer to develop a product offering that value: demand-side commerce. Conversely producers, may inadvertently invent a new product, of implicit value to, and *pushing* a response from, the consumers: supply-side commerce. If the industrial designer understands the potential demands of target markets and the technical capabilities of the suppliers, the possibility exists for leading and negotiating the synthesis of new products based on the coupling of a new or existing source of supply with a new or existing source of demand.

Potential Innovation

Innovation is traditionally looked at as something based on science: major breakthroughs result from years of research and that the changes that result are profound. However, innovation may be a response to a change that has already occurred.⁵ The extent of change is always relative to the culture that is subject to the innovation. "'Innovation," then, is an economic or social rather than a technical term."⁶ The concept of innovation is focussed on the exploitation of changes.

Innovation is subject to supply/demand relationships. On one side of the equation is a taste culture or market segment—a group of consumers with a homogeneous profile of values and behaviors⁷—that is always changing as society evolves. On the other side of the equation is a business, that to stay in business must constantly address these changing values by devising new technologies. Windows of opportunity open and close as cultures and technologies evolve and revolve.

Solving problems creates value because it improves the conditions experienced by people; the element of change defines this problem solving as innovation. Drucker defines innovation as "changing the value and satisfaction obtained from resources by the consumer."⁸ What defines innovation is the condition that change leads to the improvement of the quality of life.

Innovation is the process whereby new product ideas gain commercial fruition. Thus an opportunity could be viewed as a potential innovation; when innovation is successful--when society is realizing the benefits of the idea in the form of a product--the opportunity has been exploited, and is commercially significant.

Competitive Advantage

Competitive advantages are developed by anticipating changing states of supply and demand: predicting future innovations and dedicating resources to exploit the opportunities proactively and offensively rather than reactively and defensively. The competitive advantage is a result of offering superior value in the terms appropriate for the audience targeted.

Opportunity Identification

Opportunity identification may be reasonably defined as the process of perceiving, creating evaluating and executing an opportunity to the point of commercial fruition. When focussed on new product opportunity identification undertaken by industrial designers, this constitutes Industrial Design Opportunity Identification.

INTRODUCTION TO OPPORTUNITY IDENTIFICATION THEORY

Introduction

Much of the explicit current thought on the subject of opportunity identification resides in the entrepreneurship literature. Most focus on the screening of opportunities, strategies for searching for opportunities and some early work on the process of identifying opportunities. As this appears to be an emerging discipline, peripheral disciplines will be considered. A selection of literature will be summarized.

New Venture Models

The purpose of a concept evaluation system is to focus development on the ideas with the most potential for yield. An opportunity is a potential innovation and therefore factors affecting successful innovation affect the viability of the opportunity. In this sense a system of opportunity evaluation is pre-emptive, eliminating low-value ideas early on. The purpose of such evaluation is to focus economic effort on the best chances for success. Serial-entrepreneurs have developed techniques for pre-screening venture ideas. Based on their experience and skill they select the ventures they will focus on from the variety of options they have developed.⁹

Consider that an opportunity has not been fully identified until all relevant tests of feasibility are undertaken and major barriers to commercialization have been surmounted: "opportunities are frequently only put together after a number of months or even years of dedicated work."¹⁰ Opportunity identification may not be a discrete event, rather, it may be a process that is in effect the product development or innovation process.

The opportunity may be screened several times through its development. This phased-in strategy for developing new ideas reduces the risk of developing an infeasible product. The idea is screened and developed through several phases, each becoming more involved and requiring more effort and capital to undertake. At prescreening, the initial perception of the idea is evaluated and analyzed. This may then justify an in-depth feasibility study, which may then justify the development of a prototype, which may then justify a market test which may then justify a full launch of the product. Confidence is gained about the merit of the idea as the process evolves through its various levels of testing.

Commitment may be viewed both from the perspective of the entrepreneur's psyche and the allocation or search for resources, both revolving around the entrepreneur's perception of risk. Decisions to commit are made in the context of incomplete information, so risks are taken when information has been maximized. The quality of the information must be consistent with the level of detail. At pre-screening, decisions focus on broad, easily analyzed subjects.

Initial recognition of opportunities seems to be dependent on the individual. Decisions revolve around the individual's judgement of what is possible. Perception is conditioned

by a person's experience; the intuition required to initially recognize a new opportunity--"pre-vision"--is subjective.

"Pre-vision" is one element provided in a model developed by McMullan and Long in an attempt to "account for the thinking processes which lead the entrepreneur to design one new venture opportunity as opposed to another."¹¹ The identification of opportunities occurs through four distinct phases: pre-vision, point-of-vision, elaboration, and decision to proceed.

Point-of-vision is the "aha" or "eureka" phenomenon, the point of first perception. Development of the concept occurs through elaboration of the initial idea, anticipating problems of feasibility and working towards their alleviation and reconciliation. When serious objections to the concept have effected positive reconceptualization, and barriers to progress have been surmounted, the entrepreneur may make the decision to go, advancing to other entrepreneurial activities such as securing the necessary resources and building the organization.

Innovative opportunities are the basis for entrepreneurship. Peter Drucker contends that innovation and its mechanisms are purposeful and lists distinct sources of innovative opportunity such as changing market structure or demographics. Systematic entrepreneurship means that entrepreneurs do not wait until an obvious great idea happens upon them, rather they systematically search for opportunities.¹² In innovation, time is of the essence: "it is dangerous to assume we'll have the same opportunities tomorrow as we do today."¹³

Understanding the mechanisms of change allows entrepreneurs to predict opportunity: observing and assessing trends, looking for patterns in random events and focusing on negative trends. An "opportunity focus", preparing the mind to be open to new ideas, maximizes the probability than new connections are made and key events recognized.¹⁴

Marketing Models

Marketing concepts are distinct combinations of consumer needs and methods to satisfy them. The concept is the potential product; the product embodies the consumer's satisfaction. Marketing opportunities are thus potential consumer satisfactions.

The mechanisms of marketing are concerned with both identifying market need and applying that market need through a system of distribution to its intended audience. Marketing strategy has at least two important dimensions relevant to the identification of opportunities. Segmenting is concerned with division of people into homogeneous groups based on descriptive attributes. The larger the group of people who have a common problem, the lower the price of the solution. Price affects the volume of distribution; the larger the volume, the more significant the innovation. An opportunity exists where a group of people share a problem large enough to justify consideration. The methods of identifying opportunities are thus the methods of segmenting.

The characteristics of the product in the context of the free market is its marketing mix: attributes pertaining to the product, its price, promotion and distribution. In the minds of consumers, who face a number of options for solving their problems. Consideration of consumer behaviour and positioning techniques will provide more clues to what constitutes an opportunity. In this sense, opportunity lies in the design of products (composition of the marketing mix) that lie favorably in the perceptions of consumers, relative to competitive offerings.

Consumer Behaviour Models

Consumers purchase products for various purposes. Consideration of these purposes and the processes by which consumers select products establishes a substantial portion of the marketing perspective of opportunity identification. Opportunities lie in offering the clusters of values consumers demand, satisfying their motives as purchasers, anticipating their selection processes and providing the appropriate cues to promote the product during the sales procedure.

Objects have an undeniably important role in most cultures and economic systems. The Industrial Designer may be chiefly responsible for the character and form of these artifacts of culture and commerce. With a responsibility to both society and business, the designer must address the interface between objects and consumers to identify the best opportunities for making or responding to change, by exploring and defining factors affecting consumers and examining the roles of objects in society.

Consumers are notoriously unpredictable, however, trying to understand their condition is a significant requirement in trying to satisfy them. "Many who study consumers find their

behaviour complex, difficult to influence, and often mystifying." ¹⁵ Techniques for analyzing consumer behaviour may be applied to the identification of opportunities.

Consumer behaviour is sub-set of human behaviour influenced by factors external and internal to the individual. Factors such as beliefs, attitudes, experience and motivations effect behaviour from within, while culture, society and social grouping are the external environmental factors shaping behaviour.

In the rational view, consumption is provoked by the consumer's perception of a problem state--an apparent disparity between existing and desired conditions: "action occurs only when the consumer perceives a sufficiently large discrepancy between actual and ideal states."¹⁶ The consumption continues as the consumer searches for information, makes an informed selection, and then purchases and uses the product. Marketing may be subsequently defined as solving consumers' perceived problems through information exchange processes.

From the marketing perspective, consumers represent a source of demand for a product. The value of the demand is controlled by two factors: the consumers' willingness to pay, which can be modelled and described, and the consumers' ability to pay, which is determined by economic principles of disposable and discretionary income.

Contrary to the forces of segmentation, which move to group people according to how they are alike, personality applies to the individual and how he is different, although it may still be possible to generalize to a group. Personality refers to the behavioral tendencies of the individual: "...the behaviour of an individual is organized into a coherent pattern"¹⁷ and applies to the totality of an individual's behaviour rather than individual actions.

Central to the personality is the self-concept: the image a person has of himself. The self-concept is a filter on how the person views objects and is formed through psychological development and is continually defined, protected and furthered by the individual.

Products are perceived to have images and symbolic meaning which may enhance the self-concept. Consumption behaviour is motivated to enhance the self-image. A person chooses objects according to the consistency of the meaning with the self-concept.¹⁸

Attitudes have an object or focal point, direction (whether favorable), degree (of favourability) and intensity (the consumer's conviction of his judgement). Attitudes have structure in that they form a mental framework about the self-concept. Attitudes are learned and develop through personal experience (perception and personality) and social interaction (family, groups and culture).

Sources of Industrial Design Opportunities

The purpose of studying consumer behaviour is to make design more successful, products more innovative and business efforts more focused on appropriate consumer satisfactions. Solving the problem is the 'purpose' of the design. Consumer behaviour in this context is the study of the consumer problem-solving activity and subsequently of the sorts of problems people are expecting objects to solve. Therefore a study of the roles of objects in society is a study of consumers' problem-solving aspirations.

When talking about consumer behaviour and the social roles of objects, it is necessary to consider both aspects of the consumer--a dichotomy of the logical and psychological. The pervasive theme is that consumer behaviour is indeed rational but not exclusively or even primarily so. Consumers are also creatures of emotion.

The implication of this dichotomy to designers is that objects are not consumed purely as a result of some cognitive process. Consumers also respond to emotional stimuli. A problem, strictly defined as a perceived disparity between existing and desired states, would apply equally well to psychological processes. Thus an object of consumption is perceived in two ways by the consumer: logically and psychologically.

The role of an object in society is its purpose, is defined by consumers and must be viewed from their perspective. Alternately, a latent problem-state may first be perceived by a designer. Thus problem-states are either perceived and expressed by the taste culture, perceived by the designer and implied by the taste culture, or some part both. This notion is a corollary of the notion of technology-push/market-pull.

The consumer derives value from the object because it serves a purpose. The values held by the taste culture define the purpose of the object and are defined as subjective values, because they are dependent on the group and are not universal. The values imbedded in the

object intentionally by the designer are objective: they exist apart from a perception of them.

The technology within the design is that which facilitates the function. Technology is nested in function which is nested in the purpose. The consumer is the source of purpose, the designer the source of function and the sciences, arts, social sciences and humanities the source of technology.

The physical entity that embodies function and technology is the form. The distinct expressions of objective value in the form are the characteristics of the design, which serve both to communicate their existence to and impress the consumer and differentiate the object in the marketplace. A form is characterized by its ability to serve a purpose, its functional values and underlying technology. The valence of the object is the number of purposes it serves.¹⁹ As the terms are used here, form is the synthesis of functional elements. Strictly speaking (and devoid of connotations) form follows function.

If the primary reason for designing is consumer problem-solving, then the goal of the designer is innovation. The values of the taste culture and technological possibilities are constantly changing. This means the requirements of objects are always changing. The designers must be supplying a constant flow of new solutions to new and old problems. The element of change defines this activity as innovation. Put another way, innovation is the process of bringing object together with subject, or that of functional values meshing with the values of the taste culture.

Anthropological Survey

Mirroring the nature of the persons, the purpose of a product is a combination of both the logical and psychological. The object equivalents of these classifications are utility and symbol. An object is a complex cluster of values, attributed to its ability to serve a multitude of purposes and which may or may not be mutually exclusive or even consistent or inconsistent.

Technology

Roles in this category pertain to the object's ability to do work for the user—the traditional "function." The object is seen as a facilitator, a means to some desired end. Objects serving basic physiological and physical needs of the consumer also fall in the category,

and may be consumed because of their level of high performance--how well or efficiently they perform their tasks.

Style

Style is a desired way of doing things. Style may or may not be tied into quickly changing trends and taste as in the popular style. The object may also represent the style of a reference group and the value of the object comes from the image it projects. An object may be consumed because it suits a consumers taste--the sense of like or dislike.

Social Communication

Since society is stratified into classes there are those that have more or less than others. Objects of status exist because of the inequitable distribution of wealth within society. The purpose of the object may be to educate or inform society of some characteristic of the group associated with the object. The group can be any taste culture or individuals sharing a lifestyle.

Interaction

Objects which promote an awareness of life, as they brighten or dazzle the senses, interact with the consumer. The role of the object may be to entertain or educate the consumer, or to divert his attention in order to relax his mind or body.

Satisfaction

The object in this sense serves a consumer's motive. The motive may be a need or want. The object may be required to achieve an individual's goals, or simply to provide inspiration, motivation or happiness.

Art

The ability of an object to represent cultures of today, the past, and even of the future is its artistic value.

Aesthetics refers to the experience of beauty or its converse, and objects may be consumed for their ability to evoke emotional responses. Any exercise of the senses or perception of consumers, such as luxury or pleasure, is a role of the object.

Commodity

Objects may be purchased merely for their economic value, or the act of purchasing may be central to experiencing the object. The object may be just a possession, a family heirloom or an antique.

A gift is a case in which the purchaser and user are different. The same goes for objects intended for children. In these cases, while the purchaser takes pride in the purchase, relative to them, the object is devoid of any purpose.

Quality

The quality of an object pertains primarily to the materials and construction of the object. Quality may mean rich, luxurious or durable and tough materials. Construction, structure and strength may constitute quality.

Symbol

The symbolic aspects of the design refer generally to any role that has a semantic component. Even the most utilitarian role--the object as a tool--has meaning to the consumer because the job it is expected to perform is culturally determined and conditioned. The object may signify an idea, point of view or ideology,. The object may be a symbol of the vitality of the times, an individual or group. It may represent the real material conditions, political, environmental, or economic conditions that prompted the problem-state. Objects are symbols of the spiritual side of man and may be included in the daily and traditional rituals of life. Lastly, objects may represent an episode in a persons life.

Application

Most if not all objects are multi-valent. Objects are thickly cloaked in layers of meaning and usefulness--of utility and symbol. Opportunities lie in creating rich objects which are multi-valent and ambiguous and that would serve the widest audience. The reality of the segmenting concept is that while it gives the designer direction and an understanding of taste cultures within society, it fails to accurately portray the often flippant and transient behaviour of consumers. In a free society, membership in any one segment is voluntary and merely a snapshot of things at a particular unstable moment in time. Good design must respond to the characteristics of its targeted segments, but to be of greatest value to society as a whole it must transcend the barriers erected by the classification of people into groups.

In addition, any one person may belong to any number of segments all of which may or may not be mutually-exclusive or even consistent.

Good design should integrate the rational and emotional. While the two cannot be separated, they may be made to be consistent. In this capacity, the design is more valuable since it is no longer the sum of positive and negative components. The elements work together towards the common goal of fulfilling the purpose of the design.

Selling Models

Opportunities From a Selling Perspective

Selling activity is oriented towards the consumer and is thus involved with problem-solving. Not all problems are worthy of solving. For example, if only one person requires a type of product, a market of one may not be sufficient to sustain or justify the development of the product. Also, the desires of people may be flamboyant, flippant, whimsical, frivolous or immoral. An opportunity is a problem-state existing in society, worthy of appropriate attention.

The opportunity is characterized by one or more essential requirements prescribed by the nature of the audience which must be reconciled in the form. A product with one overwhelming purpose is uni-valent, while multi-valent refers to objects with more than one essential purpose. Since the design may serve a multitude of secondary purposes, perhaps targeted at different groups, the object to an extent is ambiguous: The meaning or understanding of some characteristics is clearly transferred to some and not perceived by others.

Enlightened sales methods have acknowledged the weak foundation of what traditionally has been known as selling. Empathy is a concept describing how the sales person learns to understand the situation of the prospect. If empathy is used in the creation of the product concept, than continuity through to the final pitch is preserved.

The Principle of Selling

Selling may be simply defined as promoting your point of view (represented in your product) to a level sufficient to evoke the appropriate purchasing response from a consumer. The goal is to exchange economic value for the capacity of an object to fulfill a purpose: the meeting of supply and demand.

From the prospective customer's view, the perception or belief that an object will fulfill its purpose is a benefit. The benefit is a promise of value that will be delivered upon consumption. Thus it is essential that the designer define the essential, critical purposes of the form so that the object that the consumer is interested in buying is what the designer offers.

The role of an object may be enhanced by advertising. The existence of both an object and an image in an ad, serves to transfer the meaning of the image to the object. In this sense the value transferred, such as a "communicator of status", and now attributed to the object in the minds of the consumer is really attributed to the ad—the value is imputed. Conversely, when a certain characteristic of the form serves a purpose that characteristic is formal. The distinction between the two is that the designer uses elements of the form which are symbolic while the advertiser uses an element of culture which is symbolic and associates it with the form. Once an imputed characteristic is adopted, it may serve as a formal element in the form.

The dichotomy of behaviour also applies to the selling process. Consumers are motivated by both rational and emotive forces. Thus both utilitarian and symbolic characteristics may serve to benefit the consumer. Each aspect must be considered differently in the sales effort. In the rational component of consumption, the consumer defines a problem state, searches for information, evaluates the alternatives, makes a selection and purchases the product. The seller must respond appropriately to each of these phases in structuring the offer to purchase. Communication of benefits is a function of both the design and packaging (which should speak for themselves) and of advertising and/or personal selling, which may serve to clarify any ambiguity or highlight the multi-valence of the product.

In the emotive component of consumption, the consumer acts on a response that is emotional. The offer to purchase must address the semantic requirements of the product; the product must have meaning to the customer in order to elicit a response, but further, it must be consistent with its implied purpose in order that the consumer follows through with the purchase. The role of the designer and of the advertiser or salesman is the same, but the approach is different.

From the commercial perspective, innovation refers to the meeting of supply and demand and has two necessary conditions: That the object is consistent with both the rational and affective motives of the consumer. On one level the product is a physical thing which has some utility, on quite another level, the product comes alive in the perceptions of people in its semantic capacity.

Interaction between the designer and consumer in society means that the sales thrust is based on some proportion of communication and persuasion.

The Economics of the Sale

The rational consumer model implies that consumers make minute calculations of potential satisfaction in order to make comparisons between alternative products. This is added to the list of criteria a consumer uses to make his final choice. On the emotional side, if the consumer responds positively to a product he may buy it, regardless of whether he has the money or not.

