

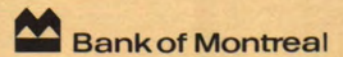
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INNOVATING FOR SUCCESS

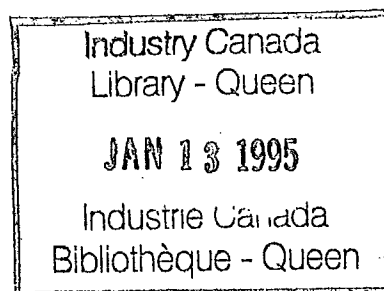
***A PRACTICAL GUIDE TO INNOVATION
FOR SMALL BUSINESSES***



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INNOVATING FOR SUCCESS
A PRACTICAL GUIDE TO INNOVATION
FOR SMALL BUSINESSES



Service Industries and Small Businesses Branch
Industry Canada
November 1994

Written for Industry Canada by Paul Tisdall and Jan Fedorowicz, Prospectus Publications Ltd.

The views expressed in this guide are not necessarily those of Industry Canada, the Government of Canada, or the sponsors.

© Minister of Supply and Services Canada 1994
Cat. No. C2-249/1994E
ISBN 0-662-22694-1
SISB PU 0023-93-01

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Aussi disponible en français sous le titre *Innover pour réussir : guide pratique à l'intention des entrepreneurs*.

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MESSAGE FROM THE MINISTER



Innovation is the key to success in today's competitive economy. This is especially important for small and medium-sized enterprises (SMEs). *Strategies for Success*,¹ a recent Statistics Canada study of 2000 businesses, shows that innovation is associated with successful and rapid growth: 55 percent of the

companies surveyed had recently introduced an innovation, and 33 percent attributed their business success directly to their innovation strategy.

Many SME owners know that they must innovate to prosper. Despite limited resources, many of them are looking for ways to improve their existing processes, products and services, or they are developing entirely new ones. At the same time, they also know that innovation does not just happen. It must be planned, prepared for and managed. The *Strategies for Success* study shows that growing firms devote considerable attention to developing the management skills required for successful innovation.

The Government of Canada understands just how important innovation is to the future health of SMEs in this country. It also recognizes that innovation can be complex, difficult and intimidating. To help the SMEs that are ready to benefit from innovation, it has prepared this practical guide to the process of identifying and introducing appropriate improvements to their products, services or internal operations.

It is not possible to provide a comprehensive description of innovation that addresses the needs of every small business. Much depends on the unique needs and capabilities of each firm. This document can present only a simplified and schematic description — a step-by-step summary — of how to approach the process. In doing so, it points to some of the “best practices” small businesses can use to manage innovation. It includes working tools in the form of practical diagnostic exercises and checklists that can be used for self-evaluation and identification of areas ripe for improvement. In addition, it contains an Annex summarizing federal sources of innovation assistance.

The federal government is committed to helping SMEs by providing them with practical planning tools. This guide is intended to help both the aspiring and the experienced small business entrepreneur address the issue of innovation. It is often said that innovation is too creative and unpredictable a process to be analyzed or managed — that innovators must rely on uncertain inspiration. However, one of the world's greatest innovators, Thomas Alva Edison, said that “genius is 1 percent inspiration and 99 percent perspiration.” This booklet offers problem-solving techniques to address that 99 percent!

A handwritten signature in dark ink, reading "John Manley".

The Honourable John Manley, PC, MP
Minister of Industry

¹ John R. Baldwin, *Strategies for Success: A Profile of Growing Small and Medium-sized Enterprises (GSMEs) in Canada* (Ottawa: Statistics Canada, 1994).

MESSAGES FROM THE SPONSORS



Success in today's marketplace is characterized by knowledgeable entrepreneurs who plan proactively, anticipate change and recognize the value and role that new technologies play as they grow and expand their businesses. The evolution of technology is spurred by ongoing research and development. However,

the real value of any technology can be measured only by the success enjoyed through its deployment.

The depth of technological advancement seems endless. New technology continues to evolve as our markets demand faster, more reliable, more accurate and less costly means to achieving desired results. These demands foster the innovative process and, as such, innovation will be a perpetual state of being in our society. To continue to successfully compete, small businesses more than ever before will need to be innovative and adopt new technologies. In short, technology must be used as a strategic tool to provide businesses with the capability to create new products and services.

Northern Telecom's focus on small businesses has led us to design telecommunication tools to address specific applications/solutions for this growing segment of the Canadian marketplace. The deployment of our communication infrastructures and applications enablers to process information through voice, data, video or computer-telephone integration can be viewed as being successful only when there is superior value to our customers.

Northern Telecom's own success is due to our continued fostering of innovation and our endless pursuit of new technology. As we look forward to our 100th anniversary in 1995, we are confident that our technologies will have sustained value for our customers.

The innovation process, while it abounds around us, is not a simple one to grasp. There are many elements to it and, to be successful, entrepreneurs must develop a disciplined approach to it.

Northern Telecom is privileged to sponsor the Industry Canada guide *Innovating for Success: A Practical Guide to Innovation for Small Businesses*, which is designed to help you approach innovation in a methodical manner. It is sure to become an indispensable reference manual for those entrepreneurs planning a practical, logical path to success.

Richard P. Faletti
President
Multimedia Communication Systems



We at Bank of Montreal believe that by its very nature — imaginative and flexible, focused and opportunistic, courageous and even outrageous at times — small business is Canada's key to success in the 21st century.

So we have committed ourselves to the success of small business — a commitment, I can say without exaggeration, that has already produced fundamental changes in the way we do business.

We are rapidly redesigning ourselves into an utterly customer-driven organization, no longer just a place for seeking loans and making deposits, but a place for getting hands-on help, understanding and guidance.

That hands-on help will be provided by Bank of Montreal people well trained in the necessary skills — including one for fostering a sense of partnership with our customers.

One of the Bank's key roles in these virtual partnerships will be to put the customer in touch with other possible sources of assistance and opportunity, including self-help networks, government incentive programs, private lenders and other business professionals.

By autumn 1994, when this message was written, we already had strong indications that our new way of doing business works. The evidence was provided by our Transforming Economy Lending Program.

This is a program specially crafted to meet the needs of tomorrow's big employers and wealth-creators — the knowledge-based small companies that are such important players in Canada's transforming economy.

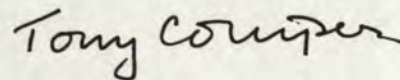
In short, we appear to have found a way to enable our account managers to provide financing to companies which, for lack of the traditional tangible assets for collateral, would have been turned down in the past; and do so at no added risk.

By mid-1994, our Transforming Economy Lending Program was available in 10 Bank of Montreal Innovation and Technology Centres across Canada — Vancouver, Calgary, Winnipeg, London, Kitchener-Waterloo-Cambridge, Mississauga, Markham, Ottawa, Montreal and Halifax — with others slated to open in the near future.

As customers will soon discover, these centres are staffed by intensively trained teams of account managers who understand the spirit of the program as clearly as the substance.

We are doing all these things — just as we are participating in the sponsorship of this particularly useful book — because we know small business is *good* business. And, with all of us working together this way, the business of small business is going to get better and better.