Disposable and discretionary income may define an individual's ability to purchase certain products or classes of products. Thus price is a characteristic of the product and is a criteria in the marketplace for relating or comparing competing products or classes of products. In each purchase, the consumer may or may not consider the opportunity cost. The segment or taste culture may exhibit tendencies for certain purchasing behaviors and has a unique set of economic priorities.

Success and Failure Models

Cooper

Opportunities stem from an understanding of how new product programmes fail. Robert Cooper has dedicated considerable effort empirically studying the factors relating to commercially successful products. The following is a summary of findings relating to factors critical to success²⁰:

1. a strong market orientation (sourcing ideas from users or the marketplace, marketing inputs to product design and to test market acceptance, and knowledge of buyer behaviour in the launch),
2. a unique superior product (derived from design, attributes and positioning, based on an in-depth understanding of customer needs, wants, problems, etc.),

3. more homework prior to product design and development ("its what's up front that counts"),
4. problem definition (protocol) prior to development (defining the target market precisely, the product concept and benefits, positioning strategy, features and attributes, specifications and requirements),
5. better, more consistent evaluation (most projects should be killed, 7:1 ratio, avoid financial screens at outset, use pre-set criteria, checklists or scoring models.
6. a well conceived and executed launch (strong selling effort, good marketing communications, well targeted; marketing planning is an integral part of the new product process, beginning early and based on sound market research),
7. appropriate organizational structures (rewards creativity and tolerates failures, provides adequate resources),
8. a game plan (a process for moving a new product from idea to launch),

Timmons

Indicators for the what constitutes opportunity are implied by the criteria venture capitalists use to evaluate and become committed to new ideas. Their experience is relevant because implemented selections receive feedback from the marketplace. Understanding their failures and successes is requisite for their own survival.

A preliminary study of these criteria has identified some key success factors²¹:

1. product-market structures (identification of the true market for a product, a well defined notion of the actual customers, the customers rationale for purchasing, benefits and economic payback realized by the customer; large market size and potential for fast growth; significant product differentiation through superior quality, unique features and proprietary advantages),
2. competitive dynamics (competition based on technological superiority and product differentiation rather than on price, competition against apathetic and static competition, high market share in excess of 20%, cost and price leadership, expandable product lines),
3. business economics (high value-added producer, high gross margins, multiple sources of exchangeable supply, clearly defined and accessible distribution channels, unique or exclusive relationship to suppliers, financing received in logical segments, clear exit path)

4. business performance (appropriate break-even time, rather than very short or long, 10-15% net profits, appropriate profits, rather than very small or very large, 25-30% return on investment, positive cashflow within 18 months)
5. business management (proven, integrated management, specific experience with particular markets and technology, teamwork, opportunity focus rather than resource-control focus).

Vesper

Karl Vesper describes factors critical to screening new venture ideas for entrepreneurs based on the head start possible, cost factors and pay-off potential²²:

1. preliminary screening (the idea is intuitively correct, the idea has personal appeal, the entrepreneur has some of the skills required to develop the venture, the entrepreneur has some experience with the nature of the venture, the idea appears technically feasible, there appear to be customers available, the venture appears to be potentially profitable),
2. more detailed check-out (the idea is physically feasible, it does not violate any patents, zoning regulations, laws, safety considerations, etc.; the prototype functions, the market is willing to buy based on a demonstration of the prototype, the product appears to be economically feasible in terms of cost and price)
3. financial analysis (financial forecasts make sense, sales volumes are feasible for break-even, exposures are acceptable, potential profits are enticing),
4. longer term prospects (requirements of the venture consistent with the goals of the entrepreneur).

Technology Transfer Models

Diffusion of Innovations

Novel ideas do not become successful immediately: they are typically adopted by society in stages. Initially a small number of customers are able to appreciate what are essentially abstract benefits. As they learn to use and benefit from the innovation, more and more people come in contact with it and come to appreciate it. Innovations thus diffuse through society.²³

Opportunities arise from the diffusion process. The volume of an innovation adopted gradually increases and follows an exponentially increasing curve until it tops out and declines (a product life cycle). Entry into a market may be most productive when the optimal balance of technological development and customer adoption is reached.

Foster: Principles of Innovation

Richard Foster describes this problem with a concept called the S-curve. Technologies are developed, they diffuse through society, and as newer technologies begin to be adopted, older ones are replaced. The drive towards more productive technologies is what drives research and development. Opportunities in this sense stem from the development of newer more productive technologies capable of supplanting older ones.

Corporate Models

Northern Telecom

Northern Telecom uses an innovation process called the "Gating Process"²⁴. Employees that have new product ideas may be awarded a small budget to make a presentation to begin more formal R & D. If accepted then the innovation proceeds through several decision gates at which investment decisions are made.

Novatel

Novatel uses a similar process called PDP²⁵. The "Product Development Process" is a series of gates. A member from each functional area may veto the project at any point if the potential innovation fails to meet any critical constraints. On the panel are people from Quality Assurance, Industrial Design, Manufacturing, etc.

**SYNTHESIS OF INDUSTRIAL DESIGN OPPORTUNITY
IDENTIFICATION**

The Industrial Design Model of Opportunity Identification has evolved over a three year period of professional work in industrial design consulting firms, through three distinct phases. A total of thirty-five projects have been completed.

Phase I

In the fall of 1987, I was first introduced to the concept of opportunity analysis (or opportunity identification, opportunity assessment planning etc.) by Dennis Ray, who was

teaching an introductory graduate-level course in entrepreneurship at the University of Calgary. Emphasis was on studying the factors contributing to the emergence of an opportunity and the characteristics of entrepreneurs relating to their abilities to exploit opportunities. Essentially, the goal was to answer two questions regarding the prestart-up of a venture: where is the opportunity in any given situation and is the entrepreneur capable of exploiting it (or should you wait for an opportunity better suited to your needs and abilities)?

The principle was to only expend resources on the best ideas; thus the purpose of the analysis was to quickly screen the ideas to filter out low-yield opportunities, focussing on the ones with best potential. If an idea has little merit you find out early on, saving time, effort and money. Less emphasis was placed on the actual process and methods of identifying opportunities.

Prior to that I had been involved with several start-ups, at the point where we were assessing preliminary feasibility at the prestart-up phase of the ventures. I had also taken courses in the New Venture Programme. At that time I was interested in the idea of industrial designers acting as entrepreneurs in the development of new products: design entrepreneurship. From this perspective, I enhanced the approach taught in the entrepreneurship class, and developed my own methods, aimed at both the supply (technology) and demand (market) sides of the economic equation. I completed several "opportunity analyses" during this formative time, allowing me to refine the approach taken and develop a more structured model and methods taken from the perspective of industrial design.

Opportunity analyses were undertaken under various guises: "Opportunity Assessment Plan", "Opportunity Analysis", "Preliminary Concept", "Design Brief", etc. During this time, from fall 1987 to Summer 1989, nine projects were completed. Most were internal, undertaken as part of my venturing, while others were for clients. Significantly, some were undertaken as intrapreneurial proposals during my tenure at a large Calgary-based outerwear manufacturer. The nature and scope of work was diverse. The focus of these studies varied: some emphasized design considerations, others technical considerations.

The important result of this work were the notions that:

1. The feasibility of any new product idea had three dimensions: one dealing with the consumer, one with the producer (and distributor) and one with their confluence in an economic system.
2. Preliminary feasibility should be assessed and documented early on to lower risk, guide the venture and help raise resources. Also, it would be best to find out that an idea was not feasible early in the life of a venture.
3. Clients who were not experienced in the complex process of product development, but who had a new product idea, could benefit from a "map" of the process specific to their venture. Knowing what challenges they had to face could allow them to assess whether they were prepared, leading to either to a commitment to the venture or a decision to return to what they perhaps did better.
4. The model could be used to identify new opportunities for established companies, considering their commercial and technical strengths and potentials.

Phase II

In 1988, I participated in the founding of a new industrial design consulting firm. A particular type of prospect began inquiring about product design. These entrepreneur-inventors had a new product idea, but often lacked the scope for advancing the idea through to commercialization. They often also lacked cash. In more traditional industrial design practice (in Europe, Eastern Canada, and the U.S.), the clients are more sophisticated and experienced, have sufficient resources and have a clear, documented idea of their innovation and how to get it to market (mostly these clients are established firms with experience with their technology and markets.) The entrepreneur-inventors often had no experience with their target market and no understanding of how to manufacture the product and get it to market. Although they may have requested industrial design services, they were advised to critically assess the commercial and developmental issues of their product.

At this time we introduced the opportunity analysis as an inexpensive new service to allow the inventor to evaluate whether he should abandon the project in favour of other options or continue on to more expensive product design, prototyping, test-marketing and launching

activities. The document that was produced could help the inventor sell his idea, perhaps to raise funds from family, friends and business associates.

For \$1000.00 (or less) the inventor would receive a conceptual document briefly analyzing (but not necessarily evaluating) the essence of the potential innovation. Work would be undertaken in only 40 hours and would focus on providing answers to the three simple questions concerning market, technical and economic feasibility: Can we sell it? Can we make it? Are the margins sufficient to justify further development? A patent search would be carried out to provide initial information on similar products or processes. Informal market research attempted to understand the needs of the consumer (potential consumers, buyers, trade magazines and manufacturers.) Technical research identified ergonomic concerns (product liability and safety, functionality, CSA, UL, etc.), potential production processes and design issues such as styling requirements and product configuration. Economic research attempted to estimate potential sales volumes based on simple statistics and market research by comparing these volumes with breakeven production volumes (calculated by considering development process and costs associated with each phase as well as the margin between suspected price-point and production costs.) The entrepreneurs were encouraged to compare their goals to the demands of the project in order to complete the assessment of the opportunity.

The document could in this form be used to determine, not whether the idea was necessarily viable, but whether the next phase was justified (prototype, market research, patenting). Also, it could help to sell the ideas to those people the entrepreneurs needed to secure various resources from.

Advertising consisted of a single ad in the Calgary Sun. The response to the ad was not substantial, however, most phone inquiries resulted in an introductory meeting. The close rate for these prospects was greater than 75%.

While this form of opportunity analysis was practiced as a formal service the underlying conceptual framework and methods were codified. The process was subject to active cost degradation. Some effort was made to standardize, rationalize and streamline the process. Economies of scale were starting to be achieved in the undertaking of market research, patent searches, database searches and costing. Stock sections of document text, common

to all projects, were developed, concerning patenting, licensing, etc., general information helpful to the inexperienced entrepreneur.

Generally a project was undertaken in the following manner.

1. Short client questionnaire: This exercise served to get the client thinking about the development challenges, his goals, strengths and weaknesses, while providing the consultant with the insights on which avenues would be most relevant for the client. (please see appendix A for the details of the questionnaire.)
2. Patent search (a database search covering 98% of the world's patents as far back as 1975): This served to identify some potential conflicts, but also provided indicators of how others may have attempted to solve the same problem.
3. Informal market research: Newspaper and magazine articles regarding the product's situation were collected to give a sense of trends, threats and industry characteristics. Also, statistical searches were undertaken to give an idea of market size in Canada. These literature searches may have been supplemented by informal primary research: interviews with relevant buyers, retailers or customers.
4. Market analysis: Preliminary definitions of market segments, competition, social trends would ultimately lead to some indication of whether the product could be sold.
5. Technical analysis: Preliminary definitions of production issues and research into manufacturing processes and materials would ultimately lead to some indication of whether the product could be made.
6. Economic analysis: Guidance quotes from manufacturers were obtained to allow estimation of production costs. Marketing information suggested approximate price-points and margin structures through distribution systems appropriate for the product. Calculation of gross margin and the estimates of development costs provided an indication of whether there was any money to be made in the exercise.
7. Definition of the development process: A general map of events was provided to the client, with indication of abort points and investments required. General information regarding fund-raising during this process and information about licensing were also provided. Some detail was spent

on the specific next phase: "if you were to go forward, this is what you should focus on, and this is how much it will cost." Alternatives (depending on the nature of the product) were to: build a prototype, test-market (attend a tradeshow, see a buyer, build some product and try to sell it), write a business plan, do a more in-depth feasibility study. Two examples: One product may require intense technical development (capital intensive.) Securing such funding may require detailed feasibility analysis, business planning and team development. Another product may be so simple and inexpensive to prepare a batch production run that the best strategy is to try immediately to get an order from some retail vendor.

A written evaluation was not included, it was left for the client to infer the viability of the idea from the information given. When the report was delivered, the consultant might provide an opinion in this regard, if asked, however with the explicit disclaimer that at this particular level of development the accuracy of feasibility estimates is dubious.

Documentation (writing) would normally take 16 hours (much of the analysis occurred during the writing.) Client meetings would normally take 3 hours. At a selling price of \$1000.00 and a consulting rate of \$40.00/hour (at the low end of the pricing spectrum for business consultants), work would need to be completed in 25 hours for reasonable profitability. Thus research would need to be completed within 6 hours. This was rarely possible to achieve even when several studies were being done at once. Also, initially, the projects were sold for less than \$1,000.00 (some as low as \$600.00.)

Experimentation with price was done throughout the history of the service: starting at \$600.00 and ending at \$1000.00. The clients did not appear to be sensitive to these increases. It may be that as long as the price is in a certain order of magnitude, they will continue to be motivated to subscribe to the service. Also, after the study is completed, the entrepreneur was more aware of the magnitudes of capital required for full commercialization and the extent of cognitive dissonance was limited.

Twenty projects were completed over a two year period, the majority in the final eight months: the volume of studies was low to begin with at the outset, but with the addition of advertising, a research assistant, and time for the service to become known, the volume

increased to the level that two people were occupied full-time. Generally the quality of ideas was high. Some represented significant innovations.

The industrial design consultancy went out of business for reasons not pertaining to the opportunity analysis service and the service was discontinued (in April of 1990.)

An informal endorsement came from a venture capitalist who became interested in the service as a support to his efforts of due-diligence.

The important results of this work were the notions that:

1. To attain a suitable level of information quality the margins may be too low (at the price-point of \$1000.00) to achieve acceptable profitability for a strictly fee-for-service consultancy.
2. The prospective clients may be willing to pay more for the service (up to \$3000.00 to \$4000.00.)
3. A viable market for the service may be financial institutions such as venture capitalists who may benefit from an enhanced process of due-diligence.
4. Industrial design may be required in a creative as well as analytical capacity.

Phase III

Recently the service has been resumed with a more substantive approach. Work now includes a distinct conceptual design component: The purpose of the projects is now to explore and identify opportunities through design and informal research rather than statically analyzing the idea for merit. We start by finding the problem, working through a process to one possible solution, rather than starting by analyzing a solution.

Work in these consulting projects is more expensive, which serves the function of screening less serious prospects, increasing the quality of thought and allowing the addition of some basic design work.

Also, the nature of work undertaken was expanded. The model was expanded to focus on more of the development process (past the pre-screening phase). This phase partially overlapped with Phase II. Six projects have been completed in the past year and the service is on-going.

In one case the element of primary consumer research was used to identify areas of true value. Sketches were prepared and shown to potential customers. This led to the preparation of renderings that were shown to another group of prospects. This led to a second set of renderings shown to prospective buyers and retail vendors. The opportunity was identified in this process because those to whom the innovation would be targeted were polled first and could visualize and contribute to the creation of the product. The process was a design process and allowed the characteristics of the successful product to be defined inexpensively (it is easier to prepare 36 renderings than to build 36 prototypes or enter the market with 36 different products). Another case involved the design of a test-market programme. The design of the product was kept tentative to allow the consumers to make the final choice of what they want. In all cases the process was also entrepreneurial because it focussed on the reduction of risk through the intelligent application of scarce development resources.

The current model now considers the entire process of innovation from the point of conception through to commercialization.

The important results of this work were the notions that:

1. Opportunity identification is a process beginning at the pre-screening level and ending at commercialization: Thus the nature of opportunity identification changes through the development process.
2. Opportunity identification is dynamic and responsive: opportunities are created to respond to situations the entrepreneur-designers come to understand as he proceeds through a process of solving the problem. Opportunity analysis is static and reactive: it analyses a solution to a problem instead of the problem itself. The former may be more productive, less risky and thus more entrepreneurial.

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CHAPTER 2
Testing the Practice

RESEARCH DESIGN

Objectives

Primary research was carried out with the former customers of the Opportunity Analysis Service at Synertek Design Group from 1988-1990 (Phase II in the development of the Industrial Design Model of Opportunity Identification.) An analysis of the impact, satisfaction and value offered by the service will provide an indication of the success of the programme itself. Problematic areas will be defined as a basis for refinement. These statements will be developed by considering:

1. responses to a survey administered by phone and targeted at past clients and
2. brief case studies of each client and project.

Clients and projects are coded numerically. Their identity and specifics of their product will not be required to demonstrate the issues. The questionnaire itself appears in Appendix B for further inspection.

Sample

In Phase II of the development of the Industrial Design Model of Opportunity Identification (IDMOI), the service was standardized: generally the scope and effort was consistent from study to study. Twenty projects were completed. The studies focussed on assessing preliminary feasibility. A response of 14 clients (entrepreneur/inventors) was achieved. Others were unavailable for comment (they could not be located as Synertek's records were destroyed.)

Hypotheses of the Opportunity Analysis

The service was intended to provide benefits to the clients. The survey explored these issues as indicators of service quality:

1. Ventures require effort to develop. Overall risk may be reduced if the more global issues of the innovation are assessed early on in order to justify whether further, more substantive, work is required.
2. People have a variety of alternative ways to spend their time and money. Their commitment to one (a new venture) may preclude others. Thus a method of quickly and effectively assessing possibilities at their concept level will enable individuals to focus on activities best suited to their personal requirements.

3. Ideas should be pre-screened to prevent low quality ideas and entrepreneurs from wasting effort. Based on innovation literature, probably about 10% of ideas should make it past the pre-screening tests.
4. Inexperienced entrepreneurs require information about their venture and ventures in general to allow them to assess whether the demands of the activity fit their abilities and desires.
5. Entrepreneurs/inventors often are not aware of the process they will need to go through to get their product idea to market. A venture-specific map enables the entrepreneur to structure the venture giving consideration to the nature of the idea and the particular process by which the product will come to be marketed, produced and financed.
6. The customers for this pre-screening service may be inexperienced: more experienced entrepreneurs may have developed their own mechanisms for determining their commitment to projects, and may require a differently designed mechanism operating further into the process.
7. A reasonably accurate estimate of feasibility requires analysis of market, technical and economic factors.

RESULTS

Interviews on average took 30 minutes to complete. Respondents were very co-operative, honest and insightful. They had had at least six months to reflect on the variables being measured: the impact we had had on their venture, whether they were satisfied with the work they received and whether they found the the experience valuable. Of a possible twenty, the survey yielded a response of fourteen.

Summary Statistics

Standardization

1.	Had you started a business before we studied your product?	
a.	no	5
b.	yes	9
2.	(If yes), how many?	
a.	none	-
b.	few (1)	5
c.	many (>1)	4
	and,	
d.	service businesses started	12
e.	manufacturing businesses started	3
3.	Was the product that we studied your first invention/idea?	
a.	no	6
b.	yes	8
4.	(If no), how many?	
a.	few (1)	4
b.	many (>1)	2
5.	(If no), how many have been successes?	
a.	none	7
b.	few (1-2)	0
c.	many (>2)	1

Probes

- | | | |
|-----|---|----|
| 6. | Which statement is true: | |
| a. | The report was helpful. | 7 |
| b. | The report was somewhat helpful. | 5 |
| c. | The report was not helpful. | 2 |
| 7. | Did you continue to develop the product? | |
| a. | no | 3 |
| b. | yes | 6 |
| c. | postponed | 5 |
| 8. | (If so), what activities have you done to continue development? (May answer more than one response.) | |
| a. | prototype/product design | 5 |
| b. | fundraising | 9 |
| c. | marketing/testing | 3 |
| d. | launch | 0 |
| e. | research | 2 |
| f. | licensing | 2 |
| g. | patenting | 2 |
| h. | business plan | 2 |
| 9. | (If not), why did you discontinue? (May answer more than one response.) | |
| a. | goals inconsistent with venture | 1 |
| b. | lack of time | 2 |
| c. | lack of cash | 6 |
| d. | product not feasible | 4 |
| e. | went on to different product | 1 |
| 10. | (If not), have you tried or will you try developing a different product or business? | |
| a. | no | 4 |
| b. | yes | 2 |
| 11. | Did the report give you a fair description of the challenges required to get your product off the ground? | |
| a. | no | 3 |
| b. | yes | 11 |

12. Which statement is true:
 - a. The economic research was helpful. 7
 - b. The economic research was somewhat helpful. 5
 - c. The economic research was not helpful. 2
13. Which statement is true:
 - a. The market research was helpful. 8
 - b. The market research was somewhat helpful. 5
 - c. The market research was not helpful. 1
14. Which statement is true:
 - a. The technical research was helpful. 9
 - b. The technical research was somewhat helpful. 3
 - c. The technical research was not helpful. 2
15. Did the report increase your understanding of the stages involved with getting your product to market?
 - a. no 3
 - b. yes 11
16. Did the report change your opinion of the value of your idea?
 - a. no 3
 - b. yes 11
17. Did the report change your course of action?
 - a. no 4
 - b. yes 10

Close

18. Would you use the service again if you had another invention?
 - a. no 3
 - b. yes 11
19. Which statement is true:
 - a. I was very satisfied with the report. 8
 - b. I was partially satisfied with the report. 5
 - c. I was not satisfied with the report. 1
20. Was it money well spent?
 - a. no 2
 - b. yes 12

CASES

The fourteen respondents provided qualitative information in addition to the ordinal responses to the questionnaire. This will be combined with feedback from the primary consultant—Margot Hanna—to provide a more complete picture of each project. Projects are given in chronological order.

Client 1

This client was a veteran of many service/selling ventures and had achieved success. His product was his first invention. His personality was the stereotypical inventor as champion. He was advised that the format and target market he had chosen perhaps would not yield the returns he would expect. However, despite the logic of the information provided, his attitude did not change. We did not have enough consulting time to rectify the situation.

His design would have emphasized a less savoury aspect of human society. His strategy was to use fear as the motive to prompt a purchasing decision from his prospects. However, the product's ability to actually function was dubious and he targeted it only for a limited market. We advised that there was an alternative form of the product which would provide superior market acceptance and higher margins. Whether the idea was profitable was dubious: our analysis of his plan resulted in the discovery that the requisite margins required to justify development could not likely be achieved.

Ultimately, the client held fast to his desires, but development has terminated. We had found manufacturers for the form of product that the client was interested in, but he found that economics were against him: It was doubtful enough customers would purchase the product to allow him to breakeven. In retrospect he should have followed the advice.

He was partially satisfied because the advice did not align with his wishes.

Client 2

This client had no venturing experience and limited funds, but was a parent with young children. The idea was to build a product for children based on their activity of building snow forts in the back yard in Winter. The client was satisfied on most areas of the report. The idea appeared viable: issues of cost, safety and distribution could be addressed. The

consultant agreed to continue assistance, and began preparing a business plan and preliminary design for the product. Progress terminated when the client moved away and issues of government regulation and market concentration became onerous. The client was unable to provide any funding to circumvent these problems.

Client 3

This client had no venture experience, but was a passionate and extremely tenacious entrepreneur. Originally, he had been turned away from the New Venture Group, but was driven to solve the safety problems associated with Video Display Terminals. Our analysis suggested that the market was too small, that the technology for solving the problem was dubious, and that perhaps the effort involved was unwarranted. The client politely circumvented the advice and proceeded anyway. He went on to undertake product design and prototyping, raise funds, develop a team, test his technology to be effective and is now poised to test the market with the substantial marketing contacts he has developed. He found the report helpful because it established the severity of the problems he had to solve to be successful. Although the report did not change his course of action or his opinion of the product's merit, it inspired him to proceed. In other words, he was able to draw something positive out of a negative experience and use it to his advantage—a true entrepreneur.

Client 4

This client was running two successful service businesses at the time he decided to try to do something with the yard game he had developed with his friend. The game, a standard activity at barbecues and picnics, was indeed fun and challenging to play. We discovered, however, that considering what the product would cost to make and what it could sell for, it was probably not feasible.

We have recently advised (18 months after the study) that perhaps an off-shore manufacturer could be approached. The client's assessment of the quality of the technical research was that it should have considered an off-shore source at the time of the research. Perhaps, he would not have made the decision not to proceed.

Client 5

This client had no venturing experience but a comfortable job. He had invented a reasonable yard-care implement that appeared to be viable. He went on to product design and prototyping. Initially these activities were mishandled. The costs of the design provided were too expensive to be economically feasible. By the time an economically feasible design had been developed, he had run out of money, commenting that the whole exercise was a waste of his time and money, and that he was not cut out to be an entrepreneur. Furthermore, had he known about the costing problems upfront he would not have proceeded with the more expensive prototyping. Had our study been more accurate initially (and if the design work was better handled), perhaps it could have served its purpose more elegantly. Having said that, the client commented that for the most part he was satisfied and happy, and would use the service again, albeit with better communication of his goals and abilities. He was unimpressed with how he was treated under the contract for design services.

Client 6

This client was running a service business at the time he had invented quite an innovative and simple product. He was delighted at the work that was done for him, but has stalled due to the problems associated with finding a licensor (more due to lack of time than money.) The product appeared to be feasible on most levels. Manufacturers and licensors were identified. He found the technical research of no value (despite being provided with alternative design concepts, description of the process and materials used and the list of manufacturers.) It appears that for some reason, the client does not want to commit to this project which has few barriers to entry and no apparent competition.

Client 7

This client with no prior venture experience had devised a novel gaming concept for bars and lounges. While being feasible in the sense that it was a good concept and that it could be developed and sold, the substantial level of up-front engineering development would very likely extend the event of breakeven well into the future. The client was grateful to learn this upfront. Prior to enlisting our services he was planning to contract out marketing and product design services. Although he saved those expenses, he commented that he would choose a marketing firm to study any future product ideas. He acknowledged that this would cost well in excess of what he was charged for the opportunity analysis. He

was not pleased that his credit terms were changed halfway through the project and this may have tainted his overall perception of the service he had received. The report substantiated his belief in the concept but led to a decision to terminate development based on the breakeven situation. He may choose to resume if he can secure development capital.

Client 8

This client had run two service ventures, had conceived six product ideas and had selected one for analysis. He had been looking for a document specifically to help raise financing, and in this regard felt that the information for such was lacking. He has postponed development because of lack of time and cash. In this case it could be translated into his lack of commitment. Despite this, he plans to follow-up on his other ideas; he would use the service again but at half the price.

Costing and pricing information was difficult to obtain without a specific design. The intended market was not feasible. Our work identified a potentially more viable market near the end of the study but there was little time to develop our thoughts. The product was too complex to complete a reasonable estimate of technical and development issues. A feasibility study would be appropriate, but unlikely given the clients financial resources. The goals of the service were not sufficiently consistent with what the client needed.

Client 9

This client was the only one in the sample who clearly was not an entrepreneur. Despite being advised to discontinue after the patent search, the client elected to proceed with the study. Prior to this, he had been screened out of the various agencies he visited. The client commented that he felt he needed more help getting his product off the ground, but was lacking the selling skills to get the resources he needed. Ultimately he was advised to go back to being a carpenter, which was a wise choice, and wise advice. Although, our attitude here seems harsh, our advice was administered with respect and sensitivity. He left happy: the report served its purpose.

Client 10

This client runs a successful service business but lacks confidence in the arena of manufacturing. His product idea was very clearly worth proceeding with (did not have any direct competition, was very saleable, and was a reasonable development challenge). He

made the decision to proceed with product design and technical research and development. This exercise being a success, he used his report to help gain financing (a loan from his chartered bank, co-signed by his father and using his car as security) for a batch production run, supporting a market test he plans to administer shortly. Arrangements have been made to eventually manufacture the product in Hong Kong, which will provide significant margins through the distribution chain. He has secured the membership of an experienced marketer on his team. This product should have substantial yield and success.

Clearly capable of selling and dealing with risk, this client only lacks experience and knowledge in new product development. He recently has spent a great deal of time educating himself in the venturing process. We have joined the team on this project serving to provide decision (and emotional support) to this client. He assumes the risk; we work to minimize the risk.

The report very definitely gave him the confidence to commit gradually to the venture to the point where he now stands to change his net worth considerably.

Client 11

This client was completely and unequivocally unimpressed with the work that he received. His product had been prematurely patented: and thus several design issues had been identified, which should have been worked out prior to patenting. The user and manufacturing process had not been considered in his design. However, he was not interested in this advice: he wanted us to find him a licensor. Although we provided responsible service in identifying the ergonomic, market and economic factors he did not consider, he was none the less unhappy. He commented that he could have written the report (based on his business experience and technical abilities.)

This was almost more a consulting problem, than a problem with the work performed: this case emphasizes the need for being more discerning in the client selection process, and for clear communication between client and consultant in goals and expectations.

Client 12

This client had previous venture and invention experience. His idea was elegant, easily produced, inexpensive and saleable. Little investment was required to test the market. A

design was provided to the client and this was followed with prototyping and market testing. The report enhanced their belief in their product, leading to the decision to advance. Their happiness in the work completed was explicit. A smoothly undertaken project.

This case points to the value of integrating product design with analysis to increase the productivity of the exercise.

Client 13

This client had prior venture experience and had developed an intelligent product with excellent commercial potential but had failed to identify some critical technical issues on which his success depended. We identified these issues and after months of concerted effort he has overcome his technical challenges and is prepared to enter the marketplace. The report was an effective mechanism to help him secure some of the resources he needed to advance.

Client 14

This client was a highly successful serial entrepreneur, representing a well-financed consortium, with several successful ventures to their credit. He saw the value of the service and took advantage of experienced product researchers to identify the relevant issues for the product's development. The research showed that many costs were too high and competition too intense to justify developing the product. The idea had been brought to him by an inventor looking for financing, but was rejected.

DISCUSSION

Client Profile

Clients had venture experience, but not with new products. Thus the general information about new product innovation, should be retained and perhaps enhanced to include more information about business formats (licensing, joint ventures, etc.)

The survey supports the impact of this information on clients: they were able either to commit to the venture knowing what they were up against or they could terminate, looking for a better idea to come along, or realizing that their normal job is a more appropriate way to earn a living than entrepreneurship.

There is potential for consulting designers to become involved in the opportunity as a team member. This is indicated in the study by the number of clients inexperienced in new product venturing and their subsequent stall due to lack of time and confidence. Many good ideas, otherwise lost to an inexperienced entrepreneur, may find themselves in the marketplace if aided by a highly experienced professional entrepreneur.

Impact, Value and Satisfaction

Half the sample found the report to be somewhat helpful (5) or not helpful (2). Digging further, the areas they identified had to do with market and economic research more often than technical research. There are two issues: without a design, feedback from potential customers is difficult to obtain because of the abstract nature of the concept; without many of the details defined, quotes are difficult to obtain and price-points difficult to estimate. This can be alleviated with the addition of a significant industrial design component: this would serve to define details and enable people to visualize the product. Also, the quality of market research may be improved by utilizing more specialized personnel and providing more time to do the work.

In a majority of cases (11 of 14), clients found that the report changed their course of action and their opinion of the value of the idea. A change in action could mean that they either terminated progress or advanced in a manner which they had not considered; no change could mean they ignored the advice or it was consistent with their previous plans (the latter is doubtful since the service presupposes a lack of knowledge regarding action to be undertaken in developing the idea). Changing their opinion of their idea could mean that their opinion was either reinforced (assuming that their opinion was positive) or that it was not demonstrated to be feasible (8 and 3 clients responding respectively). No change could mean that they disagree with the assessment or that our assessment was consistent with their assessment. Three clients terminated their progress acknowledging that they were either not prepared for venturing (one) or that their idea was clearly not worth proceeding with (two). Six clients have proceeded onto other phases: all but one on product design and prototyping; others have written business plans and are fundraising; one has secured a licensor; others are preparing for test-marketing. In all but one case, clients proceeded as advised: in that one case, the client had planned to look for a licensor and merely went on and did, with little influence from us. No client has yet launched his business, but three are

very close. In a majority of cases, the report satisfied its purpose of pre-screening and guiding.

Five clients have postponed their ventures, meaning that they may have gone on to try other phases, but for some reason, have stalled. They have not committed to one course of action over another (either advance or terminate). This could be seen as a failing of the report which may not have given them sufficient information to make the decision, or they are just indecisive. Clients usually did not go on because of a lack of time or cash (many of these have postponed their venture). Others went on only to quickly find out that the product was not feasible (some have then postponed development in order to avoid facing the truth.) One who did not go on went on to another project.

In a majority of cases (11 of 14), clients were generally satisfied with the work performed and would use the service again. In the cases of clients who were not satisfied or partially satisfied (6 of 14), many of the reasons translated to factors of clarification of both their goals by the consultant and the consultant's goals to the client. One client was partially satisfied by what he felt was a poor report and insufficient research scope, but the report satisfied him that he did not wish to be an entrepreneur. One was totally unsatisfied and was generally unimpressed.

In a majority of cases (12 of 14), clients perceived value in the service, feeling it was money well spent. One felt it was worth half the money while one found the service of no value and was generally unimpressed.

The service may be commercially viable with the adjustment of price points, rationalization and the appropriate design of a business mechanism to to distribute and produce the service. Intended benefits of guidance and increased knowledge regarding new product development appear to have been accrued to clients. Problematic areas have been identified. The underlying model and its evolution have been clearly described.

The challenges remaining are refining and designing the service to provide complete satisfaction, enhanced value and greater impact, as well as planning and executing the service design as a profitable business venture.

The issues to consider in the design of the service are:

1. Develop and codify the methodologies into a pragmatic system of practice that can be tailored to the needs of individual projects and clients. Though forsaking strict standardization, the systematic approach should retain or emphasize economies of scale and rationalization when appropriate.
2. Apply more highly developed consulting skills to avert misperceptions and expectations not met.
3. Develop enhanced research methods respecting the business and design disciplines but adapted to the significantly distinct practice of entrepreneurship.
5. Develop research and design methods for a system of practice encompassing the entire product development process: phases of work beginning roughly at pre-screening and culminating at the launch of the product. Methods should be codified based on their productivity, scope and appropriateness for the level of development.

Thus a "product line" of opportunity identification services could be developed, differentiated by the client's needs, clusters of methods, scope (and thus price) and level of development.

The service design may support any or all of the phases in the innovation process, from pre-screening to commercialization.

APPENDIX A-CLIENT QUESTIONNAIRE

The following questionnaire was administered to clients at the beginning of opportunity analysis projects.

Please answer the following questions as completely and honestly as possible. Your answers will be kept confidential and will not be disclosed to any third party beyond this research.

1. What led to the idea and how did it develop from there?
2. Who do you think is the potential customer? What problem does the product solve?
What is the market need?
3. Why does this opportunity excite you?
4. What skills and abilities do you have that makes you uniquely suited to pursue this opportunity?
5. What form will your business take? How do you expect to finance the development of the product and business?
6. What are your goals, financial and otherwise?
7. Describe the product in detail.
8. What kind of information would you like to see included in the report?

APPENDIX B-INTERVIEW GUIDE

Opening

"My name is Keith Hanna. I was with Synertek during the time you were a client of Margot's, and I am now following up on the service that was provided as a part of my Master's thesis. My goal is to obtain information on the quality of the service you received. I encourage you to give me your views, both positive and negative. The study does not make your invention public in any way. The information you give me will be kept strictly confidential and if you wish I can send you the results of the research."

Standardization

(Lines are for elaboration)

1. Had you started a business before we studied your product?

a. no

b. yes

2. (If yes), how many?

3. Was the product that we studied your first invention?

a. no

b. yes

4. (If no), how many?

5. (If no), how many have been successes and why?

Probes

6. Which statement is true:

a. The report was helpful.

b. The report was somewhat helpful.

c. The report was not helpful.

7. Did you continue to develop the product?
- a. no
 - b. yes
 - c. postponed
8. (If so), what activities have you done to continue development?
-
-
9. (If not), why did you discontinue?
-
-
10. (If not), have you tried or will you try developing a different product or business?
- a. no
 - b. yes
11. Did the report give you a fair description of the challenges required to get your product off the ground?
- a. no
 - b. yes
-
-
12. Which statement is true:
- a. The economic research was helpful.
 - b. The economic research was somewhat helpful.
 - c. The economic research was not helpful.
-
-
13. Which statement is true:
- a. The market research was helpful.
 - b. The market research was somewhat helpful.
 - c. The market research was not helpful.
-
-

14. Which statement is true:
- a. The technical research was helpful.
-
- b. The technical research was somewhat helpful.
-
- c. The technical research was not helpful.
-
15. Did the report increase your understanding of the stages involved with getting your product to market?
- a. no
-
- b. yes
-
16. Did the report change your opinion of the value of your idea?
- a. no
-
- b. yes
-
17. Did the report change your course of action?
- a. no
-
- b. yes
-

Close

18. Would you use the service again if you had another invention?

a. no

b. yes

19. Which statement is true:

a. I was very satisfied with the report.

b. I was partially satisfied with the report.

c. I was not satisfied with the report.