And in the process, so will Canada's future.



Anthony Comper
President

WHAT IS INNOVATION?

The real test of an innovation is not its novelty, its technology or its cleverness; it is whether or not it adds or creates significant value for customers.

A business innovation is a new or improved process, product or service. Innovation applies as much to the way in which a company does business as to what it offers its customers. It can affect any aspect of a business's operations: technology, financial operations, research and development, manufacturing processes, marketing techniques, supply network, distribution channels or after-sales service activities. To be truly effective, an improvement in any of these areas does not stand alone. It is integrated into a total package focused on the customer.

Processes: Just-in-time (JIT) techniques are process innovations that enable companies to save time and money. Similarly, electronic data interchange allows for better control over the flow of information while reducing the need for a paper trail.

Products: VCRs, microwave ovens, personal computers and fax machines are new products that proliferated in the 1980s because they performed valuable new functions. No less successful as innovations are replacement products such as dual-blade safety razors and radial tires, which improve on existing functions by being more efficient, more reliable, lower priced, etc.

Services: Recent service innovations include automated banking machines, home-based shopping channels on television, personal pagers and telephone service enhancements such as call forward, call waiting and call identification. Existing services have also been enhanced through innovation. For example, specialized firms deliver meals from a wide variety of elegant restaurants, thus giving traditional take-out food a "gourmet" spin.

Some innovations give a company a short-term advantage only. For example, a company can capture market share by being first with a new product, service or process. But unless it can turn that innovation into a **sustainable** competitive advantage, it will not stay ahead of competitors for long. Making it sustainable may involve expanding the scope of a company's operations, adopting a program of continuous improvement or registering and enforcing patent rights. Whatever the strategy, it involves a recognition of the fact that innovation is only part of what it takes to succeed in business.

THE FOUR DS OF INNOVATION: DEFINE, DESIGN, DEVELOP, DEPLOY

Overview of the Four Ds

Small businesses today must keep up with an economy in which change is constant and unrelenting in every field — in markets, processes, products, services, competition and government regulation. To exploit change and turn it to competitive advantage, your company must improve and transform itself continuously. It must **innovate**. “Get better or get beaten” has become the cardinal rule of business. It is a dynamic process involving scientific discovery, applied research, development, production, marketing and sales.

Most small firms now recognize that success depends on the way they structure themselves to take advantage of their creativity and manage innovation. This section of the guide outlines a framework that can help ensure sound decision making. It presents a model for understanding and managing innovation that divides it into four phases: **define, design, develop and deploy** — the “Four Ds.”

The model slices innovation into logical, sequential stages, each of which marks a major milestone and decision point.

Every innovation project necessarily involves these four key functions, regardless of whether the focus is on the implementation of new processes, the development of new or improved products or the introduction of new services.

Each of the four parts of the innovation cycle represents a different *type of activity*. It also marks a *major escalation in investment* and an increase in the commitment of time and resources to the proposed innovation.

Your company can hold reviews after each of the four parts. These reviews give you an opportunity to assess the progress of the innovation, compare costs with expected benefits and make judgments about the future of the project.

THE FOUR DS OF INNOVATION — AS SIMPLE AS BAKING A CAKE

The Four Ds can be used to guide the innovation process in any type of company. Take, for instance, a simple example of a bakery developing a new type of cake.

The first thing the bakery owners do is **define** their innovation. They look for market needs that are not being met, particularly ones that their company is better positioned to meet than competitors. For example, if the bakery has an established client base of people in their sixties, it may capitalize on this by developing a new cake specifically for retirement parties.

Once the bakery has defined a winning concept, it needs to **design** the innovation. This involves more than merely specifying a recipe for the new cake. It also includes the way the bakery can profitably make, distribute, price and market it. For example, it may decide that the recipe should be low-fat and low-calorie to appeal to health-conscious seniors. For distribution and marketing, the bakery may link up with a caterer specializing in retirement parties.

After designing the innovation, the bakery needs to **develop** it. This involves testing and refining not only the recipe, but also all other aspects including the manufacturing process and marketing. During the development phase, the bakery may supply the cake free to several retirement parties to test it and obtain customer reaction.

If, after testing, the bakery is satisfied it has a winner, it will launch the product and **deploy** all aspects of the business from manufacturing through distribution and marketing.

This example, simple as it is, illustrates how the Four Ds are stages that every innovating organization needs to perform well. The same stages are required whether the innovation involves a new cake or a rocket to the moon.

Some innovations will be stopped at one of these review points. A company that relies on continuous innovation to ensure that its business remains fresh and growing will normally originate many more process, product and service ideas than it will ever bring to completion. Many more innovations will enter the **define** stage than will actually end up being **deployed**.

Each of the Four Ds is described in detail in the following sections of this guide. Table 1 presents the Four Ds in summary form. For each of the four stages in the innovation process, the table includes:

- a **goal**
- the **actions** you need to take
- the **documents** you need to produce.

Documenting your innovation need not be an elaborate exercise, but it is absolutely necessary for two reasons. First, it will help guide your internal processes. It will let you know exactly what needs to be done, when you should do it and where you will be headed next. Second, a plan is absolutely essential if you are seeking external financing. A lender or investor will typically demand some description of what you propose together with an analysis of what it will cost and what benefits it will likely bring.

Experience suggests that without a plan, innovators are more likely to delude themselves about the prospects for their innovation. Setting down a fact-based analysis of the innovation makes it far more difficult to indulge in unrealistic optimism.

Table 1 may look complicated but it isn't. Many of the activities it outlines would be intuitive to seasoned entrepreneurs. By bringing them together in this way, however, you have a "map" you can easily follow during the innovation process.

Table 1 — Outline of the Four Ds

	DEFINE	DESIGN	DEVELOP	DEPLOY
Goal	<ul style="list-style-type: none"> • identify a business opportunity • describe a concept that capitalizes on it 	<ul style="list-style-type: none"> • design the new or improved process, product or service, as well as all supporting elements from production through sales 	<ul style="list-style-type: none"> • test to determine whether the innovation business plans formulated during design can be profitably realized in practice 	<ul style="list-style-type: none"> • scale up the innovation to full business operation
Action Items	<ul style="list-style-type: none"> • evaluate your strengths and weaknesses • identify customer needs and opportunities for providing added value • develop an innovation concept 	<ul style="list-style-type: none"> • conduct market, technology, process, legal and resources research • based on this, develop a detailed innovation plan 	<ul style="list-style-type: none"> • conduct a comprehensive prototyping, lab testing and field trial program of all aspects of the proposed innovation 	<ul style="list-style-type: none"> • put all the systems required for the innovation into operation — manufacturing, marketing, distribution, sales, service, training, etc.
Documentation Required	Innovation Concept Outline	Draft Innovation Plan	Revised Innovation Plan	

THE FIRST D: DEFINE

The Goal of Definition

The definition stage is the most critical part of the innovation cycle. The goals of **definition** are to identify a business opportunity and to describe an innovation that capitalizes on that opportunity.

The amount of effort you should put into definition depends on the risks and potential rewards you see arising from the innovation. A good first step is to evaluate your company's own **internal** innovation potential relative to that of competitors. This will give you a sense of just how much innovation you can hope to tackle successfully.