20. Was it money well spent?

a. no

b. yes

CHAPTER 3
Refining the Practice

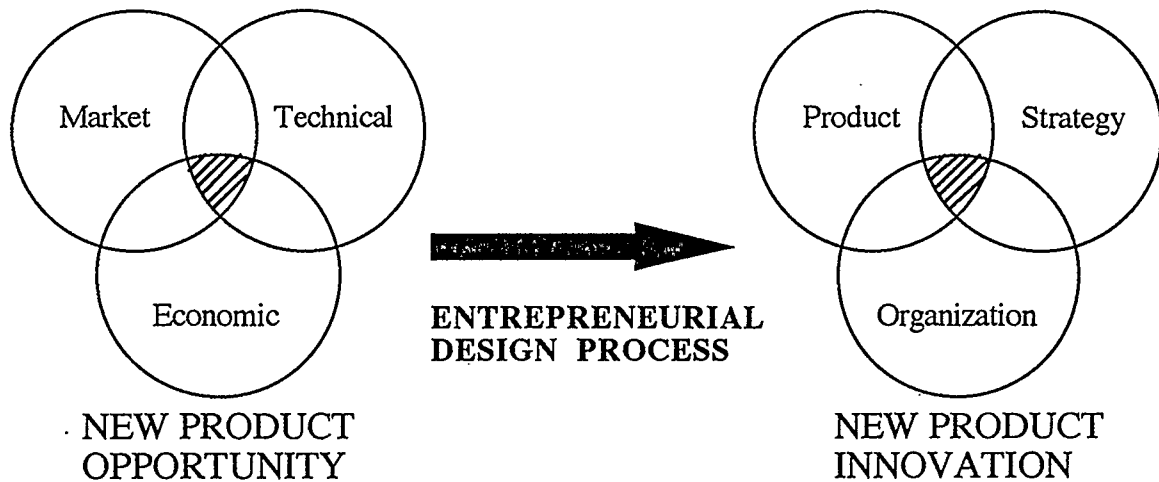
PROBLEM DEFINITION

A Concept of Industrial Design Opportunity Identification

Industrial Design Opportunity Identification is a proposed model of consulting practice exploiting the synergy of design and entrepreneurship. The consultant is integrated with the client as a professional entrepreneur, identifying opportunities available to the client and designing the client's products, strategy and business structure to respond. The consultant may manage a portfolio of clients and projects, optimizing a flexible structure of fees based on cash, equity and royalties. The role of the consultant is to provide leadership. Applying a substantial network of contacts, the consultant orchestrates the execution of the innovation, bringing together all necessary resources required for success.

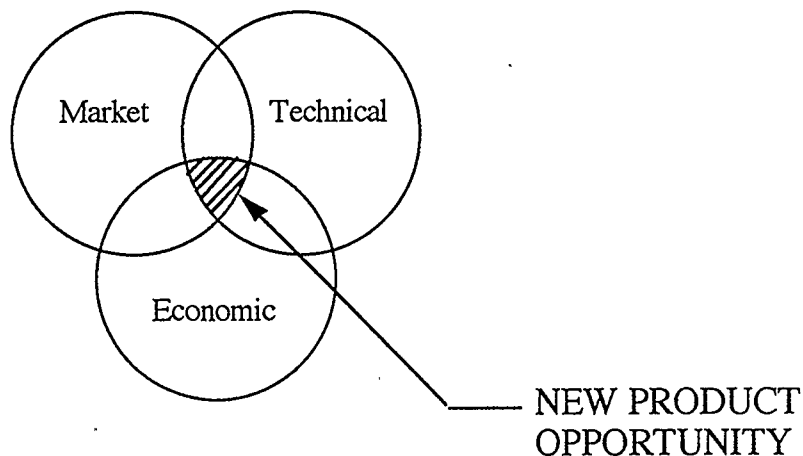
The purpose of Industrial Design Opportunity Identification is to increase the productivity of new product development in companies and regions with limited resources and experience with new products. This model evolved from the economic conditions in Alberta, which have a pre-disposition to resource-based industry and lack traditional industrial infrastructure, but have an entrepreneurial economy, a growing high-technology sector and other specialized manufacturers often competing globally in niche markets. The productive power of the model lies in the integration of two approaches: first, the industrial designer's capacity to visualize and articulate patterns, phenomena and trends in culture, to source and apply new technology and to synthesize innovative, timely products; and second, the entrepreneur's capacity to moderate risk, to persevere, to procure resources and to organize and promote the creation of an innovative venture.

Industrial Design Opportunity Identification is an entrepreneurial design process of analysis and synthesis. Opportunities are perceived through intuition and cost-effective methods of research and exploration. Innovations are crafted through a series of increasingly detailed, iterative development phases, punctuated by decision-gates which optimize intuitive and rational judgement. Resources are more comfortably committed at these points as the innovation proves to be increasingly feasible.



Entrepreneurial Design Process

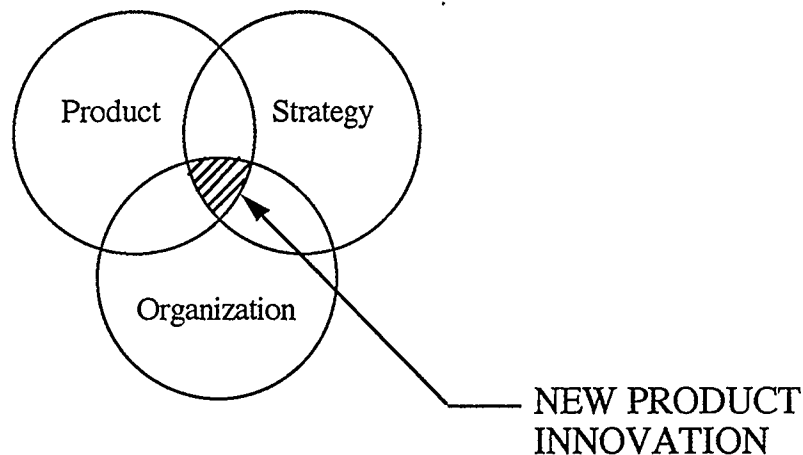
Industrial Design Opportunity Identification focuses on the analysis of three critical dimensions of opportunity. Market Feasibility Analysis anticipates and articulates the existing or potential purchasing motives of consumer targets. Technical Feasibility Analysis anticipates and articulates the existing or potential capabilities of production or competitors. Economic Feasibility Analysis anticipates and articulates the existing or potential possibilities of creating commerce, in terms of cost, price, margins, investment and profitability. Opportunities are the confluence of these dimensions.



The Focus of Opportunity Analysis

Industrial Design Opportunity Identification focuses on the synthesis of three critical entrepreneurial design responses to opportunity. The innovative product is designed to satisfy the conditions of demand, reflect the capabilities of supply and to provide the

possibility of commerce by respecting the requirements of price and cost. The innovative strategy is the combined effect of planning and methods to achieve innovation. The innovative organization is a system of human and financial resources, controls and operations combined to produce and deliver the product to its intended market, providing returns to its investors and regenerating itself through the continuation of opportunity identification. Innovations are the confluence of these responses.

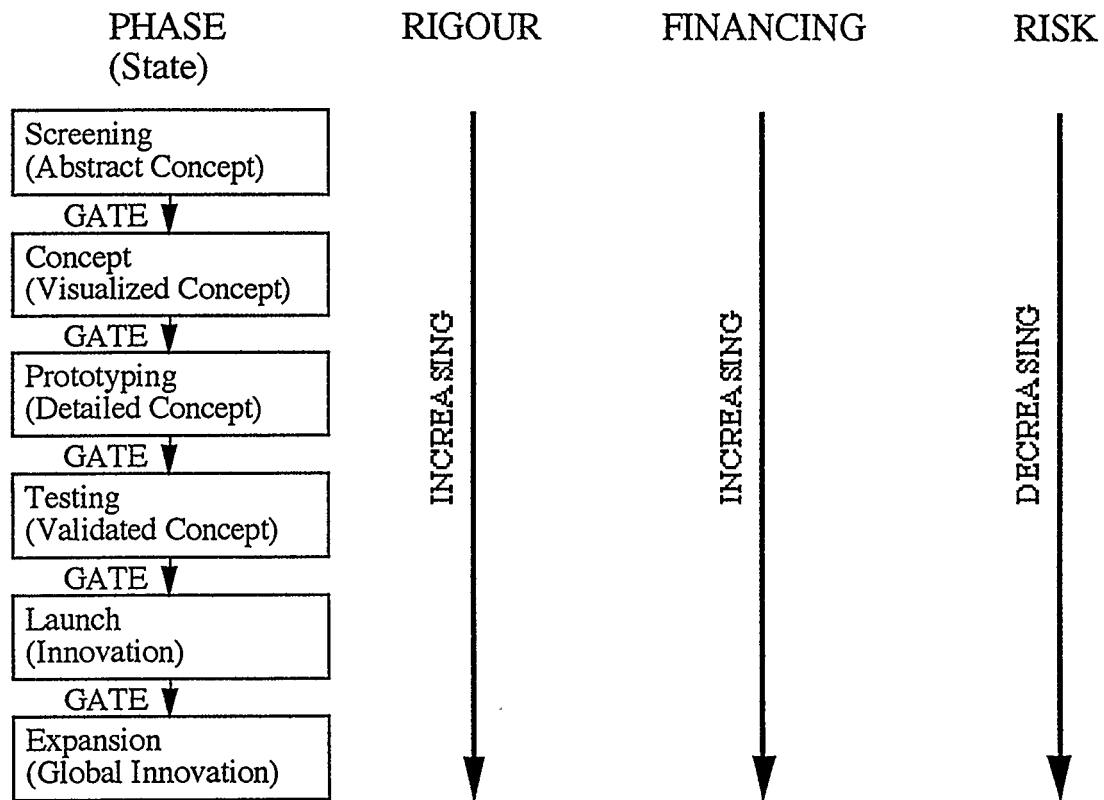


The Focus of Design Synthesis

The model of Industrial Design Opportunity Identification allows for increasingly substantive consulting at each phase of innovation. The Screening Phase is the first attempt to understand the situation to determine if the concept warrants any consideration. The Concept Phase is the first attempt to visualize the concept. The Prototype Phase is the first attempt to translate the concept to physical, operating significance. The Testing Phase is the first attempt to attain authentic customer and user response to the concept. The Launch Phase is the first attempt to fully execute the concept in the marketplace. The Expansion Phase considers enhancements in operational scope in global or product-line terms. A programme of service products may be administered to clients based on their limitations for carrying out the full development.

The Entrepreneurial Design Process

Opportunities progress through the Entrepreneurial Design Process by revolving (iterating) through periods of imagination, presentation and evaluation.



The Entrepreneurial Design Process

In design terms, there are two concurrent activities--analysis and synthesis. Situations are perceived, requirements and capabilities are understood, and responses are formulated or take form. The contribution of design skill and experience affects the lenses by which situations are perceived, the tools by which requirements and capabilities come to be understood and the criteria by which solutions are formulated. The disciplines of new venture development and industrial design provide frameworks of concepts and principles borne of tradition, experience and knowledge that provide the lenses, tools, methods and criteria of innovation.

Imagination

Clients require assistance conceptualizing the opportunity and innovation. There is always a sense of both the problem and its solution. Together they form a concept. The lucidity of the problem and the value of the solution increase as the venture and product become detailed. When the concept is fully detailed, in other words, when it has been launched, it is no longer a concept. It has assumed concrete significance. It is an innovation.

Evaluation

Clients require documentation validating or evaluating the feasibility of the business and product concept to support further commitment. At early phases of the development, judgements are necessarily made on vague information: substantial resources are not logically committed early on to answer the feasibility question decisively. The purpose of evaluating or testing feasibility at each phase is not to provide accurate, highly confident evidence that the concept will be a commercial success, but to determine if the subsequent phase of development is justified. Thus the concept becomes increasingly feasible, or its development may be aborted at any point.

Concepts are evaluated against the criteria provided by the disciplines, against the real situations they are intending to respond to and the objectives defined by the client or consultant. Evaluation of the concept occurs along three dimensions, consistent with the three types of value: right/wrong, good/bad and like/dislike (moving along a continuum from objective to subjective).

The quality of research and the tools of analysis affect the confidence of judgements made about the opportunity. As the process proceeds the rigour increases. Rigour is resource-intensive, and so rigour and risk are co-dependent variables. Early on in a venture, and in fact through the entire development of a venture resources are limited; this is what defines this process as entrepreneurial. Rigour and risk are always optimized.

The quality of the design response is determined first by the criteria developed in the analysis and second by the criteria provided by the disciplines. If the analysis creates a problem definition—essentially an articulate description of the attributes of the solution—then the design response synthesized from that definition must always be evaluated against that definition. The definition itself is subject to further rigour and is itself criticized, transmuted and refined. When the concept gains form, further understanding is gained about the problem, and they develop in concert. Each discipline has its philosophical and conceptual propositions of what constitutes good design, and so the concept is subject to evaluation on this front. The industrial design, engineering and marketing disciplines may define good design as a product that satisfies a market need (motive), is attractive, symbolic, well made and safe. The policy, human organization, marketing and entrepreneurship disciplines have like definitions for what constitutes both a good organization and good strategy. A good organization is one that provides a good return to

investors, has a good breakeven, treats its people well, controls its affairs and has a social presence. A good strategy is one that gets the company into business with a minimum of effort and risk, positions its products well against competitors and survives its infancy to become a going concern.

There are three levels of evaluation. The first is whether the concept is right or wrong. Offering an unsafe, environmentally abhorrent product is wrong: there is scientific and legal evidence to prove it. The second level is whether the concept is good or bad: such as spending all the companies capitalization on nice offices rather than on marketing effort. The latter is likely a better strategy in most cases and this is probably supported by the literature. The third level is taste--like or dislike. Examples here are product aesthetics or format of business plans (shorter versus longer, depending on who you talk to). Another example of taste is whether the organization is the reflection of the values of the entrepreneurs who commenced it: it perhaps has a bearing on the happiness of the entrepreneur, may lead to a competitive advantage, but can be also either good or bad or right or wrong. An entrepreneur may not favourably evaluate an opportunity that is good, right but not interesting (and vice versa).

Different criteria are relevant at different phases. At the beginning evaluation may be based on whether the product can meet the needs of consumers, or whether the needs of consumers may be met at all. Further on, criticism may specifically focus on the details of a financial plan.

Presentation

Clients require proposals to support the procurement of all the resources they will require to develop the opportunity. In early phases the work is conceptual and relatively inexpensive, but always must be cost-effective. These funds may come from the client personally, or from the clients friends and relatives, supplemented with limited government grants. Further in, equity and debt financing will likely be required beyond the means of the client. Thus objective evidence must be developed to support the pitch for these resources. Also, clients need human supplements to their own capabilities, who must also be lured to join. The product and venture concept may be presented in document, graphical and physical form, to effectively communicate the vision and provide an articulated capsule of information appropriate for evaluation.

Analysis

At increasing levels of detail, analysis focuses on the three dimensions of opportunity. An opportunity does not exist if any factor is unviable: there may be a demand for something that simply cannot be produced, a product may have no demand, the price at which a product will sell is incompatible for the price at which it can be made or the breakeven is well in excess of the size of market.

Market feasibility views the concept from the customer's perspective, whether the customer is a person or organization, influencer, user. Analysis attempts to anticipate the changing tastes and requirements of consumers, identifying those areas in which consumer attitudes have changed or could be persuaded to change. Emphasis is on understanding all aspects of what constitutes the product including pricing, promotion, required attributes, distribution channels, safety and use. It then attempts to identify the social and cultural forces affecting and driving the changes.

Technical Feasibility considers the capabilities of supplying any demand of consumers: engineering, production and materials available or potential available, the capabilities of the venture team, product design considerations, the extent to which competitors can satisfy the same or similar demands, and the variables on which the product is positioned.

Economic Feasibility considers the implications of supply and demand in a competitive arena: pricing, costs and margins. It also considers the scope of investment required and the nature of breakeven and eventual profitability. Analysis completed by trying to understand the role of economies of scale, market size, global scope, and the ultimate forces affecting price sensitivity, cost and margins.

Synthesis

The role of synthesis is to generate venture and product concepts to respond to the situations perceived in the analysis. An innovation does not exist without a product to embody it, an organization to produce and distribute it and a strategy to bring it to fruition.

The product is everything a customer buys. Every innovative production technique, material, distribution method or promotional ploy is reflected in the product. The product is the package of benefits provided to and purchased by the customer, including aesthetics, image, price and quality.

The product must be produced, whether by the entrepreneur or a contractor, and it must find its way to the customer. This encompasses a system of manufacturing, assembly and parts sourcing, marketing, promotion and shipping, including the human and financial resources to support. The system must return profit to the resources and continue to anticipate change to sustain operations.

The organization is a result of planning, objectives and missions set and measured. Strategy encompasses the plan to get into business, assume operations, penetrate market segments and research and develop new innovations, where the process may repeat itself. Policies regarding risk and investment, service and quality orientation are the result of purpose and methods laid out by the strategy.

JURY REVIEW

Research Design

The purpose of the jury review is analogous to the role a jury plays in a design project. In that case, an assemblage of experts would provide a critical review of renderings or models presented by the designer. Prior to building a prototype, the designer has the option of integrating the commentary made by the jurors into a reconceptualization of the product. Likewise the concept which has been described in the preceding section is the current state of the model. The presentation of the model in capsule form may then be used to elicit the required critique. This approach draws upon the large collective experience of the jury and may lead to increasing the value of the proposed service and validating it as a viable proposition.

Sample

The jury consists of about fifty experts from a very diverse collection of backgrounds:

1. Government and Institutional. These people work within and understand the nature of commerce in the province: Alberta Economic Development and Trade, Alberta Research Council, The University of Calgary, The Southern Alberta Institute of Technology, Chambers of Commerce in Calgary and Edmonton, Alberta Technology, Research and Telecommunications, Western Economic Diversification, Alberta Opportunity Company, Federal Business Development Bank, etc.

2. Scholars. These people located in various parts of North America and Europe provide a more theoretical and macro perspective: Design Management, Entrepreneurship and Management.
3. Local Entrepreneurs. These people face the venture development questions and Alberta context first-hand. They are people who have or in the process of innovating.
4. Design Schools. These institutions are responsible for the training of young designers and together represent the gamut of competing design philosophies: University of Calgary, Emily Carr College of Art and Design, Carleton University, Ontario College of Art, Illinois Institute of Technology and The Pratt Institute.

Summary Results

The Jury provided the following information:

1. A critique of the concept. Jurors identified weak spots and provided missing elements in the argument. Jurors supported the concept as a timely and integrative view of the problem of innovating.
2. Insights into the nature of the market segments that may be targeted by Industrial Design Opportunity Identification.
3. Insights into the nature of competition and the product development industry in Alberta.

The service products have been designed to respond to the Jury's critique and input into the industry analysis.

SEGMENTING AND POSITIONING

Industrial Design Opportunity Identification Consulting Services may be offered to three types of new venture clients:

1. inventors,
2. entrepreneurs, and
3. established firms.

Within each of these categories there are those clients who are sophisticated and those who are not. A sophisticated client appreciates the challenges of new venture development, has resources or is capable of procuring them and has substantial skill and experience in

development of inventions or ventures. The service tends to be more substantive with unsophisticated clients.

Inventors

Inventors are individuals or professionals who by virtue of their particular or special set of experiences, conceive of a potential new product opportunity. These experiences are comprised of their hobbies, education and employment. These individuals may be anywhere, may be anybody and may have their 'eureka' at anytime. The inventor:

1. might be technically skilled,
2. lacks the business acumen and interest, and especially the market focus required to commercialize the product,
3. has a product idea which may have significant mass market potential,
4. underestimates the value of the financial and human resources required to commercialize the idea,
5. does not trust people easily with the details of their idea,
6. wishes to license or sell their idea to someone who will commercialize it in exchange for a royalty,
7. symbolizes their new product idea as their opportunity to achieve massive wealth and recognition, and
8. might have the capital or desire to invest in the invention's commercialization.

Industrial Design Opportunity Identification Consulting Services would enhance the technical capabilities of the inventor, by undertaking aesthetic design, production design, and corporate identity design, to develop the product to a level suitable for licensing.

Industrial Design Opportunity Identification Consulting Services would enhance the management capabilities of the inventor by undertaking opportunity analyses and feasibility studies to verify the viability of the product in the proposal for licensing.

Industrial Design Opportunity Identification Consulting Services may assume outright control of the product idea and investment responsibility, becoming the licensee.

Entrepreneurs

Entrepreneurs are individuals, professionals or consortiums who by virtue of their particular or special set of experiences, discover a potential new product opportunity and conceive of a potential new venture opportunity. The entrepreneur:

1. might be technically skilled,
2. might lack entrepreneurial skills and experience, but has entrepreneurial attitudes (commitment, leadership, willingness to talk to people about the opportunity),
3. might fully appreciate the importance of marketing focus and the effort required to commercialize the product,
4. has either invented a new product idea or has acquired rights to one,
5. might have the time to undertake development directly due to the demands of potential other ventures,
6. might appreciate the magnitude of resources and effort required for successful commercialization, and
7. has the desire to commercialize the product and invest in its development.

Industrial Design Opportunity Identification Consulting Services would play the technical role for the entrepreneur by undertaking aesthetic, electronic and mechanical design, production design and corporate identity design, by sourcing materials, components and manufacturers and by researching standards, technologies and costing, to design the product to a level suitable for launch.

Industrial Design Opportunity Identification Consulting Services would enhance the entrepreneurial capabilities of the entrepreneur by undertaking opportunity analyses, feasibility studies, business plans, and project management, to support the launch of the venture.

Industrial Design Opportunity Identification Consulting Services may assume a minority interest in the client's firm as recompense for time and risk.

Established Firms

These companies by virtue of their operations discover a potential new product opportunity and conceive of a potential new venture opportunity. The established firm:

1. might have internal technical and management resources,
2. might be unable undertake new venture directly due to the demands of its established operations,
3. might be intimately aware of the challenges of commercializing new products,
4. has direct experience with their markets,
5. has either invented a new product idea or has acquired rights to one, and
6. might have the desire and the resources to commercialize the new product and invest in its development.

Industrial Design Opportunity Identification Consulting Services would enhance the technical capabilities of the established firm by undertaking aesthetic, electronic and mechanical design, production design and corporate identity design, by sourcing materials, components and manufacturers and by researching standards, technologies and costing, to design the product to a level suitable for launch.

Industrial Design Opportunity Identification Consulting Services would enhance the entrepreneurial capabilities of the established firm by undertaking opportunity analyses, feasibility studies, business plans, and project management, to support the launch of the venture.

Industrial Design Opportunity Identification Consulting Services may assume a minority interest in the client's firm as recompense for time and risk.

COMPETITIVE ANALYSIS

Potential competitors of the services of Industrial Design Opportunity Identification Consulting Services fall into two general categories:

1. consultants, and
2. institutions.

Consultants

Consultants offer specialized services which run the full gamut of the entrepreneurial problem:

1. marketing (research, feasibility analysis, marketing programmes, advertising, product design and development),
2. engineering (product design and technical development, materials and production engineering, technical feasibility analysis),
3. accounting (financial planning and control),
4. management (information systems, operations, human resource development, strategic planning),
5. legal (business financing and organization, intellectual property, contracts and proposals),
6. industrial design (product conceptualization, prototype development, packaging), and
7. invention management (licensing arrangements, marketing, production sourcing).

Consultants:

1. offer specialized and expert advice,
2. are objective third parties,
3. are task specific and responsive to a venture's needs, and
4. are costly.

Institutions

There are many publicly instituted support mechanisms available to ventures. Support is in the form of general information, subsidized consulting and various types of financial assistance. The scope of institutional support also runs the full gamut of the entrepreneurial problem; many of the same types of services are available:

1. chapters of the chamber of commerce (networking, seminars),
2. municipal development authorities (networking, trade development, incubators, seminars),
3. Alberta Research Council (technical support, testing),
4. Alberta Economic Development and Trade (small business counselling, trade development, grants),

5. University of Calgary, New Venture Group (business planning, feasibility studies, research, strategy, financing, legal, accounting),
6. University of Calgary, Industrial Design Clinic (product design),
7. University of Calgary, Research Services (contract research),
8. SAIT (technical development),
9. colleges, continuing education (short course, seminars),
10. Waterloo Innovation Centre (invention evaluation, feasibility analysis),
11. financial institutions (financing, general information, counselling, seminars),
12. Alberta Opportunity Company (financing, general information, counselling, seminars),
13. Federal Business Development Bank (financing, general information, counselling, seminars).

Institutions:

1. offer general and expert advice,
2. are publicly supported third parties,
3. are mandate specific and require alignment of the venture's needs, and
4. are inexpensive.

SERVICE DESIGN

Service Model

General Principles of the Competitive Advantage

Industrial Design Opportunity Identification offers highly specialized support to ventures, and also contributes to maximizing the probability of successfully exploiting an opportunity by facilitating, optimizing, orchestrating and integrating.

Tenet 1

Industrial Design Opportunity Identification *facilitates* innovation by providing clear vision and confident leadership.

Products and the ventures that launch them, are developed through a well developed process of innovation. This process starts at a point of initial conception, and through time and the application of resources becomes more concrete to the point where the concept has

Refining the Practice

become an operating reality. The process is designed for each innovation. The purpose, objectives and requirements of the venture are derived from this plan. Therefore development effort may become focussed.

Tenet 2

Industrial Design Opportunity Identification *optimizes* the risk of innovation by effectively and efficiently exploiting the limited resources available to entrepreneurial undertakings.

Innovation proceeds through iterative phases, which are increasingly detailed and thus require increasing financing. The feasibility is measured at gates punctuating the process, at which, decisions whether to proceed and infuse more resources are made. Phased-in development reduces the risk because the venture must continually justify its advancement: early in the process, when the nature of the work is more conceptual, judgements are made intuitively (and inexpensively); later in the process, when the nature of the work is more commercial, judgements are made empirically (and expensively). Funds are spent on activities appropriate for the level of detail: technical development for example is not allowed to outpace the other factors, dominating the cash of the venture for development which is too advanced.

Tenet 3

Industrial Design Opportunity Identification *orchestrates* the resources required for successful innovation by developing strategic alliances with government, the financial community, the professional community, manufacturers and distributors.

The venture requires many types of human and capital resources to achieve commercial success. These resources must be identified and motivated to allocate themselves to the venture.

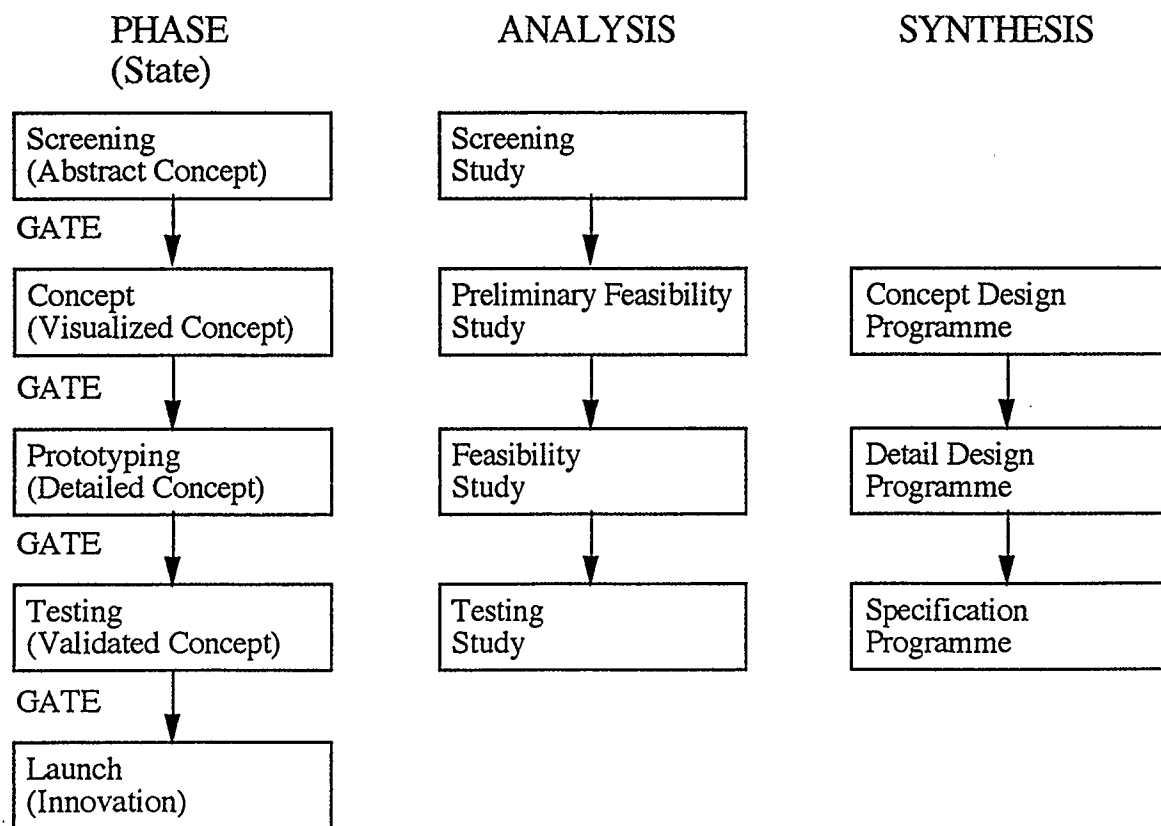
Tenet 4

Industrial Design Opportunity Identification *integrates* technical, economic and market factors in the analysis of opportunities and product; strategic and organizational factors in the synthesis of innovation.

Two conceptually distinct activities should occur during the process of commercialization: analysis and synthesis. Innovation is a creative process: problems are found and studied and their proposed solutions conceptualized and refined. To effectively study an opportunity, technical, economic and market factors must be taken together. Separating the analysis of the factors reduces the possibility of synergy during conceptualization. Likewise, analyzing opportunities separate from their synthesis as innovation raises the risk that a good product and venture will be developed.

General Service Model

Prior to the launch of a product and venture, many phases of development must be undertaken, and many decision gates reached. Service products are offered in two categories: Analysis and Synthesis, and are delineated according to their appropriate timing in the life of a venture.



The Service Product Line

Screening Phase

The Screening Study

Purpose and Scope

The purpose of the Screening Phase is to provide a preliminary indication of whether a new venture or product idea has merit:

1. to provide an inventor or entrepreneur with a cost-effective basis for committing to preliminary development or selecting from a selection of alternatives,
2. to test the commitment of the potential client by communicating the requirements of product development and assessing their attitudes and personality,
3. to quickly eliminate obviously poor ideas, and
4. to allow the consultant the opportunity to decide if the project is within the experience, interest and skill realm.

Objectives

There are five parts to the study which together provide the client and KIGO with enough information to assess whether they can work together and if so, if there is anything to work on:

1. Initial Client Interview: In this half-hour long interview KIGO would present the company portfolio to the prospect, allowing the prospect to understand the nature and scope of the services.
2. Client Questionnaire: The questionnaire focuses on discovering the nature of the idea, the client, the information that has been collected and the development that has been done.
3. Internal Checklist: Aspects of technical, market and economic feasibility would be reflected in a checklist that will be developed to allow the analyst to get a basic sense of the opportunity.
4. Client Attitude Measurements: One of many entrepreneurial attitude and personality measurement tools could be administered and computer-analyzed.
5. Documentation and Proposal: The analyst would sum the effect of the interview, client questionnaire, client attitude measurement and patent search into a rudimentary opinion letter to the client. This letter would provide a

detailed proposal for the next phase of development and indications of what the process of development might be.

6. Optional Patent Search: A Dialogue database search will provide a good non-legal impression of what work has been done in the past on the subject. If it appears there may be infringement then legal counsel may be sought in downstream phases.

Pricing

The pricing of the screening study reflects the tentative state of the venture: the concept is abstract and unproven and thus the risk of losing any investment at this point is high. The work could be reasonably completed in about 7.5 hours; the optional patent search could be completed in 1 hour. The price to the client would be \$400.00, plus \$200.00 for a patent search.

Concept Phase

The Opportunity Analysis

Purpose and Scope

The purpose of the opportunity analysis is to provide an inventor, entrepreneur or established firm with a cost-effective basis for more serious resource commitment or initial procurement, by providing *qualitative* evidence that proceeding on to the next phase of development is justified.

Objectives

The opportunity analysis is a preliminary feasibility study which is undertaken in four parts:

1. Market Analysis: Informal marketing research and analysis undertaken in this phase attempt to describe client's customers. Segmentation may be based on demographic, geographic or psychographic criteria. Segmentation may be supported by informal interviews of prospective customers, users, wholesale buyers, distributors and retailers. If a concept is articulated, these groups can address the features of the concept, providing opinions useful in developing the concept further. Secondary research is more easily obtained and may be quite relevant to the market in question. This information may be developed from KIGO's archives, databases, libraries, etc.

2. **Competitive Analysis:** The needs of the client's customers may be potentially satisfied by potential direct and indirect competitors. This analysis is undertaken concurrently with the market analysis and with the same methods. The goal is to identify the strengths and weaknesses of other firms and to anticipate responses to the introduction to the client's products.
3. **Engineering Analysis:** Technical research and analysis focuses on defining the alternatives available for producing the product, the capabilities of the venture team, the requirements for R & D, and possibilities of licensing the required technologies. Patenting, agency approvals (CSA, UL, etc.) are addressed in rudimentary terms, to determine their basic role in the future development.
4. **Financial Analysis:** Economic research and analysis focuses on generating budgeting guidelines: estimates of price-points, distribution margins, provisional costing. Segment sizes and capitalization requirements are estimated to give a sense of penetration required to achieve breakeven. Development requirements are sketched out as a basis for defining the budget required to get to the point of launch; this analysis provides indication of team skills and investments required for success.

Conceptual Design Programme

Purpose and Scope

The purpose of the conceptual design programme is to provide an inventor, entrepreneur or established firm with a cost-effective visualization of the venture and product design problem and possible solutions.

Objectives

The venture and product concept is designed to respond to the opportunity which is analyzed concurrently:

1. **Conceptual Product Design:** The product is considered in conceptual terms, reflecting market, technical and economic factors. The concept is a hypothesis, a cluster of values attempting to satisfy the conditions of product innovation: characteristics that would tend to make the product appropriate for sale, production and commercialization. The emphasis is on visualizing the concept. It is developed in sketch or rendering form, in

mock-ups or models. The visualized concept articulates the vision of the product to all those that may be called upon to commit to developing the innovation.

2. **Conceptual Venture Design:** The strategy and organization design is concerned primarily with defining how the process of development will proceed, what the schedule will be. The mission of the venture will take form, precipitating out of the combined goals and capabilities of the venture team. The organization is essentially a venture team, and consideration must be given to downstream phases and how the team must be augmented. The presentation of these ideas would be in document form, a preliminary business plan. The evaluation of the concept is not a formal part of the process per se. Rather it is implied in the conceptual design and formalized at the close of the phase. At that point, external persons, the client and KIGO proceed to determine if further commitment is warranted.

Pricing

The pricing of the Opportunity Analysis and Conceptual Design Programme reflect the still tentative nature of venture at this point. The chance of losing any investment is still high since the screening tool provided only preliminary judgements. Risk is optimal if both parts are carried out concurrently, however it is often appropriate to emphasize one over the other. If an Opportunity Analysis is undertaken separately, then the concept articulated by the client may be visualized but not refined. Alternatively, if the client provides the Opportunity Analysis, then Conceptual Design is undertaken on that impetus.

Although the amount of effort required varies vastly from project to project, generally, an Opportunity Analysis may be completed in 35 hours and Conceptual Design may be completed in 35 hours. The price would be \$4000.00 for each part of the Concept Phase. The price optimizes the need to know conclusively whether the concept is viable and the need to minimize investment.

Prototype Phase

The Feasibility Study

Purpose and Scope

The purpose of the Feasibility Study is to justify and help secure the large investments required to advance the venture into testing and launch, by providing *quantitative* measurement of the viability of the concept.

Objectives

The Feasibility Study is a more substantive version of the Opportunity Analysis and has the same parts:

1. Market Analysis: Market research and analysis methods are more formal. Some care is taken in the design of questionnaires and interview guides; some care is also taken in the sampling of respondents; the size of samples will increase. The drive is on the collection of objective information regarding segmentation and concept review. The provision of a working prototype allows users, customers and distributors to realistically and confidently draw upon their frameworks to provide valid and accurate opinions. Market research may include focus groups, depth interviews with distributors and retailers, and surveys of customers.
2. Competitive Analysis: This analysis is undertaken concurrently with the market analysis and with the same methods. The goal is to identify the strengths and weaknesses of other firms and to anticipate responses to the introduction to the client's products.
3. Engineering Analysis: Technical research and analysis concentrates on preparing for both mass and batch production. Extensive agency research is undertaken to define the constraints imposed by organizations such as CSA and UL. The performance of the prototype is considered. Materials and components are sourced and evaluated. Engineering analysis of mechanical and electronic design considerations may be undertaken. Patenting, trademarking, packaging and labelling are also considered.
4. Financial Analysis: Economic research and analysis is concerned with generating more accurate costing, pricing and margin data based on the provision of a physical prototype. Financial analysis focuses on estimating investment requirements, calculating potential returns and breakeven.

Detail Design Programme

Purpose and Scope

The purpose of the Detail Design Programme is to revolve the venture and product concept into a more concrete article.

Objectives

The venture and product concept is detailed to respond to the feasibility which is analyzed concurrently:

1. Detailed Product Design: The product concept is now in concrete form. Its engineering design is undertaken. The concept functions and operates authentically. Actual materials are used in the fabrication of models, mock-ups and prototypes.
2. Detailed Venture Design: The strategy consists of both the strategic view of the venture itself and the tactical view of planning for market testing. The organization may be seriously prepared for the future launch, whether this consists of a venture team or project team, or formal corporation. A preliminary business plan is formulated to guide further pre-launch activities.