REASONS FOR PLANNING

Many small businesses do not have a plan. They operate on a hit-and-miss basis, responding passively to one challenge after another. Such businesses can be successful, but their success comes at an unnecessarily high price.

Businesses with a plan know where they are going and when they are likely to achieve their objectives. Instead of reacting to challenges, they set the agenda, using the plan to identify likely threats and possible responses before they meet a crisis.

An innovation plan can be thought of as a subset of your company's business plan. It consists of some of the same elements as the larger plan, but focuses on a description of the innovation and explains why it is desirable, how it will be implemented, what it will cost and what benefits it will promote. Some companies may even include several distinct innovation plans in their overall business plan, depending on the nature and extent of the improvements they intend to make.

The innovation plan need not be complex or elaborate. It should, however, be clear and well integrated into your company's larger strategy.

Evaluate Your Strengths and Weaknesses
Determine Customer Needs
Identify an Innovation Opportunity
Match Internal Strengths with
External Opportunities
Write an Innovation Concept Outline

At that point, you can move on to identifying attractive **external** opportunities that are matched to your own **internal** capabilities. Your company should look for areas where customers might demand new or improved products and services or where its ability to serve customers can be significantly improved by new manufacturing processes or management techniques.

This type of analysis is sometimes referred to as **SWOT**, which stands for Strengths, Weaknesses, Opportunities and Threats. Strengths and weaknesses are key internal success factors and might include personnel, distribution, promotion, pricing, technological capabilities and management. Opportunities and threats are **external** factors such as the economy, competition, marketplace trends and new legislation.

Evaluate Your Strengths and Weaknesses

Successful innovation calls for a combination of creativity, common sense and knowledge. It needs a vision and the determination to see it through to realization. And it takes a commitment of time, energy and resources, a willingness to take calculated risks and an aptitude for problem solving.

Most successful innovations arise from those features that are unique to an entrepreneur or a small business. Since your own and your company's strengths and weaknesses will affect your ability to innovate successfully, it is important that you examine them first.

Self-Evaluation: Identify Your Strengths and Weaknesses

To begin the innovation process, identify your company's strengths and weaknesses. Consider the following questions in relation to the selected corporate attributes. Set realistic targets for making the best use of your assets.

Internal skill base
Technology (proprietary or purchased)
Existing plant and equipment
Unique processes or patents
Size
Flexibility
Service standards
Financial positions (debts and assets)
Position in marketplace
Name or brand recognition by customers
Reputation
Other (define)

Which attributes
are positive strengths
for your company?

Which are weaknesses?

Which are suitable
areas for innovation?

Which can be used
as resources
to facilitate innovation?

Determine Customer Needs

After assessing your innovation potential, look at existing and potential customers to see which of their needs are not being met. Then explore ways your company can leverage its strengths or take advantage of competitors' weaknesses to exploit such opportunities. The point is to define a business opportunity where market trends, competitive circumstances and your company's internal capabilities coincide.

Typically you will generate many more bad ideas than good ones. The definition stage is a filter for selecting the few potentially profitable business ideas you want to focus on. You should therefore spend relatively little time and money on this stage of the process.

To innovate successfully, you should have a clear idea of who your customers really are. For example, manufacturers of toys are unlikely to sell directly to children. They are more likely to sell to distributors or retail chains. In such a case, there are three customers for the product: the distributor (who cares about timely and reliable deliveries, price and terms of sale), the parents of the children (who care about safety, educational value and price) and the children (who care about fun). Each of these are customers for the product, and the successful innovation must address each of their concerns.

To identify new business opportunities in the definition stage, use your own knowledge and that of your employees, associates, suppliers and customers. There is no need to undertake costly and time-consuming original research at this stage.

Your own employees — particularly those who interact directly with customers — are excellent sources of new product and service ideas. Front-line employees such as sales personnel often have valuable insights into customer needs that can be turned into improved processes, products and services.

Self-Evaluation: Who Are Your Customers? What Do They Care About?

Next, identify the characteristics of your business that interest your existing or potential customers. This will help you highlight areas where you might modify your business in order to improve your service to them.

In the first column, check off the characteristics that describe your own company's offerings. Then indicate which ones your customers care about.

Note that your customers may have differing views depending on whether they are:

- agents, distributors, retailers, other intermediaries
- end users, consumers
- other companies
- governments and institutions.

Attempt to rank the characteristics in order of importance to your customers.

Now review your responses and target areas for introducing innovation. Can you think of innovations that might influence your company's ability to deliver each requirement to customers?

	Important to firm	Important to customers	Customer type	Rank
Quality:				
• function				
• reliability				
• durability				
• safety				
• technical design				
• visual appeal				
• ease of use (user friendliness)				
Price:				
• lowest possible price				
• competitive price per function				
• low maintenance costs				
Timeliness:				
• ahead of the competition				
• behind the leader but with a proven offering				
• delivered when and as needed				
Responsiveness:				
• flexibility in payment terms and conditions				
• delivery and credit				
• ongoing consultation with customer				
• product/service modification or customization				
Service:				
• installation				
• after-sales service				
• return policy				
• warranty				
• ongoing relationship and technical advice				
• add-ons, innovations				
• serviceability				

INNOVATION DOES NOT DEPEND ON TECHNOLOGY

Alive & Well of Markham, Ontario, is a women's clothing discounter that has won several awards for innovation and excellence.

Its success lies with a commitment to treating customers not only with respect but also with kindness and humour. That's why the store offers complementary coffee, tea, mineral water or juice to its clients. It also has five vibrating "massage chairs" for tired shoppers and a children's play area complete with toys and videos. In addition, Alive & Well encourages women to take an unlimited number of garments into one of 50 mirror-equipped change rooms where they can view their fittings in privacy.

Alive & Well also has an in-store gazebo where community groups can hold charitable events at no cost. In addition, the company collects used winter coats from its customers, dry-cleans and mends them at its own expense, and then delivers them to women's shelters and inner city schools.

As company president and owner Donald Cooper says, "Alive & Well is passionately committed to treating their customers with trust, dignity, respect, joy and understanding. These are the fundamentals of building relationships with people."

Informal research with so-called "lead customers" or "lead users" can also be enlightening. Lead customers are your most demanding and sophisticated clients. Often they will have excellent ideas for improvements. And lead customers can do more than just give you ideas. If they depend on your product or service to enhance their own competitiveness, they may be willing to participate in the whole innovation process, for example, by serving as a test site for prototypes. Continuous communication with lead users is also valuable in tracking changing markets.

However, important as it is, a good reading of customers is not enough. The definition stage requires the full development of the concept including a demonstration that it is feasible and that it will make a significant positive difference to the way customers see your company.

Identify an Innovation Opportunity

Evaluation of your company may suggest weaknesses that need improvement or strengths that can be leveraged through innovation. Evaluation of customer values may identify needs that your company is not addressing adequately. Both of these have innovation **potential** that can be turned into an innovation **opportunity**.

Identifying an innovation opportunity means targeting process improvements, developing new or improved products or enhancing service offerings in areas that can significantly improve business performance. Performance improvements can be measured in terms of:

- developing an ability to serve more customers or to serve existing customers better
- addressing a larger market
- capturing market share
- addressing new markets (e.g. exporting)
- increasing revenues
- improving the bottom line of your firm's financial sheet.

USING PERSONAL EXPERIENCES

Wendy Murphy has based a successful innovation and a new business on personal observation. The research technician from Toronto's Hospital for Sick Children watched the evacuation of babies from a hospital destroyed by the Mexican earthquake of 1985, and was struck by the lack of proper stretchers. In response, she designed the Weevac 6 specifically for infants. The Weevac has three expandable "pockets," each of which can hold two infants. The stretcher is made of mylar laminated vinyl, which is waterproof, on a lightweight aluminum frame. The infants are secured by adjustable Velcro straps. The infants are kept warm, dry and secure during transport in the Weevac 6, which can easily be handled by two nurses. As a result, the innovation received the National Research Council of Canada's 75th Anniversary Award for Innovative Health Care Product Design, the Alberta Manning Award's \$5 000 for Innovation and the Ontario-based ORTECH International's 1992 Sir Joseph Flavelle Award.

Ideally, you should target an area where there are likely to be many customers interested in the improvement but few competitors with a similar offering. There are four broad areas where you might look for opportunities:

- changes in markets
- emergence of new technologies
- political, legal or regulatory changes
- emergence of new business systems and processes.

Changes in Markets

When markets change, they frequently open up opportunities. Because small businesses tend to be closer to customers and faster to change than large firms, they can often be the first to develop processes, products and services to address new market niches. By anticipating market trends and understanding how they work, you can target your innovations to take advantage of them.

Short-term market changes occur constantly. Fashions change and hot new fads seize the imagination — hemlines go up or down, “rap” music gives way to “grunge,” ties become wider or narrower, and “pet rocks” become an instant craze. It can be profitable for your company to ride such waves — at least for the short time the craze lasts — if you have correctly anticipated it.

Another type of short-term market change is driven by economic cycles. Canada has weathered several recessions in the past few decades, each of which was marked by increases in unemployment and falling consumer demand. Such recessions typically last only a year or two, and they affect different parts of the economy in different ways. For example, the onset of a recession is marked by a decline in consumer spending on durables such as houses, cars or large appliances. If you are in this type of business, you will be hit hard. Spending on goods or services that are perceived as daily necessities (food, clothing) is not as likely to be affected. If you think a recession is coming, are there innovations you can introduce that will help you weather the downturn or take advantage of bargains as other companies reduce their inventories?

Underlying short-term changes in the market are *longer-term market trends*. On the basis of the most recent recession, it is arguable that Canada is experiencing a longer-term transition that will result in a fundamentally different kind of economy. For example, one observable long-term trend involves the shift toward services, especially those revolving around the creation and management of information. In this case, how can you use innovation to increase the knowledge intensity of your business?

Beyond economic cycles, however, there are other fundamental influences on the marketplace. In Canada, one important reality that defines major long-term market trends is the baby-boom population bulge. This country experienced the largest postwar baby boom in the world. Nearly seven million Canadians were born in the 15 years between 1951 and 1966. Since then, the birth rate has fallen sharply. And Canada’s low birth rate has combined with relatively low levels of net immigration to produce a slow-growing, aging population. This may be significant if your product or service addresses a particular age group. It can also inspire innovations that address the particular needs of the baby-boom generation at different points in its life cycle.

A second significant market change in Canada is the rapid entry of women into the paid work force. Today, the majority of working-age women are employed outside the home. At the same time, the income women earn continues to lag behind that of men. This trend might be important if you are in a business that caters to women or that targets the lifestyles of Canadian families.

A third significant market change involves the increasing diversity of Canadian society. The sources of immigration to Canada are changing as a larger share of newcomers originate outside Europe. Not only does cultural diversity have an impact on tastes and preferences (stimulating an interest in different types of food, for example) but also it has given rise to several culturally distinctive target markets for certain types of products or services.

Another significant long-term structural change is globalization of markets. Driven by improvements in transportation and communications and by a worldwide acceptance of free-market capitalism, today’s international economy is characterized by the breakdown of national/regional market systems and the emergence of global markets. The traditional distinction between domestic and foreign markets has been significantly eroded.

As a result, the international marketplace is a growing source of business, not only for the large multinational and transnational firms that have traditionally dominated trade, but also for smaller firms that in the past have been reluctant exporters.

There are growing opportunities in the global marketplace for innovative small Canadian firms. Some participate by serving as suppliers to larger companies. Others develop unique niches that can include anything from customized software to distinctive, high-value-added business services. Still others enter the international marketplace by forging innovative alliances and foreign partnerships to perform joint R&D, to improve product delivery, to offer new services or to serve new markets.

POSSIBLE STRATEGIC RESPONSES TO MARKET TRENDS

Knowledge Economy: Look for service-oriented, knowledge-intensive innovations. Consider ways of leveraging information and communication technologies. Stay lean and look for business in areas where you can take advantage of flexibility, using strategic alliances and business networks to achieve critical mass when it is needed.

Aging Baby Boomers: As baby boomers get older and more financially secure, the next few decades will see a wave of increasing demand for recreational goods and services, financial and investment services, health care products (eyeglasses, pharmaceuticals) and goods and services associated with preparation for retirement. Your company might be able to use innovation to satisfy a need in one of these areas.

Women in the Paid Labour Force: With fewer women staying at home, there has been a surge in demand for house-cleaning services, convenience and fast foods, child care, time-saving appliances like microwaves, second cars and workplace fashions. Your company might identify innovative goods or services that can address the changing roles of women and family life.

Ethnocultural Diversity: Cultural diversity presents new opportunities in areas such as food processing, the hospitality industry, tourism, cross-cultural education, language instruction and the media. Companies can identify and address specific ethnic markets or they can use innovation to address some of the needs created by the fact of diversity.

Globalization: Your company might try to develop products and services for a foreign market, starting perhaps with the United States as the easiest and most familiar target. Alternatively, you could develop a close relationship as a supplier to a larger exporting company, using innovation to satisfy its requirements.

Self-Evaluation: How Do Changes in the Market Affect Your Business?

One avenue to successful and sustainable innovation lies in riding the waves of change in the marketplace. In trying to identify a possible innovation, consider the following questions.

Market Definition

What market do you currently serve?

How large is it?

What share do you have?

Is your target market growing or contracting?

Is your share growing or contracting?

Profile of End Users (see box on page 5)

How much disposable income do the end users of your products or services have?

Is their income rising or falling?

Profile of Buyers (if different from end users)

Who are the buyers of your products or services?

What factors influence their purchasing decisions?

Market Forces

Which of the following forces affect your market and how?

- fads and fashions
- economic cycles
- demographic changes
- social changes
- globalization
- other

How do such changes affect your existing markets and demand for your product or service?

Are markets opening up or disappearing as a result?

Strategic Response

How can you better serve your existing market?

How can you develop new markets?

What do you need to change inside your company to accomplish one or both of the previous objectives?