Pricing

The pricing of the projects in this phase reflects the new requirement for relative accuracy in the documentation of analysis and the substantiation of design variables. The requirement is driven by the larger investment that will be required in following phases and the need to raise capital beyond the capabilities of the entrepreneur. The chance of losing any subsequent investment is drastically reduced at the successful close of this phase: a good sense of economics, the market and technical concerns has been developed; the product works, the venture has vision, direction and clarity of purpose; the venture team is a high-performance collection of individuals who are passionate in the development of the innovation.

Generally, a Feasibility Study may be completed in 150 hours; Detail Design may be reasonably completed in 150 hours. The price would be \$18,000 for each part of the Prototype Phase.

Testing Phase

Testing Programme

The purpose of the testing phase is to validate the assumptions made during development: removing uncertainty in order to justify and help procure the large capital investments that may be required during the launch of the venture and product. The testing programme may include ergonomic testing, batch production and limited-scope, highly focussed test marketing.

Specification Programme

What is learned during testing effects the final form of the product, strategy and organization prior to launch. The specifications are fixed statements of how the venture and product will be launched. A formal business plan and consideration for a more substantive and professional company structure must be made; the firm has detailed objectives and means to achieve them.

Pricing

Apart from direct costs associated with running test-markets and producing small quantities of the product (which are widely varying), the consulting costs are roughly similar to the preceding phase.

Internal Research and Development Programme

Purpose

Industrial Design Opportunity Identification is an information discipline. The R & D programme would provide technical support to the performance of the projects.

Objectives

Success and Failure

The literature on entrepreneurship, design and business contains much information about factors in venture development that tend to increase or lower the probability of success.

Licensing

This as an important business option because it offers a scale of manufacturing and distribution that is beyond the reach of small business, and which may be the only viable development goal.

Financing Options

Financing is the critical venture resource. Venture capitalists, private individuals, institutions provide ventures with funding but are each motivated uniquely.

Support Programs

The municipal, provincial and federal governments have grants, loan guarantee programmes, and other support, which are often easily available when the mandates are clearly understood.

Legal Protection of Intellectual Property

Issues such as patents, trademarks and product liability are vital issues to businesses built around intellectual capital.

Ergonomics

The quality of products is an essential competitive necessity in this age of global markets. Ergonomics studies the interface of man and product, easing use, enhancing safety and increasing performance.

Environmental Factors

The environment is currently receiving public attention and the trend towards government legislation limiting the selection of materials and processes is sure to continue.

Consumer Behaviour

All products are consumed (purchased and used). An understanding of both consumer and commercial buying behaviour will lead to more effective and efficient marketing programmes.

APPENDIX A-JURY PROTOCOL

The structure of each interview is as follows:

1. The respondent is sent a copy of the capsule version of the model (See Appendix A).
2. A follow-up interview is undertaken by phone or in person, or alternatively, the respondent responds in writing.

Interview Guide

Since only a small amount of time is available to each respondent, the probes are kept simple (the interview proceeds serendipitously from there):

"I have developed a concept for a new industrial design consulting service. Your comment will help me to complete the design of the service. Please identify a benefit of this proposed service and a problem facing its development."

Capsule

The capsule consists of an introductory letter, brief written description of the model and five graphics:

Industrial Design Opportunity Identification

Industrial Design Opportunity Identification is a proposed model of consulting practice exploiting the synergy of design and entrepreneurship. The entrepreneurial industrial design consultant is integrated with the client as a professional entrepreneur, identifying opportunities available to the client and designing the client's products, strategy and business structure to respond. The consultant manages a portfolio of clients and projects, optimizing a flexible structure of fees based on cash, equity and royalties, depending on the nature and extent of leadership provided to the client.

The purpose of Industrial Design Opportunity Identification is to increase the productivity of new product development in companies and regions with limited resources and experience with new products. This model evolved from the economic conditions in Alberta, which has a pre-disposition to resource-based industry and lacks traditional industrial infrastructure, but has an entrepreneurial economy, a growing high-technology sector and other specialized manufacturers often competing globally in niche markets. The productive power of the model lies in the integration of two approaches: first, the industrial designer's capacity to visualize and articulate patterns, phenomena and trends in culture, to source and apply new technology and to synthesize innovative, timely products; and second, the entrepreneur's capacity to moderate risk, to persevere, to procure resources and to organize and promote the creation of an innovative venture.

Industrial Design Opportunity Identification is an entrepreneurial design process of analysis and synthesis. Opportunities are perceived through intuition and cost-effective methods of research and exploration. Innovations are crafted through a series of increasingly detailed, iterative development phases, punctuated by decision-gates which optimize intuitive and rational judgement. Resources are more comfortably committed at these points as the innovation proves to be increasingly feasible.

Industrial Design Opportunity Identification focuses on the analysis of three critical dimensions of opportunity. Market Feasibility Analysis anticipates and articulates the existing or potential purchasing motives of consumer targets. Technical Feasibility Analysis anticipates and articulates the existing or potential capabilities of production or competitors. Economic Feasibility Analysis anticipates and articulates the existing or potential possibilities of creating commerce, in terms of cost, price, margins, investment and profitability.

Industrial Design Opportunity Identification focuses on the synthesis of three critical entrepreneurial design responses to opportunity. The innovative product is designed to satisfy the conditions of demand, reflect the capabilities of supply and to provide the possibility of commerce by respecting the requirements of price and cost. The innovative strategy is the combined effect of planning and methods to achieve innovation. The innovative organization is a system of human and financial resources, controls and operations combined to produce and deliver the product to its intended market, providing returns to its investors and regenerating itself through the continuation of opportunity identification.

The model of Industrial Design Opportunity Identification allows for increasingly substantive consulting at each phase of innovation. The Screening Phase is the first attempt to understand the situation to determine if the concept warrants any consideration. The Concept Phase is the first attempt to visualize the concept. The Prototype Phase is the first attempt to translate the concept to physical, operating significance. The Testing Phase is the first attempt to attain authentic customer and user response to the concept. The Launch Phase is the first attempt to fully execute the concept in the marketplace. The Expansion Phase considers enhancements in operational scope in global or product-line terms. A programme of service products may be administered to clients based on their limitations for carrying out the full development.

ENTREPRENEURIAL DESIGN MODEL

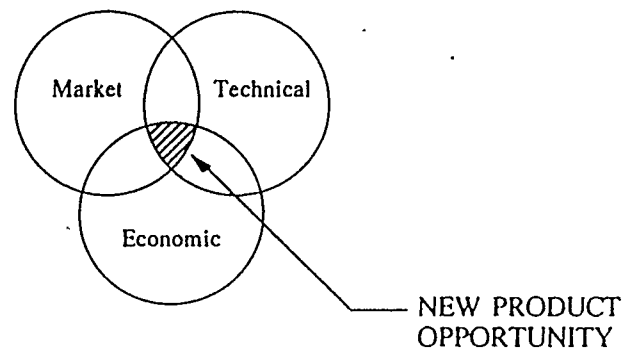


OPPORTUNITIES	PROCESS	INNOVATION
SITUATIONS CREATED BY CHANGE (UNCONTROLLABLE VARIABLES): Market Factors Technical Factors Economic Factors	A PROCESS EXPLOITING DESIGN AND ENTREPRENEURSHIP: Creativity and Intuition Design Methods Optimization of Risk and Scarce Resources Perseverance	EXISTING OR POTENTIAL COMMERCE (CONTROLLABLE VARIABLES): Organizational Factors Strategic Factors Product Factors

Note: In this model, innovations are created to respond to opportunity situations through the entrepreneurial design process. The success of the venture depends first on the clarity of the understanding of the situation (uncontrollable variables) and second on the joint feasibility of the product, strategy and organization design (controllable variables).

SOURCES OF OPPORTUNITY

Note: In this model, opportunities are the confluence of changing market, technical and economic factors.



TECHNICAL FACTORS

EXISTING OR POTENTIAL CAPABILITIES:

Engineering Technologies
Materials
Emerging Technologies
Production Methods
Product Design
Competitive Structures
Positioning Criteria
Technical Effort Required

MARKET FACTORS

EXISTING OR POTENTIAL CONSUMERS:

Cultural and Social Trends
Consumer Attitudes/Motivation
Ergonomic Requirements
Segmenting
Distribution channels
Market Inertia
Penetration Effort Required

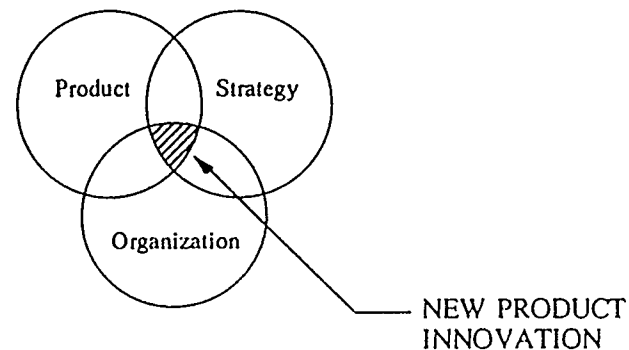
ECONOMIC FACTORS

EXISTING OR POTENTIAL COMMERCE:

Pricing
Costing
Margins
Social Determinants of
Price-points
Technical Determinants of Cost
Commercial Determinants of
Margin
Investment Scale
Profitability Potential

SOURCES OF INNOVATION

Note: In this model, innovations are the confluence of product, strategy and organization design



PRODUCT FACTORS

THE DESIGN OF A PRODUCT :
Aesthetics
Ergonomics
Product Image and Style
Pricing
Promotion and Merchandizing
Packaging
Safety Accreditation
Selection of Vendors and Channels
Positioning
Manufacturing Methods and Materials

STRATEGIC FACTORS

THE DESIGN OF PLANS, OBJECTIVES AND MISSIONS:
Competitive Strategy
Development Strategy
Marketing Strategy
Business Strategy
Financial Strategy
Business Planning
Decision-making
R & D Philosophy
Risk Management
Competitive Entry Wedges

ORGANIZATIONAL FACTORS

THE DESIGN OF THE ENTERPRIZE:
Human and Financial Resources
Controls and Measurement of Objectives
Development of Product Distribution and Delivery Systems
Development of Manufacturing Processes and Locales
Development of Material and Component Suppliers
Development of Information Systems

ENTREPRENEURIAL DESIGN PROCESS-ANALYSIS

PHASE (State)	MARKET FACTORS	TECHNICAL FACTORS	ECONOMIC FACTORS
Screening (Abstract concept)	Client questionnaire/Consultant screening: What are the demands, problems, attitudes and values of the existing or potential customers?	Client questionnaire/Consultant screening: Is there a potential or existing product, technology or business supplying these customers?	Client questionnaire/Consultant screening: What social and technical trends effecting the price and cost of the product? What are the orders of magnitude of pricing, costing, margins, investments and breakeven?
Concept (Visualized concept)	Informal market research Preliminary Segmenting	Preliminary materials, production sourcing Preliminary competitive analysis Informal ergonomic research	Price and cost estimation Margin analysis
Prototyping (Detailed concept)	Formal market research Focussed ergonomic research Segmenting	Materials, production sourcing Competitive Analysis Ergonomic research Preliminary environmental Research	Guidance costing Guidance pricing Preliminary financial analysis
Testing (Validated Concept)	Market testing	Mass-production sourcing Ergonomic testing Environmental Research Safety testing	Production quoting Financial analysis
Launch (Innovation)	Mass or niche marketing programme	Global production sourcing	Cost reduction Break-even Economies of scale
Expansion (Global Innovation)	Market penetration Product diversification Global marketing		Super-economies of scale

ENTREPRENEURIAL DESIGN PROCESS-SYNTHESIS

PHASE (State)	PRODUCT FACTORS	STRATEGIC FACTORS	ORGANIZATIONAL FACTORS
Screening (Abstract concept)		Development process	Client questionnaire: What are the client's goals, personality and skills? What team is required for development
Concept (Visualized concept)	Sketching Rendering Modelling	Mission/objectives/purpose Preliminary Budgeting	Adhoc team Internal financing Business visualization
Prototyping (Detailed concept)	Mock-ups Prototyping Test-jigs	Preliminary planning/strategy Budgeting	Consulting team Internal financing
Testing (Validated Concept)	Test-jigs Batch production runs Product specifications	Planning/strategy Financial planning	Venture team Informal external financing
Launch (Innovation)	Pre-production prototypes Production engineering Niche production runs Large production runs	Growth planning/strategy Business management Financial management	Professional structure Formal external financing
Expansion (Global Innovation)	Massive production runs Research and Development for product line extension/diversification	Diversification/extension strategy	Massive professional structure Massive external financing

CONCLUSION TO PART I

OPPORTUNITIES FOR FURTHER WORK

Further Service Development Opportunities

Forecasting tools may be developed which at an abstract level attempt to predict the state of a market or technology in a given planning horizon. Products are frequently the confluence of several innovative technologies. New opportunities may be identified long in advance by studying how those technologies may be advanced and combined, together with an analysis of changing social and cultural structures. This forecasting service may be sold as a supporting tool for strategic planning and may easily be derived from the principles which drive the other service products.

Commercialization Opportunities

In the language of the model, a prototype has been developed. This concept must be further detailed and tested. In a commercial sense, methodologies and research tactics must evolve from the basic outlines of each service product.

PART II
Design Entrepreneurship:
Crafting the Future

INTRODUCTION TO PART II

PURPOSE

The purpose of this Part is to provide *editorial* context for the design created in the previous part.

OBJECTIVES

Chapter 4: See the Future

The objectives of this fourth chapter are:

1. Demonstrate that the creation of the innovative vision is a matter of design.
2. Explore the precedents in industrial design history of creating innovative visions.
3. Explore the precedents in design management of creating innovative visions.
4. Explore the precedents in design methodology of creating innovative visions.

Chapter 5: Capture the Future

The objectives of this fifth chapter are:

1. Illustrate the dimensions of entrepreneurship relating to design.
2. Introduce the notion of design entrepreneurship as a mechanism of productive innovation.
3. Illustrate the role of design in the management of risk.

Chapter 6: Survive the Future

The objectives of this sixth chapter are:

1. Explore the dimensions of globalization that effect regional competitiveness.
2. Describe the nature of the Alberta Economy, verifying the need for innovation in the maintenance of competitive advantage.

CHAPTER 4
Seeing the Future

CRAFTING OPPORTUNITY

The typical notion of craft describes those human activities which are intimately impacted by human skill, judgement and experience. Artifacts of craft evolve through the creative process as the form is transmuted through experimentation, as initial aspirations are reconciled with actual results and as the artifact develops within the understanding of the situation. The form follows function as it is the proactive product of intentional rational action; the form evokes function as it is the reactive product of serendipitous random exploration. The role of the craftsman is both to create value and discover value.

Form Follows Function

Modern Design

The term "form follows function" conveys the spirit of rationality sparked by concepts such as scientific management. Streamlining is a movement that began in the early part of the twentieth century and gained considerable momentum when designers such as Raymond Loewy, Walter Dorwin Teague, Henry Dreyfuss and Norman Bel Geddes began their careers in New York City during the Great Depression.

Streamlining began as a scientific principle: that objects would be more efficient if they were designed to allow smooth passing of air streams. Forms affording this efficiency were inspired by nature: the smooth forms of birds and fishes and the shape of water drops about to fall. Initially, moving objects such as cars, trains and airplanes were streamlined. As the depression wore on efficiency became an enticing objective; streamlining was applied to everything from staplers to architecture and clothing. Later, after the war, streamlining doctrine had attained significant social meaning. Streamlined objects symbolized a bright happy future made possible through science and technology, a future visualized by designers.

The Immutable and Objective

The underlying principle of rationality began to pervade all facets of the synthetic world. Streamlining was one manifestation of the modern movement in which objective knowledge predicated the forms of human artifice. "Wasteful" decoration was removed from surfaces because it impeded the objective of efficiency and had no underlying reasoning or justification. As mass production and communication technologies became more prevalent the doctrines of modernity became more universal and thus any subjective

relativism was slowly removed. As aesthetic principles were taken directly from science, they were seen as immutable as gravity.

The Marketing Concept

The same thinking that caused the phenomenon of modernism was also reflected in other aspects of the industrial experience. Taylor's scientific management eventually led to a state during the 1970's where corporations in the United States were driven by quantitative methods, wielded by powerful financial managers. The products of these industries—the objects which through their sale had enabled corporations to have numbers to manipulate—were relegated to financial statements where they lost all meaning. Paper entrepreneurship took the place of authentic innovation. The prosperity which America enjoyed in the post-war years was in a state of decadence: the trade deficit slowly grew through the seventies and eighties. Philip Kotler and Theodore Levitt promulgated the marketing concept, which was their attempt to bring the customer and product back into the focus of industrial corporations. The principle simply stated is a corollary of the original concept of modernism: the product is designed to fit the needs of the customer (form follows function).

The marketing concept became entangled with the drive towards scientific market research, as a natural extension of rationality. Only those products that were the result of highly confident statistical market research could be approved by the same financial managers.

Form Evokes Function

A Sense of Post-Modernism

The term "form evokes function" is intended to convey a new spirit tolerant of random experimentation and inventiveness. While the process of rational design is concerned with solving well defined problems, this attitude prescribes messy exploration with potential solutions in the effort to gain new insights into old and new problems. A form is created as a basis for assessing opportunity.

The Subjective and Intuitive

One of the drives of post-modernism is the desire to reclaim the subjective and intuitive. This is one sense in which post-modernism revolted against its predecessor. Post-it notes began as an exploration of the possibilities of a new adhesive: the concept may not have been discovered if a rational design process had been undertaken. The need was created

from a new possibility, it did not exist prior and therefore could not have been defined. The Ford Edsel was one of the most dismal failures despite being the result of substantial scientific market research. Somewhere in the translation of the market data to form, the life was choked out of the concept. More recently, the Ford Taurus has revolutionized the auto industry by reflecting the retro-style of streamlining developed fifty years earlier. Reference is the essential driving force of subjectivity, but in the case of the Taurus, it has been tempered by a re-evaluation of the science of streamlining. It seems that there is some value in balancing the subjective and objective as was done with the Taurus: working a problem from both ends.

Anticipation of Change

Innovation is about anticipating and mediating the future: to look into the void of events not yet occurring, to discern patterns of human development and progress and to make proactive claims on certain niches of economic activity.

Forecasting and Mediating Cultural Change

Designers of streamlined products gave life to their forms over and above pure utility. While pure utility may have been a strict goal of modernism, streamlining captured the spirit of the society from where it sprang and in so doing spurned substantial commercial success. Customers eager to raise their psyche in the depth of the Depression, purchased streamlined products. This design revolution was about rethinking the production of goods to lower their costs and rethinking their appearance to increase their appeal.

Designers were fascinated by the future. Bel Geddes published *Horizons*, a richly illustrated glimpse into the glamorous future. Huge ships and multi-deck airplanes were shown. He was the inventor of the energy-saving Dyamaxon principle, utilized in torpedo-shaped cars and spherical houses.