- improve the existing product or service
- develop a new product or service
- address internal operations and processes
- improve delivery
- review marketing techniques
- enhance after-sales service
- other

Emergence of New Technologies

Technological change and the emergence of new technologies are major sources of innovation opportunity. Unfortunately, overuse has made the word technology intimidating to many small businesses. In fact, technology is nothing more than the tools we use to do what needs doing. A wheel or a hammer are technologies, although we no longer think of them as such because we take them for granted. We tend to apply the word *technology* to new and far more complex tools, but they are still tools just the same. For example, technology has been defined as *the engineering and scientific skills or disciplines that are applied to a particular product or service to address a specific market need*. In other words, technology is what we need to make a product or deliver a service that customers will buy.

Some companies are in the toolmaking business. The focus of activities in a high-tech firm is to find new technologies, since that company depends on developing and commercializing new technologies that can be used by other companies. But technology-producing firms account for only a small percentage of Canada's companies. The real importance of technology lies in its broad application to improving the performance of small businesses throughout the economy. In that sense, technology is relevant not only in high-tech industries but also in low-tech industries such as restaurants or mature industries such as furniture manufacturing.

Most small businesses will not develop their own new technologies. Virtually all of them, however, can benefit from the application of appropriate technologies to their business operations. This is especially true in the case of information technologies such as computing and telecommunications.

As the example of IATCO illustrates (see box below), small business operators who do not employ much technical wizardry can still wield technology effectively. Although they may not be technology leaders, small businesses need to monitor developments in technologies that may be applicable to their businesses. They should also be ready to adopt appropriate technologies when costs are justified and when the technologies can significantly enhance their businesses.

RECOGNIZING A MARKET OPPORTUNITY

IATCO Industries Inc. of Mississauga, Ontario, recognized a business opportunity when it saw it. The company was formed in 1989 by Canadian business people who acquired patent rights to develop a unique and innovative tire product for the North American market. Because the product added value to the customer in so many different ways — lower cost, convenience, better traction, improved comfort and environmental friendliness — it established itself in the marketplace despite a recession.

IATCO makes and markets non-pneumatic, hollow segment tires, the first major innovation in the tire industry since radials. IATCO's tires are designed for construction machinery and off-road vehicles. Because each segment bolts directly to a rim, damaged segments can be replaced without removing the whole tire. In addition, installation and removal can be done without specialized equipment.

IATCO tires, marketed under the name AirBoss, give better traction than foam-filled or solid tires and provide greater comfort for machinery operators, as most equipment designed for off-road work has a fixed suspension. AirBoss tires are puncture-proof. The tires, which cost less than most other non-pneumatic tires, significantly cut the cost of replacing and maintaining wheels, tires and tracks, the second-largest vehicle operating expense after fuels. Because only damaged tire parts need replacing, the AirBoss is more environmentally friendly than conventional tires. Segments are homogeneous, which mean that when they wear out, they are easily recycled.

Company president Robert L. Hagerman says, "The company has managed to develop and successfully launch its products during a period of extreme economic difficulty in North America. This was particularly true in the construction industry, which was our primary target market. The fact that it has been done successfully is a tribute to the innovativeness of our engineering groups, who have, quite simply, developed a better product."

Self-Evaluation: How Can Your Company Apply Technology?

For most small businesses, a key innovation issue is not how to develop new technologies but how to apply the technologies developed by others. To do that successfully, you must first have a clear idea of what the technology is for.

Which objectives are relevant for your company's operations?

To Improve Operations:

- reduce costs
- improve efficiency
- enhance internal information flow
- acquire competitor intelligence
- upgrade information systems
- improve internal and external communications
- enhance organizational flexibility
- decrease production cycle times
- extend management control
- improve marketing efforts/customer contact

To Improve Existing Products:

- lower the cost
- prolong useful life
- improve reliability
- enhance performance
- reduce defects
- shorten delivery times
- facilitate maintenance
- improve after-sales service/customer contact

To Enhance Delivery of Existing Services:

- speed turnaround
- offer more complete service
- stay closer to customers and their requirements
- reduce costs/overruns

To Offer New Products:

- add new functions and features
- raise quality
- be first to market

To Offer New Services:

- enter new business areas
- offer more comprehensive service packages
- deliver anywhere, anytime
- be first to market

To Sell Technology to Customers:

- adapt customized process technology used in own operations for use by others
- develop technology on contract for others
- develop technology "on spec" for later commercialization

The profile you indicate above will shape the type of technology you should look for, where you can acquire it and how you will have to adapt it for your own use or for use by others. Resolving such issues is part of the **design** and **development** stages of the innovation process (see following sections of this guide).

Political, Legal or Regulatory Changes

Changes in the political, legal and regulatory framework provide a third important source of innovation opportunity. Such changes are occurring at a rapid and accelerating pace, reflecting an underlying global shift in favour of free-market economies. Indeed, today's economy is characterized by the breakup of old mass-production systems and centrally planned economies in favour of worldwide open markets. Free markets are gaining ground in former communist states such as Russia and even in nominally communist states such as China.

With the opening of international markets and the consequent growth in international trade and commerce, governments are pursuing framework policies that will enhance the competitiveness of their industries. Some of the most widely used measures are regulatory reform, privatization and domestic market liberalization. At the same time, governments are moving to reduce barriers to international trade. Among the most important of these trade initiatives are embedded in the General Agreement on Tariffs and Trade, the emergence of the European Community, and the signing of the Canada-U.S. Free Trade Agreement and the North American Free Trade Agreement.

The regulatory environment is also being transformed by concerns over health, safety, technical standards and environmental degradation. Various levels of governments are introducing measures to set stricter standards for product safety, ingredients, truthful advertising and pollution abatement. Companies anticipating such concerns can be first to market with products addressing health issues or responding to environmental concerns.

Private companies and business associations are also influencing the business environment through self-regulation or the development of new standards. For example, ISO 9000 is a worldwide private sector initiative sponsored by the International Organization for Standardization to define new quality standards for companies and to develop certification mechanisms identifying companies that comply with those standards.

Entrepreneurs who follow and anticipate these changes in the political, legal and regulatory framework can avoid being blindsided by the sudden appearance of new competitive conditions. At the same time, they can identify new market opportunities. If they move quickly to capitalize on them with new products and services, they can establish their presence in a new market and become very difficult for competitors to dislodge.

ANTICIPATING CHANGING STANDARDS

Enermodal Engineering Limited of Waterloo, Ontario, won the 1991 Innovation Award given by the Canada Awards for Business Excellence (CABE) because it anticipated the emerging market demand for energy-efficient homes. Enermodal specializes in the design of energy-efficient heating and cooling systems for buildings. It won the 1991 CABE for development of FRAME, a computer program that allows users to determine heat loss and energy efficiency in window frames. FRAME is the only program approved by Canadian and U.S. authorities for rating the thermal performance of window framing systems.

Company president Stephen Carpenter attributes its success to two factors: "The first involved identifying a need and developing a world-class product to meet that need, in this case, the FRAME program. The second was making the world aware of the product, in this case, by participating in standards development in Canada and the U.S. and by hosting seminars around the world."

The Canadian telecommunications service sector provides an excellent example. Because of regulatory changes, companies can now compete for growing markets in long-distance and cellular services. Most people are aware of the big players in these markets — Unitel Communications Inc. and Stentor Canadian Network Management in long distance, Bell Canada and Rogers Cantel Mobil Inc. in cellular. Few realize that, within the past several years, regulatory change has spawned the creation of some 80 small and medium-sized businesses in the Canadian long-distance resale market alone. Many of the small telecommunications service resellers who moved rapidly to capitalize on this new market opportunity have grown quickly and have chalked up impressive profits.

Self-Evaluation: How Does the Regulatory Environment Affect Your Business?

The regulatory environment affecting your business is being influenced simultaneously by a global trend to deregulation and market liberalization and by regulatory responses to concerns about health, safety and the environment. Such changes offer innovation opportunities for those who understand regulatory trends.

Which of the following types of regulation apply to your business?

- new tax rules
- foreign tariffs (exporters)
- import duties (importers)
- consumer protection regulations
- health standards
- safety standards
- technical standards
- environmental legislation
- market management regulations
- copyright, protection of intellectual property
- other

Do you know where you can find out more about changes to these regulations?

How should your business move to anticipate these changes? (E.g. modify existing offerings to conform, or create new offerings that anticipate change.)

How can you develop a competitive advantage by anticipating regulatory change faster than your competitors? (E.g. produce environmentally friendly products faster than the competition, or comply with ISO standards before others do.)

Emergence of New Business Systems and Processes

Changes in business practices and techniques offer a fourth source of innovation opportunity. Today's economy is characterized by an entirely new approach to business. This approach is accompanied by new systems and processes that can make a business more productive and profitable or ensure that its products and services are more satisfying to customers.

At the heart of the new approach is an unrelenting emphasis on continuous improvement or incremental innovation. However, the new approach includes a number of additional characteristics. Taken one at a time, none of these features is new or innovative. But taken together, they add up to a revolutionary new way of doing business.

This new approach includes the following features:

- a customer-focused organization
- the use of total quality control/management (TQC/TQM)
- intensive collaboration with other companies as well as networking with customers and suppliers
- concurrent engineering in which different parts of the engineering process are performed simultaneously
- work force empowerment
- cross-functional work teams
- a flattening of the managerial hierarchy
- just-in-time supply systems
- contracting-out of all but core value-adding activities
- a total product life cycle design philosophy.

In combination, these features allow businesses to deliver a continuously expanding and improving range of high-quality, low-cost products and services to market quickly. Thus, the products and services of companies that employ the new approach are both more satisfying to customers and more profitable to the business itself.

Changes or Discontinuities Create the Best Innovation Opportunities

In business, as in warfare, the element of surprise is critical to success. Both seasoned generals and experienced entrepreneurs look for unexpected new conditions and exploit these to gain a competitive advantage. Thus, an innovative technology like the jet aircraft can revolutionize both warfare and civilian transport.

A useful tool in the search for discontinuities and innovation opportunities is the idea of the S-curve, which is shaped like the letter from which it draws its name (see Figure 1). The S-curve is a graph of the relationship between the effort put into developing a new product, service or process and the payback from that investment.

Initially, as funds are invested in developing an innovation, progress is very slow (the section of the curve labelled "a"). Then, the returns from the investment accelerate and there is a dramatic increase in performance, sales and profitability (labelled "b" in the figure). Finally, returns on investment trail off as market saturation and the limits of progress are reached (labelled "c").

Self-Evaluation: What Operational Innovations Are Relevant to Your Business?

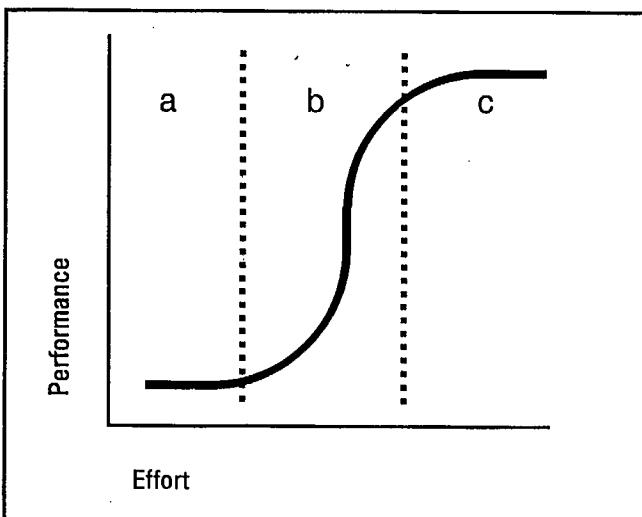
Businesses that can implement the new management techniques creatively have clear competitive advantages over firms that cling to outdated methods. Consider the following questions in relation to the new management and production approaches.

	Continuous improvement	Customer focus	TQC/TQM	Partnering	Concurrent engineering	Work force empowerment	Cross-functional work	Flattened hierarchy	JIT supply systems	Subcontracting	Design philosophy
Which approaches can provide your firm with a competitive advantage?											
Which can be implemented in your company?											
Which can offer the best potential of cost/benefit results for your company's operations?											

As an innovation begins to run out of steam, the entrepreneurs should start searching for the next discontinuity and the next opportunity. The key is to know how to apply the S-curve. Fortunately, there are a few guidelines that can help.

Physical Limits: Processes and technologies mature as they approach their physical limits. For example, the laws of physics dictate a limit to the volume of information that can be carried over copper wire. As copper-based technology approaches those limits, researchers look for other technologies, such as optical fibre, that embody higher physical thresholds. The closer an innovation is to its physical limits, the more mature (farther along the S-curve) it is.

Figure 1 — S-Curve



Degree of Uncertainty: Relatively recent innovations have a high degree of uncertainty associated with them. The degree of uncertainty and effervescence in a business is a good indicator of whether or not there are still opportunities to be identified. Stable and predictable businesses are also likely to be mature businesses in which new opportunities are few and far between.

Level of Business Interest and Activity: Business investment in product development activity is highest in relatively new innovations. Technologies or innovations far along the S-curve attract little such interest.

Breadth of Potential Applications: Innovations that are still at an early phase along the S-curve may have a wide range of potential applications. If there are relatively few possible applications for an innovation, this is a sign that it has already matured.

Nature of Effort Needed for Further Progress: For new products or processes, progress is largely determined by work on basic performance characteristics. For mature innovations, the focus of effort shifts to specific applications and incremental improvements.

Availability: Anything new is generally restricted in its availability. The fact that “everyone has it” may be a sign of maturity and restricted opportunity for further development.

You can use these characteristics as a way of testing where along the S-curve a given innovation is likely to be located. If your analysis situates it in the “a” zone, be warned that considerable development work is still needed before a payoff. If it is situated in the “c” zone, there may not be enough life left in the cycle to justify the time and effort to develop it further. If it is in the “b” zone, however, it is ripe for exploitation.