Today, many designers are students of culture, pop culture in particular. With exposure to a wide variety of disparate trends, designers have the opportunity to articulate the confluence of patterns in culture *and* marketing research, and translate them to product concepts.

Forecasting and Mediating Technological Change

Another facet of streamlining was the adaptation of technological innovation. Loewy's design of a milk processing machine, utilized the new moulding and forming technologies. These technologies enabled the design of a smooth, seamless form which while being exceptionally easy to clean provided significant advances in hygiene. Dreyfuss concentrated on the human element, translating his research of ergonomics into innovations of performance such as the telephone hand-set. Teague transformed bulky photographic equipment into sleek, useable cameras such as the Kodak Brownie.

Today, industrial Design firms such as the Moggridge ID Two in San Francisco, contract-out to *imagine* the future of certain product classes or technologies. Companies such as Apple Computer generate forward looking product concepts such as the *Knowledge Navigator* which may have profound impact on company direction.

The Design Management Interpretation

Innovation by Design

The emerging discipline of design management is seeking to establish the relevance of design in business. Business is a human artifice no less the product of design than architecture or objects. The emerging discipline of design management is endeavoring to raise the status of design from the "drawing board to the board room"¹, giving a design influence to business operations at the highest level.

The concept of the design management approach is that industrial designers, by virtue of their experience and training in both technical and cultural matters, are capable of contributing more to the business than the strictly technical discipline of product design. If an explicit purpose of business is innovation, then, in a sense, design management seeks to establish the contribution of design to innovation. Industrial designers have the opportunity to play a role as arbitrators between technology and culture in the process of innovation, speaking the language of the customer and speaking the language of the producer.

Leadership by Design

Innovation requires the synthesis of many different types of information and backgrounds; it is an interdisciplinary activity comprising many specialists: accountants, financial people, human resource people, marketers, industrial designers, sales people, advertisers, engineers, scientists and lawyers. These functions are all necessary but insufficient on their own for the progression of the problem-solving process. Conceivably, these functions could all be carried out by one person, but as the problem becomes more complex integration within one person becomes less feasible. The venture team concept has been proposed based upon this logic. The number of people required depends upon the magnitude of the task at hand.² Creatively, a group offers more opportunity for synergy and thus as a team, they should be higher-performing problem-solvers. In venture groups, the designer by virtue of a wide background, design training and communication abilities may play the role of synthesis/integrator/interpreter.

Leadership pertains to setting goals and facilitating their accomplishment: the *what* and the *how*, the *plan* and the *attack*. There are two facets of leadership then; the goal-setting and the goal-facilitating. Goal facilitating demands good management; goal setting must reflect the opportunities available to the business and thus demands good design. Perceptive designers may enhance goal-setting; experienced and appropriately educated designers may enhance goal-facilitating:

"Underpinning the ability of many [industrial] designers to play a full part in the development team, and the potential of some even to become the team's co-ordinator, is a set of unusual personal attributes. Some are inborn and some are learned. They include imagination; the ability to visualize shapes and the relationship between objects, in three dimensions; creativity; a natural unwillingness to accept obvious solutions; the ability to communicate, through words as well as sketches; and finally, the designer's stock-in-trade - the ability and versatility to synthesize all sorts of multi-disciplinary factors and influences into a coherent whole."³

Strategy by Design

Strategy is the statement by a business of what goals it will work towards and how it will achieve them. Innovation has both prescriptive and executive elements. Principles are defined to guide action. The perception of an opportunity leads to the definition of the problem. The problem definition guides the synthesis of the product. The product guides the development of a business system to produce and sell it. "The planning and patterning of any act towards a desired, foreseeable end constitutes the design process."⁴ There is strategy permeating each of these steps of development:

"Strategic planning can be mechanistically, and therefore incorrectly defined as deciding how to allocate resources among the possibilities of what's to be done. This definition is incorrect, because it presumes that these possibilities are self-evident. They are not. It is wrong to say that the most important and creatively challenging act of corporate decision-making is about choices regarding what's to be done. The most important and challenging work involves thinking up the possibilities from among which choices have to be made....A possibility has to be created before it can be chosen. Therefore to think up the possibilities from among which choices might be made is to engage in acts of creative imagination."⁵

DESIGN CRAFT

Six Senses of the Design Process

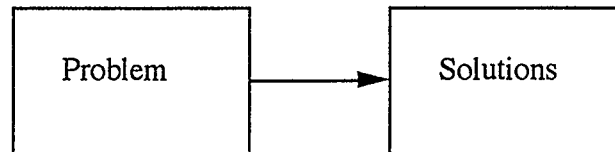
Design is a creative process. Where there once was nothing, at the completion of a design process, there is a tangible product, whether valuable or not. The product is a part of the future, a plan or statement for something that does not currently exist.

Design is a process of creating artifice. Artifice in its many forms has six interesting, inter-related dimensions: problem-solving, conception, meaning, structure, composition and decision-making. As a process, designing revolves around the change of something from one state to another.

Problem-Solving

Process Implications

The essence of problem-solving is a formal rational process which roughly begins with a problem and roughly ends with a solution.



A successful design process is one where the problem is appropriately and sufficiently solved.

Convergent/Divergent

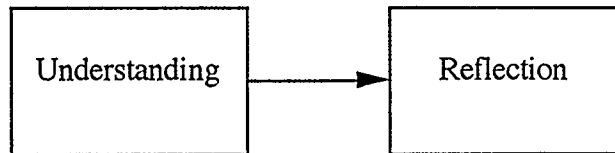
Simplistically described, the elements of the process are problem definition, analysis, generation of alternatives, selection and implementation. Starting with a situation requiring remedy, the designer diverges by considering many options for alleviating the problem-

situation (exploration), finishing by converging upon a solution. In this process the nature of the solution is defined and the alternatives are intended to respond to that definition with varying levels of success.

Meaning

Process Implications

The essence of creating meaning is one of understanding the knowledge, beliefs or values of an audience and reflecting such in the form of the product



The process is successful if the form communicates an appropriate function to the audience.

The Analysis of Function

Artifice is significant in its ability to satisfy some human motive. The motive may be utility, need, aesthetics or symbolism. Research, analysis and intuition leads to understanding customer's motives. Understanding leads to definition of design problems.

Function is derived from culture (all functions are culturally determined and have a cultural frame of reference). Design of any artifice is thus a cultural activity.

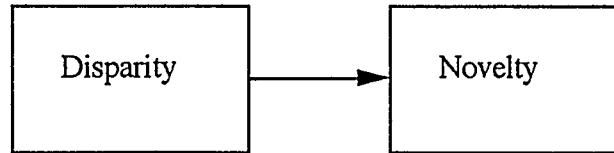
The Synthesis of Form

Meaning is a result of satisfying motives. If the form of the artifice offers a person certain values which are perceived as being consistent, then meaning has been developed. Meaning pertains to an object's ability to communicate with its user. If an artifact is useful, the meaning of utility is conveyed; if an artifact is beautiful the meaning of aesthetics is conveyed; if the artifact is desirable the meaning of need is conveyed. Once meaning has been established, the problem becomes one of sales: determining the mix of pricing, promoting and distributing that will maximize the probability of the person responding with purchasing behaviour.

Conception

Process Implications

The essence of conception is one of creating new insights and ideas from elements of knowledge which did not necessarily have any relevant, logical connection prior.



The process is successful if new ideas are created.

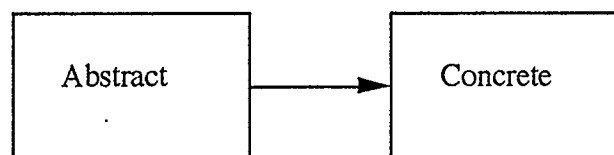
Invention

The creation of any idea constitutes invention. Invention is the essence of the creative experience. Inventions are newly conceived combinations of elements (such as opportunities being significant combinations of a source of demand and a source of supply). The "eureka" occurs when juxtaposed ideas are inadvertently perceived in a different light. Conversely, "eurekas" may be sought out by randomly juxtaposing different ideas until a significant connection is made that may warrant further consideration.

Structure

Process Implications

The essence of establishing structure is one of transforming an abstract concept into a concrete reality. A process of beginning with a macro level of detail and working towards a micro level.



The process is successful if the structure develops integrity and quality.

Iteration

The design process is a series of iterative phases, wherein the state of the artifice is transmuted from abstract to concrete. The designer may begin with an abstract image of a problem. During a period of information collection, sketching and experimentation, the

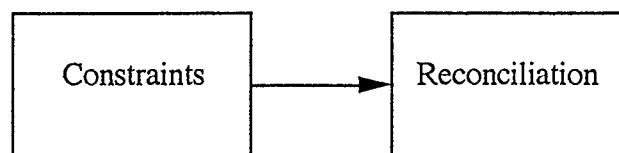
concept is presented in rough form. The very act of articulating the form transmutes it: it is capable of being evaluated by others and begins to take on physical attributes in further iterations. The process proceeds through periods of image development, presentation and testing against concrete criteria (developed by considering the motives of the design audience). As the concept becomes more detailed, different testing criteria apply: ergonomic, economic, etc. Also, the presentation becomes more concrete. During periods of imaging, thinking is loose and divergent (explorative). During periods of presentation the thinking is tighter and convergent (discerning).

Thus design is an intellectual activity, driven by intuition and experience, enhanced by research and analysis. Concepts spin-off this activity as presentations which may be evaluated and tested. Testing may change the course of the imaging, leading to a second presentation, and so on. Images are invented as new knowledge combines with old to create new concepts and new insights into old concepts. Problems are found as the designer learns to see the situation clearly. Skill and experience enable the designer to articulate the image

Decision-Making

Process Implications

The essence of decision-making is one of identifying and articulating constraints and criteria imposed by the situation and reconciling these at appropriate points in the design process.



The success of the process requires efficiency of the process.

Optimization

Optimization is a result of tangible decisions made about the form throughout the design process: the transformation of programming statements (design rules and objectives). Tactics are developed in the greater contexts of purpose and strategy. Occasionally, the decisions of strategy must be challenged and impeached, as the further tactical development

identifies infeasibilities otherwise not anticipated or discernable. Thus progress evolves and revolves.

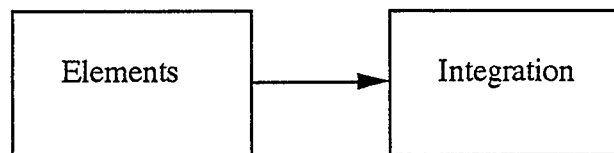
Levels of Detail

The development of artifice proceeds from a macro to micro level of detail. The efficiency of the process is driven by the skill of the designer in being able to develop all facets of the problem at the same level of detail. The energy required to advance a concept from macro to micro level, increases with detail. Thus, it is wasteful to advance parts of the concept, independently of the whole because it removes a large amount of energy required for advancement of the more general facets of the whole. In practical terms, if most of a firm's resources are allocated to technical development, marketing development may lag. The product may not be feasible, and a large amount of resources have been wasted: Expensive tactical decisions are irrelevant in a process of strategic decision-making.

Composition

Process Implications

The essence of composition is the integration of distinct components into a cohesive whole.



The success of the process depends on the cohesion developed in the whole.

Juxtaposition

Artifice is formed of elements. Some elements contribute to the satisfaction of motives and some to the structure. The inclusion of some elements precludes others, and thus the process is one of optimization. Bringing disparate elements together for some purpose is synergistic and valuable. The skill required to see the potential synergies constitutes vision.

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- ¹Christopher Lorenz. *The Design Dimension* (Oxford: Basil Blackwell, 1986) Rear Cover.
²Steven Brandt, *Entrepreneuring in Established Companies* (Dow Jones-Irwin: Illinois, 1986) 10.
³Christopher Lorenz. *The Design Dimension* (Oxford: Basil Blackwell, 1986) 8
⁴Victor Papanek, *Design for the Real World* (New York: Pantheon, 1971) 3.
⁵Theodore Leavitt, *The Marketing Imagination*. (New York: The Free Press, 1986) 138.

CHAPTER 5

Capturing the Future

THE DESIGN ENTREPRENEURSHIP INTERPRETATION

Entrepreneurship as a Design Discipline

Entrepreneurship in basic terms involves the creation of commercial entities. In many senses the object of entrepreneurship—the new venture—is a product of design.

Problem-Solving

The entrepreneurial problem is to transform an opportunity to commercial fruition. The purpose of the venture may be defined. Alternative strategies for enacting the mission may be generated and the best chosen. Plans may be drawn up and tactics devised in the same fashion.

Meaning

Meaning is created by understanding and reflecting the culture of the venture's target market, suppliers and distributors: marketing in the spirit of the marketing concept. The organization gains meaning by reflecting the culture of its leaders, managers and employees. The corporate identity conveys to everyone the values and reputation of the new venture.

Conception

The new venture is itself an invention: the creation of an entrepreneur targeted at exploiting an opportunity. The opportunity may be derived from internal capabilities and external environment. The core of value is essential to the innovation that is conceived and developed by the new venture.

Structure

The new venture develops through phases: from an abstract notion of the opportunity, through research, development, testing and launch. Meanwhile the venture attains structure as control measures are enacted, human resources added and equity developed.

Decision-Making

Ventures advance only through continuing commitment of time and money. Ventures pass through gates at which feasibility must be demonstrated.

Composition

New ventures are the product of combining a variety of resources synergistically. New technologies are combined with human and financial resources, distribution networks, product designs and strategies to form an innovation that is capable of creating wealth for both the customers of the new venture and the new venture itself.

Design as an Entrepreneurial Discipline

Industrial designers are evolving a capacity to guide and develop ideas, taking them through production and to the market:

"Unlike their predecessors, who were content simply to dictate style, contemporary industrial designers see themselves as experts who can guide the development of a product from conception through mass production. ... The new industrial designers are activists. More and more, [industrial design] consultants are being used at the strategic level."¹

Perspectives on Entrepreneurship

Limited Resources

Entrepreneurship is the practice of innovation in the context of limited resources. The entrepreneur's counterpart in an established firm that has ample development resources may be an executive. That same person acting within a firm without ample resources may be an intrapreneur. The plans, strategies and tactics may come from sources external to the executive or intrapreneur. The innovator in a new venture must operate in the style of the "renaissance man": All responsibilities of design and execution responsibilities and authorities reside within the entrepreneur or venture team.

Among the most important roles of the entrepreneur is that of sales. This skill is required in all aspects of the start-up problem: financing must be secured, customer support garnered, teams built. Selling begins with the vision of the future that the entrepreneur is trying to create. The designer creates the vision and the entrepreneur sells the vision. *Good sales skill is the first part of capturing the future.*

Risk

A state of limited resources increases the uncertainty of the venture: the firm perhaps cannot afford comprehensive technical development and testing, may have a limited market research budget or cannot support a large staff. New ventures are inherently risky; larger corporations can lower the risk by raising the development budget. To operate at a level of financing the entrepreneur would have to lose the bulk of equity. Also, the logistics of fund-raising and lack of documented venture history generally impede the entrepreneur. The problem then is to innovate with uncertainty. The designer creates the innovation with limited resources and the entrepreneur accepts the incumbent uncertainty with a vision clearly in mind. *Risk mediation and acceptance is the second part of capturing the future.*

Challenge

Uncertainty leads many times to unpleasant barriers to the innovation that must be overcome. The designer defines the challenges and the entrepreneur perseveres through those challenges with the vision as faith. *Tenacity is the third part of capturing the future.*

Dimensions of Design Entrepreneurship

Two Components of Innovation

Two components drive the process of innovation: design and entrepreneurship. When design is applied to products the result is the disciplines of industrial design, engineering and marketing. When design is applied more generally to innovation in the context of limited resources, the result is design entrepreneurship.

Many of the characteristics of innovation that are attributed to the entrepreneur (creativity, planning, etc.) may be better attributed to the unrealized designer implicit in the character of the entrepreneur (and vice versa). Most entrepreneurs probably do not realize or believe that they are designing as entrepreneurs. Entrepreneurs, designers or venture teams will perform the innovation process better if they are aware of both elements that are required. A fully developed design aspect is capable of seeing the future; a fully developed entrepreneurship aspect is capable of capturing the future. The phrase innovator is thus tantamount to the phrase design entrepreneur.

A challenge of innovation is to reconcile many disparate requirements. These disparities may be described by the following semantic differentials.

Vision/Execution

Innovation may be thought of as a process of phases. The process always begins in the present and always ends in the future. Proceeding to the future requires first a vision of that future and second the means to that future. Both aspects constitute leadership.

Vision is the product of an understanding of culture and skilled design ability; execution is the product of effort, tenacity and risk acceptance.

Flexibility/Focus

Faith in the vision drives the tenacity of entrepreneurs. Flexibility however is needed to circumvent bad judgement and venture challenges. Often flexibility and tenacity are antithetical. Failure may result if the entrepreneur holds unswervingly to a vision which is inaccurate or inappropriate. Similar results can occur if for example incorrect marketing strategy decisions are misperceived as a need for more advertising expenditures because customers are not buying. The entrepreneur must develop the judgement to know when an innovation has been misapplied and when it is very innovative and just takes time. If the design and entrepreneurship roles are sufficiently strong, they may negotiate a compromise at those times when compromise is truly appropriate.

Planning/Action

Entrepreneurs are people of action. Action is physical: making things, taking a sales trip, attending a tradeshow, fund-raising. Planning is intellectual: defining mission, strategy and tactics. Action without planning may fail; planning without action leads nowhere.

RISK MANAGEMENT

The Ramifications of Scarce Resources

Exposure and Probability

Large, established, well-financed firms devote substantial resources to lower the probability that an innovation fails. Highly rigorous research and analysis techniques provide highly confident descriptions of customers needs, competitive products and strategies, technical performance. With increasing statistical confidence and competent executives, the probability of failure may in fact be reduced. Also, larger firms have access to highly capitalized and mechanized production and distribution systems keeping costs low. Larger firms, however, are exposed to large losses should failure result. Large firms are averse to risk because of the funds locked into established structure, and the need for

fiscal responsibility to shareholders, employees and the community. Large companies avoid betting the business on speculative innovation.

Prudent Optimization

The probability that a venture fails would be 0% if the venture had perfect information. New ventures are unlikely to develop the resources capable of driving towards perfect information. Pure speculation, while driving towards low exposure, is tantamount to gambling and precludes the entrepreneur's drive to minimize risk (increase the odds). Neither strategy is really feasible: both are very risky for the new venture. Thus the essence of entrepreneurship (innovation in the context of limited resources) is optimizing resource use against the drive towards perfect information.

Design Optimization of Risk

The Compromise of Knowing and Feeling

In the new venture, the larger firm's drive for perfect information is necessarily replaced by entrepreneurial judgement and intuitive speculation. Some uncertainty replaces some exposure. The doctrine of form following function (the marketing concept, quantitative management, rationality, objectivity) drives toward 0% probability (high statistical confidence) of failure and high exposure. The doctrine of form evoking function (intuition, speculation, subjectivity) drives towards 100% probability (low statistical confidence) of failure and low exposure.

Risk management in the new venture is a process of optimizing the probability of failure with exposure. Intuition is enhanced by some research and analysis which may then lead to informed judgement rather than expensive empirical judgement or wavering speculation.

Appropriate Structuring and Decision-Making

Design decision-making may be used as a tool by entrepreneurs to achieve this optimization, by constraining the budget to contain only those items which contribute to enhancing informed judgement. In delineating which constraints are relevant at a certain phase wasteful use of time and money may be eliminated.

The process of phased-in development may be utilized to achieve appropriate structuring. With discipline the entrepreneur can maximize the performance of capital by avoiding levels of detail which are too specific to the level of thought at the time. When development

proceeds from macro to micro, strategic to tactical and abstract to concrete, then increasing energy is required. For example a prototype or feasibility study costs less to develop and is less structured (less concrete decisions having been made) than a batch production of product and a market test. Each proves something different to the entrepreneur. With a balanced approach, the market, technical, economic, product, strategic and organizational factors all advance at the same rate of structuring. If any factor outpaces another, an inordinate proportion of the critical budget has been spent too early.

The phased-in approach provides answers to the questions necessary to raise the next level of funding. Should the venture fail to answer any questions positively then the exposure has been minimized at time of abortion. The communicative ability of design presentation techniques allows investors to understand the vision proposed at each level of funding early on: they may then choose to invest if the vision is consistent with their belief. The concreteness of the presentation increases with the level of detail as more and more questions require answers.

High Performance Problem-Solving

With limited resources comes the need to be right the first time. Capital resources, customers and distributors have small tolerances for errors. By enacting a design problem-solving process, the venture may focus in on key problems, generate and evaluate more than one option for solving the problems and execute the best solution, integrating the advice of investors, distributors and customers along the way.

Meaning and Marketing Focus

To maximize the chances of successful innovation requires an accurate view of technologies, customers and economic factors and an accurate reflection of these factors into the innovation.

The marketing concept may be enhanced by the design process of creating meaning. When an innovation is meaningful to a customer (in terms of benefits and price, etc.) the probability of purchase increases and the probability of venture failure decreases.

Visionary Conception

Windows of opportunity open and close. By learning to perceive patterns in culture, forecast technological trends and social attributes, entrepreneurs may develop more ideas. The probability of having a good idea (opportunity) increases with the volume of ideas generated and thus the probability of venture failure tends to decrease.

Synergistic Composition

The concept of synergy plays a key role in optimizing risk. If synergy is created when the whole is more valuable than the sum of the parts then, the amount of resources required to innovate is less if they are brought together with synergy. Design judgement and skill lead to knowing which juxtapositions are valuable, or which resources may be left out entirely. Reducing exposure means that less fund-raising is requiring, making the venture less risky, or conversely, synergy creates resources that may be used for the drive towards more perfect information.

¹Russel, S. "Design Entrepreneurs" *Venture* (Oct 1984) 46

CHAPTER 6
Surviving the Future

THE GLOBAL ECONOMY

The New World Order

Substantial change has occurred in the world economic system over the last several decades. Increasingly, nations are confronting the realities of the global community and realizing the necessity of enhancing or maintaining international competitiveness.¹ Any nation that ignores or underestimates the international interdependence in the economic sphere will suffer considerably in terms of decreases in standard of living, employment and autonomy. Drucker characterizes this global economy by outlining three major economic changes:²

1. Primary products are being used more efficiently, and therefore increases in industrial productivity are not matched with greater demand for raw materials.
2. Industrial production and employment are no longer coupled. Increases in employment can longer be expected as a result of increased production.
3. Movements of capital (global acquisition and investment) rather than the trade of goods and services have become the major impetus of the global economy. Most profits are made in spite of no value added.

Core and Peripheral Regions

World System Theory³ explains that some regions in the world system are exploited as peripheral; some dominate as core regions. The core regions have capital and technology while the peripheral regions must sell natural resources to survive within the system. International competitiveness is important, we are no longer involved in national markets and industrial or occupational division of labour. The modern age is characterized by a division of labour; globalism takes this concept to its ultimate fruition as an international division of labour. NICs (Newly Industrializing Countries such as Korea and Mexico) that enjoy low labour rates act as manufacturing and assembly areas for companies based in other more developed areas. Some NICs are technologically truncated: professional, managerial and technical staff are held outside their own realm of control. Saavy NICs develop their own infrastructures to become developed countries in their own right.

By virtue of its technological truncation and supply of natural resources, Canada appears to be a semi-peripheral nation within the world system (semi-peripheral regions are defined as those exhibiting characteristics of core and peripheral regions). The problem arises when we look at the wealth and standard of living Canadians enjoy indicative of core regions.

Canada's participation in economic associations such as the Group of Seven, for example, belies the threat of deindustrialization imposed by the NICs. In many ways the world's prosperity sums to zero: if some countries (Germany, Japan) work the system better than others (The United States, Canada), then those others will suffer. Many powerful bureaucrats fear that Canada will begin to resemble the Third World regions unless the technological base is developed.⁴ These changes will be difficult to make because the problem is cloaked by Canada's high standard of living. In some senses Canada is like a publicly traded security with a strong balance sheet but weak fundamentals.

International Competitiveness

Competitiveness is measured using economic indicators such as exports or the trade balance, productivity rates, profit margins, real wages or standings in sectors such as high-technology⁵. All of these measures have no meaning unless considered comparatively with other countries and/or past performance.

International competitiveness is important in context of the changes in the economic system and the changes in the composition of industry that are occurring. It has been widely noted beginning with Daniel Bell's notion of the Post-Industrial Society, that the nature of industry is changing. Economic growth and employment growth is increasingly coming from the tertiary sector, replacing the previous primacy of manufacturing and resource development. "The world economy is becoming saturated with resources and low technology goods but its capacity to absorb services and high technology goods is still growing"⁶. Recognition of these changes and the ability to adjust with the changes are key to maintaining international competitiveness.

Canadian data on economic growth indicates that service and high-technology industry are the major sources of growth in Canada. Resources, as predicted have shown limited growth, but account for over 40% of the Canadian economy.⁷ Another indicator, the trade balance shows that Canada is importing and exporting more high technology goods, but the trade deficit is growing. This leads the Science Council of Canada⁸ to characterize Canada as underdeveloped in terms of industrial technology relative to the other advanced countries.

Considering other economic indicators will help to illustrate the implications of ranking poorly in international competitiveness. Since 1970, Canada has consistently had a higher

than average unemployment rate among the OECD countries. In 1982, when Canada's unemployment rate stood at 10.9%, there were only four of twenty-four OECD countries with higher unemployment (and this is a year when Canada fared better than usual relatively)⁹.

The European Management Forum annually ranks industrial countries on international competitiveness. In 1982, Canada ranked eleventh of twenty-two. This was a considerable drop from ranking sixth the year before. The Forum considers ten factors, and Canada has consistently ranked very low in four areas¹⁰:

1. Ability to adapt to new technology,
2. Efficiency of the industrial sector,
3. Focus on foreign trade and investments, and
4. Socio-political consensus.

The first three are relatively clear, but the fourth is worth discussion. In the international arena in terms of economic growth and competitiveness, the necessity for cooperation among business, government and labour is stressed. For Canada, the problem is slightly different and takes on the new dimensions of cooperation among governments and resolving regional conflict. In short, the question is, how can new technologies be developed and implemented "... in an environment of social suspicion and labour unrest"?¹¹. This is a problem that is centered on Canada's history of regionalism and uneven development.

The New Principles of Competition

Prosperity for citizens in a region will be provided by its ability to compete in the new world economy. The new world economy is described by three major global trends:

1. The post-industrial, information age.
2. Shifts in political power.
3. Globalization of markets and industries.

The Post-Industrial, Information Age

Although we live in a post-industrial age, the inherent human artifice of making things will guarantee its perpetuation. The nature of manufacturing, however has changed radically for two reasons. First, the nature of political and economic power is changing rapidly. Manufacturing dominance is being achieved by emerging third world countries which

benefit from weak currencies, foreign investment and low labour costs. Second, the application of production technologies such as CAD/CAM/CIM is translating to lower costs in developed nations.

The selection of a location for manufacturing is an economic one depending on cost and quality depending on what is being made. On cost criteria, manufacturing then becomes merely a commodity to be purchased from the lowest bidder; on quality criteria, the choice is made considering the natural strengths and expertise of the regions in which the product will be made: costs are kept down through the application of technology.

The significant commodity upon which world trade is now based is technology, whether that be information, ideas or any product of the human intellect; and this includes design in all of its forms. Superior economic performance will depend on a region's ability to develop and exploit technology in the post-industrial and global age:

"A study by Robert Lipsey for the National Bureau of Economic Research shows that a stunning 49% of U.S. multinationals' comparative advantage can be explained by how much they spend on R & D. As cheap labour floods the world from East Europe and other developing countries, a technological edge will be more vital than ever. And here again the U.S. has no monopoly on good ideas."¹²

This may mean primary scientific research and development at one end of the spectrum, and design at the other. Technologies and designs may be exported to other countries or exploited in-country depending on what makes economic and strategic sense.

Shifts in Political Power

Sweeping changes in recent years have transmuted the international system of political power. The superpowers are de-militarizing; regimes in Eastern Europe are collapsing; the Soviet Union is opening up to the world; the Pacific Rim, South America are becoming players in international trade. Formerly repressed economic states are heeding the lessons of the West's free market system, as its citizens begin to make demands for the prosperity they see through the media. Although there are pockets of military instability throughout the developing world, in general the battles countries wage on each other are economic. Countries which can harness their cultural resources are achieving substantial gains in the international forum:

"The victory of political and economic liberalism suggests the vastly greater importance of economics to world politics. Indeed the meaning of "great power" will be based increasingly on economic rather than military, territorial, or other more traditional measures of might. But the consensus that has formed around economic liberalism and market principles is only in part a victory of producers. Consumers, not producers, have the upper hand in the definition of national political goal; it is consumers...who are driving the democratic revolution...."¹³

Globalization of Markets and Industries

Barriers everywhere are falling due mostly to technological innovations in communication. Almost everyone in the world has access to images transported from every place in the world. The demand for prosperity enjoyed by developed nations is fuelling the developed nations quest for the same:

"A powerful force now drives the world toward a single converging commonality, and that force is technology. It has proletarianized communication, transport, and travel, making them easily and accessible to the world's most isolated places and impoverished multitudes. Suddenly no place and nobody is insulated from the alluring attractions of modernity. Almost everybody everywhere wants all the things they have heard about, seen or experienced via the new technological facilitators that drive their wants and wishes. And it drives these increasingly into global commonality, thus homogenizing markets everywhere.

The result is a new commercial reality--the explosive emergence of global markets for globally standardized products, gigantic world-scale markets of previously unimagined magnitudes."¹⁴

New developments in products and technology are perceived by a larger and larger proportion of the world's population simultaneously. Market segments transcend international borders allowing super-economies of scale in production and distribution. The result is preserved quality and superior, competitive prices. In goods which are not so price-sensitive and demand an emphasis on quality, production technologies such as just-in-time and flexible manufacturing are allowing diversity in product offerings, while allowing the producers to compete on cost. Computer support allows instantaneous sales feedback to guide the selection of products to be manufactured using a portion of the production capacity held back for that purpose.¹⁵

The advancement of technology is quickened as the state of the art becomes available to new product developers to build on. Development times for new products have dropped dramatically. This enables companies to respond to change quickly enabling a strong market advantage to pre-empt the competitors. Speed is enhanced by computer control throughout the development process from design, through prototyping and tooling.

THE ALBERTA CONTEXT

The Resource-based Economy

Canadians have long been known as "drawers of water and hewers of wood." A natural abundance of natural resources has supported the development of Canada as a major

economic force in global affairs, however, the economy is dangerously exposed to economic decline and unstable commodity prices. "Our abundant raw materials--wood, minerals, coal, petroleum--have made us lazy, timid, conservative to the point of idiocy." Traditionally the Canadian economy has had a trade surplus, but this belies the trade deficit we hold in manufactured goods: we buy more products from other countries than we make ourselves.¹⁶

This situation is partially explained by the colonial history of Canada. Industrial countries buy our resources and ship them back to us in the form of value-added products. As a result Canadians have not developed a strong technological infrastructure for the development of advanced industries. Post-war development of Canadian industry focused on establishing branches of large American multinationals. While this may have served to provide employment for Canadian workers, technological, managerial and professional expertise was truncated: expertise was held south of the border.¹⁷

Alberta is particularly exposed as primary and secondary industries accounted for 94% of Alberta manufacturing effort in 1988.¹⁸

Diversification is an explicit goal of the Alberta Government as outlined by Ken Broadfoot. "Excellence in new product development is critical to the province's future success." The plan of the province is to promote innovation and new product development by catalyzing diversification. In 1971, the provincial government introduced the first diversification policy, with the intention to "stop sending jobs down the pipeline". In 1976 the International Trade Program was introduced to enhance the export capabilities of Alberta business by supporting education, trade missions and export trade guarantees. During the late '70s and early '80s financing programmes were initiated such as Vencap Equities, Alberta Opportunity Company, AltaCan Telecom and various enticing tax schemes. In the mid-'80s, the province began giving loan guarantees, investing over \$235 million into tourism, forestry and advanced technology, the three explicit targets for diversification. Much of the supporting infrastructure has been developed in Alberta: the Alberta Research Council, the Alberta Microelectronic Centre, etc.¹⁹

The Small Business Sector

The logic of diversification implies a critical role for entrepreneurship. Diversification implies the creation of new and different forms of commerce on which economic activity is

based. New and different forms of commerce need to be created and this constitutes entrepreneurship.

The prime mover of entrepreneurship in Alberta is the small business²⁰ which accounts for 97% of all firms (small business are defined as having less than \$2 million per year in sales and fewer than 20 employees. A significant area of development lies in the advanced technologies.²¹ Activities in this area are poised to overtake agriculture in economic importance to the city.

Recognizing that the bulk of new entrepreneurs are inexperienced, the Province has made available a substantial support network through its departments. Support is in the form of counselling, information pamphlets, seminars and conferences.

Niches v. Mass Market Opportunity

Two types of opportunities exist for innovation: those targeted at finely defined market segments and those which enjoy large economies of scale in mass distribution. If advanced technologies are going to be a growth area, and advanced technologies tend to be specialized then, they are probably best positioned as high-quality/high-margin items.

The Provincial Department of Economic development and Trade has outlined the following strategies for working within the Alberta context:²²

1. Diversify markets by expanding into new markets with existing products (The U.S., the rest of Canada, Europe, Pacific Rim).
2. Developing niche markets in specific geographic areas.
3. Specializing production to high volume items as internal rate of return increases.
4. Reducing costs and inefficiencies to raise volumes by penetrating markets more thoroughly.
5. Attracting new investment to upgrade plants or increase marketing effort.

Other strategies may be added such as seeking powerful alliances with marketing companies of production companies that enjoy economies of scale. The alliances can be formed anywhere in the world that is most appropriate. Technologies and products may also be licenced.

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- ¹Science Council of Canada *Winning in a World Economy: University Interaction and Economic Renewal In Canada, Report 39* (Ottawa: Minister of Supply and Services, 1988) 7.
 - ²Peter Drucker "The Changed World Economy" *Foreign Affairs* 64:4, Spring, 1986
 - ³George Ritzer, *Contemporary Sociological Theory* New York: Alfred A Knopf, 1983, 162-164.
 - ⁴Interview with Alan Vanterpool, March 1991.
 - ⁵Stephen S. Cohen and John Zysman *Manufacturing Matters: The Myth of the Post-Industrial Economy* New York: Basic Books, 61.
 - ⁶Science Council of Canada *Winning in a World Economy: University Interaction and Economic Renewal In Canada, Report 39* (Ottawa: Minister of Supply and Services, 1988) 5.
 - ⁷Science Council of Canada *Winning in a World Economy: University Interaction and Economic Renewal In Canada, Report 39* (Ottawa: Minister of Supply and Services, 1988) 5.
 - ⁸Science Council of Canada *Winning in a World Economy: University Interaction and Economic Renewal In Canada, Report 39* (Ottawa: Minister of Supply and Services, 1988) 7.
 - ⁹David Wadley. *Restructuring the Regions: Analysis, Policy Model and Prognosis* Paris Organization for Economic Co-operation and Development, 1986, 21.
 - ¹⁰Science Council of Canada *Canadian Industrial Development: Some Policy Directions, Report 37* (Ottawa: Minister of Supply and Services, 1984) 7-8.
 - ¹¹Science Council of Canada *Canadian Industrial Development: Some Policy Directions, Report 37* (Ottawa: Minister of Supply and Services, 1984) 46.
 - ¹²Thomas Stewart "How to Manage in the New Era" *Fortune* (January 15, 1990) 72.
 - ¹³Francis Fukuyama, "Are We at the End of History?" *Fortune* (January 15, 1990) 78.
 - ¹⁴Theodore Levitt, *The Marketing Imagination*. (New York: The Free Press, 1986) 20.
 - ¹⁵Benetton, the Italian clothing producer withholds a portion of its production until sales has dertermined which products are selling well enough to justify further volume.
 - ¹⁶Science Council of Canada *Forging the Links: A Technological Policy for Canada, Report 29.* (Ottawa: Minister of Supply and Services, 1982) 3.
 - ¹⁷Science Council of Canada *Forging the Links: A Technological Policy for Canada, Report 29.* (Ottawa: Minister of Supply and Services, 1982) 3.
 - ¹⁸Alberta Manufacturers Index
 - ¹⁹Speech of Ken Broadfoot, June 1990.
 - ²⁰*The Big World of Small Business in Alberta* (Edmonton: Department of Economic Development and Trade) 1990.
 - ²¹Speech of Al Duerr, May 1991
 - ²²*Seizing the Opportunity* (Alberta: Economic Development and Trade, 1990) xvii.

CONCLUSION TO PART II

OPPORTUNITIES FOR FURTHER WORK

Academic Opportunities

The connection of design and entrepreneurship has been only touched lightly in this Part. Specific areas of empirical research interest are:

1. The personality and attitude similarities and differences between designers and entrepreneurs.
2. The design process and methodologies relating to innovation processes.
3. The processes of innovation and design undertaken by sophisticated versus unsophisticated entrepreneurs: success and failure factors.
4. New product anthropology as a source of opportunities.
5. Design entrepreneurship practice in other regions.

Policy Opportunities

This work is a starting point for supporting the development of policies in Alberta and other entrepreneurial regions: entrepreneurship has been acknowledged as a primer mover in economic diversification; design must also be recognized.

The province has many educational programs for entrepreneurship and design. If students are to become innovators design schools need to embroil entrepreneurial thinking into the curricula and vice versa.

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