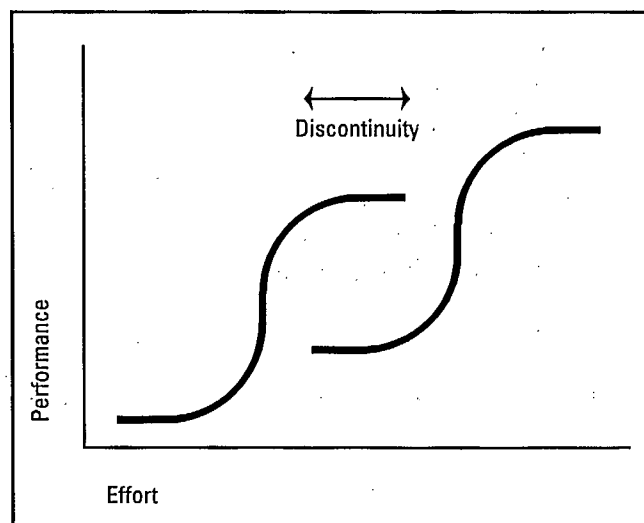
Each of the four innovation opportunities previously summarized — changes in market demand, in technology, in the political/legal framework or in business systems — can produce what is called a discontinuity (see Figure 2). Discontinuities occur when an existing and familiar way of doing things is suddenly superseded by an entirely different approach embodying a different set of possibilities. For example, in technology, the advent of the transistor, the jet aircraft and optical fibre all marked dramatic discontinuities that changed the expected evolutionary course of electronics, transportation and telecommunications. In the political and legal environments, the collapse of the centrally planned approach to economics marked a dramatic discontinuity in the expected evolution of the countries that were once members of the Soviet bloc.

The search for discontinuities is vital to any entrepreneur wishing to prosper in an economy that emphasizes continuous innovation. As a small business innovator, you must constantly be on the lookout for the changes in markets, technology, the political/legal framework or in business systems that signal innovation opportunities.

A classic example of capitalizing on a discontinuity is the introduction of the transistor radio. By recognizing the importance of this technological change early on, Sony was able to open up the global market for transistor radios in the late 1950s. Although Sony did not invent the transistor, it was the first company to produce portable radios that exploited the opportunity created by the technological change from vacuum tubes to solid-state electronics — the discontinuity that spawned the entire Information Revolution.

In summary, small businesses must be constantly on the lookout for the changes or discontinuities in business conditions that can define major opportunities for innovation. Much of this activity is part of basic business planning. It is, however, critical to the success of the innovation process. You can use the self-evaluation on page 15 to help you identify new business opportunities.

Figure 2 — Discontinuity in S-Curves



Self-Evaluation: Selecting a Business Opportunity

In selecting a high-growth business opportunity, the key is to make sure you have identified a discontinuity — a market niche or customer need that is not being met. Then you have to meet the need in a way that is unique and that entices customers to spend money. To identify suitable, high-growth innovation opportunities, consider carefully the following questions.

Where are significant changes or discontinuities in your area of business expertise occurring?

- markets
- new technologies
- political, legal or regulatory environment
- new business systems and processes

What unexploited market niches are opened up by these changes or discontinuities?

What customer needs are not being met?

What process, product or service can you supply to meet these needs?

What business opportunities can you see as a result of these discontinuities?

Match Internal Strengths with External Opportunities

At this point in the definition stage of the innovation process, you should have assessed your own strengths and weaknesses and identified a potential innovation opportunity — whether it is an extension of your existing business or an entirely new one. Now you have to devise a process, product or service that addresses the opportunity by leveraging your strengths and capitalizing on the weaknesses of competitors.

You need to develop a detailed concept for the innovation, and you need to differentiate it from those of competitors so that customers have compelling reasons to choose your product or service over all others. Customer needs, your company's internal strengths, competitor weaknesses and your analysis of the market opportunity help to define whether your product or service emphasizes quality, price, features, timely delivery, after-sales support, training and so on. You also need to determine the changes and improvements required in your own internal business operations so you can deliver your offering as efficiently and as profitably as possible.

ADOPTING PROCESS INNOVATION

Allen Simpson Marketing & Design Ltd. (ASMD) of Guelph, Ontario, has achieved success by adopting an innovative approach to marketing. Formed in 1977, the company has successfully exported a large part of its production of innovative garden tools to some of the most discriminating markets in the world: France, Italy, Sweden, the United Kingdom, Germany and the Benelux countries. It is also the only Canadian company ever to export garden tools to Japan.

A commitment to produce only innovative, high-quality, hand-finished tools (many of them developed in-house) initially prevented ASMD from selling in traditional markets. Price, not quality, was the dominant factor then, so a different approach was needed. Through appealing and unique packaging, ASMD was able to establish a presence in non-traditional retail outlets such as gift boutiques, specialty stores, jewellery outlets, gourmet food outlets, even restaurants and museum shops. Mail order also became big business for the company's products. This focus has allowed ASMD to distance itself from competitors and to carve a unique niche for itself in the global marketplace.

As company president Allen Simpson says, "By carefully analyzing markets we were interested in and using creative merchandising ideas, we successfully distanced ourselves from competitors. ASMD responds to consumer needs: moderate pricing, high perceived value and a lifetime of performance. As entrepreneurs, we must continue to be at the forefront of innovation if we are to succeed. We cannot walk behind and simply imitate and try to do better. You must innovate, not only with product but also in the approach to the market, break new ground and hopefully do what you do better than the other guy."

In reality, of course, there is a tight relationship between your internal processes and the final product or service. If you want to cut costs, speed up delivery times, add features or improve quality, you have to modify your internal processes as well as the product or service.

A useful way to think about process improvements is to visualize a company's operations as a series of transactions or as a chain, with each link adding value to what is delivered to customers. Process innovations that can enhance the value of the product or service to customers can be made at each link in the chain.

The innovation process is essentially the same whether you are concentrating on product, service or operational improvements — whether a business is improving its method of procuring materials, adapting a new piece of

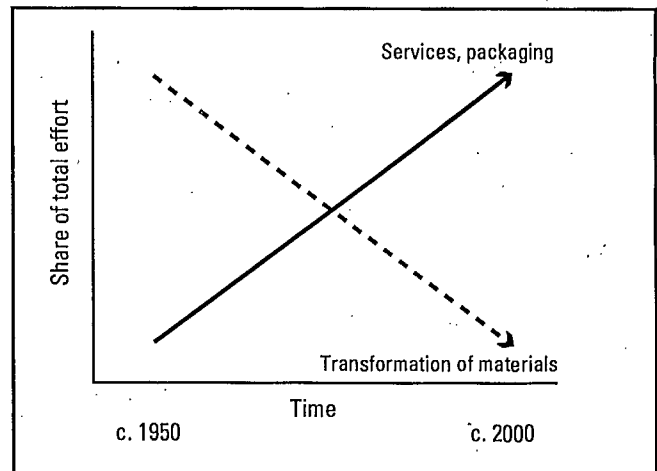
accounting software to its internal operations, adding new features to its products or offering new services such as customer training. In all cases, the Four Ds of innovation can be applied.

Few firms today deliver pure products or services; the two are so closely intertwined that a change in one necessitates a change in the other.

In fact, the nature of what delivers value to customers is changing. It used to be the case that most of the value in a product was embedded in the materials used in its manufacture. Increasingly, however, value is created by processes, product packaging and services (see Figure 3). Virtually every product today is nested in a service environment. The product may even be a commodity that is indistinguishable from competing products. It is the service environment that provides true product differentiation. For example, with personal computers, competitive advantage is increasingly found in the services — manuals, warranty, training, after-sales support, operating system software, etc. — that are bundled with the product, rather than in the product itself.

In summary, every substantial innovation will necessitate changes in your internal processes, in your products and in the services you deliver to customers. In most cases, products, services and processes are so closely intertwined as to be indistinguishable. Since customers determine the value of an innovation, it is their perceptions that count. Very rarely do they distinguish product from process from service. However, they know quite well whether or not their relationship with your company is satisfactory.

Figure 3 — The Changing Focus of Effort



Write an Innovation Concept Outline

During the **definition** stage, it is useful to prepare a brief one- or two-page document summarizing the innovation idea, the market opportunity and the way it capitalizes on your company's strengths and competitors' weaknesses. This document, the **Innovation Concept Outline**, can be used by innovators to clarify their own thoughts as well as to present their ideas for review both to key personnel in their company and to trusted and knowledgeable associates outside the company such as lead customers. This will provide assistance in deciding whether the idea is worth further development and the commitment of greater effort and investment. Thus, the Innovation Concept Outline is a key aid in helping you and your company decide whether or not to proceed with your innovation to the next of the Four Ds, the **design** stage.

EXPLOITING A DISCONTINUITY

TIR Systems Ltd. of Burnaby, British Columbia, was founded to exploit an invention produced at the University of British Columbia, the Light Pipe.

The Light Pipe works on a principle related to fibre-optic cable. The light from a bulb at one end of the tube is prismatically reflected down the length of the entire "pipe." Due to the evenness of this reflection, the effect is that of the entire length of pipe giving off light, rather like a fluorescent fixture. What makes the Light Pipe better than fluorescent tubes, however, is that when it burns out, only the bulb at the end needs to be replaced and not the entire length of pipe.

This means that the tube can be placed so that the bulb is relatively accessible, even if the rest of the tube isn't. This is why McDonald's restaurants have started installing Light Pipes in their exterior roof beams to replace hard-to-service fluorescent tubes. In addition, Light Pipes are also being used in swimming pools, in hospital Magnetic Resonance Imaging Rooms (where conventional bulbs would cause interference) and as accents on various tall buildings.

Lorne Whitehead, company chairman, says, "TIR is becoming successful in introducing an entirely new type of lighting product to the world lighting industry. We are able to do this because of the availability in Canada of world-class technical personnel, business professionals and far-sighted investors."

Self-Evaluation: Matching Your Competitive Capabilities with a Business Opportunity

Successful innovation focuses above all on what is possible and practical. It builds on the strengths and capabilities of a company. You need to determine whether or not your company actually has what it takes to introduce the innovation successfully. As you define an innovation opportunity, keep in mind the existing capabilities of the company and compare them with the requirements of the proposed innovation. You also need to determine whether or not the potential of the innovation is worth the time and expense required to introduce it.

✓ Which of the following capabilities are required for your proposed innovation?

	Already exists within the company	Development is required	Implementation approach (describe)
Commitment of management and employees			
Innovation development infrastructure: <ul style="list-style-type: none"> • R&D facilities • development staff • development champion 			
New technological capabilities: <ul style="list-style-type: none"> • for internal processes (manufacturing, operations, etc.) • internal/external communications • embedded in innovation 			
Specific employee skills: <ul style="list-style-type: none"> • technological • creative 			
Financing of development and implementation costs: <ul style="list-style-type: none"> • financing from internal operations • external sources of financing 			
Project management skills and capabilities: <ul style="list-style-type: none"> • innovation champion 			
Logistics: <ul style="list-style-type: none"> • new inputs • handling • storage and warehousing • processing • shipping 			
Marketing mechanisms: <ul style="list-style-type: none"> • sales force • promotional techniques 			
Sales and distribution: <ul style="list-style-type: none"> • order processing • distribution channels • delivery 			

CHECKLIST FOR INNOVATION CONCEPT OUTLINE

Successful innovation focuses above all on what is possible and practical. It builds on the strengths and capabilities of a company and works within the company's business environment. At the end of the definition stage, it is useful to pull your innovation concept together into a succinct one- or two-page outline. It should include brief responses to the following questions.

Current Offerings

What are your company's most important current assets and capabilities?

What is unique about your current product, process or service?

The Business Environment

Is your business being affected by changes in the environment (markets, technologies, regulations or business processes)?

What changes or discontinuities does the innovation capitalize on (in markets, technologies, regulations or business processes)?

What impact would your innovation have on your company's current offerings?

The Market

Who are your existing customers (defined according to age, sex, buying habits, etc.)?

How big is the market?

Is it growing or shrinking?

What market share can you realistically achieve?

What combination of features do customers in your target market most value?

- quality
- reliability
- timely delivery
- after-sales support
- training
- lower prices
- more features
- other

How does your existing offering meet customer needs?

Does it fully satisfy their requirements?

What customer needs does your proposed innovation satisfy?

How will customers react to your solution?

- readily understand and use it
- are willing to pay for it

Would your innovation allow your company to address an entirely new market?

Your Competitive Advantage

What specific advantages does your company have in serving the market?

How does your innovation leverage your own company's strengths?

What specific advantages do you have in developing this innovation?

What makes your innovation superior to others already available in the same area?

Who is your competition (describe size, capabilities, characteristics)?

What differentiates your offerings from those of your competitors?

- faster
- cheaper
- more effective
- more reliable
- other

Does your proposed innovation take advantage of your competitors' weaknesses?

How are your competitors likely to react to the threat your success will inevitably pose to their businesses?

How will you defend yourself?

THE SECOND D: DESIGN

Research the Innovation

Market Research

Technology Research

Legal Research

Resources Research

Write a Draft Innovation Plan

The Goal of Design

Design is the second D in the innovation process and it is critical. Although typically you will spend only about 10 to 15 percent of the project budget on design itself, virtually 100 percent of the budget will have been committed by the time this stage is finished.

By the end of the **definition** part of the innovation process, you have identified your competitive strengths and have selected a promising innovation opportunity suited to these capabilities. During the **design** stage, you will research the innovation concept and will develop detailed plans and specifications to flesh it out. Your objective should be to gather the information needed to produce a **Draft Innovation Plan**. The plan will be further refined as a result of pilot testing carried out during the subsequent **development** stage of the innovation process. The purpose of the design stage is:

- to obtain in-depth research about the innovation concept
- then, based on this research, to write a Draft Innovation Plan.

The innovation plan should be part of your overall business plan. It is absolutely essential if you are seeking funds from financial institutions or venture capital sources. Potential lenders or equity partners will want to see a plan, especially one with detailed financial analyses and projections. Even if the innovation is to be financed from your own or your company's internal resources, an innovation plan, at least in abbreviated form, is important in clarifying the concept for yourself, your employees and your business colleagues. Without a plan, you are more likely to cut corners or leave key areas unexplained. Setting down a fact-based analysis of the innovation's prospects makes it far more difficult for you to miss something significant.

Innovators often think that their key challenge is merely to design the product, service or process. In fact, the real task is to *design or redesign your entire business*. Business issues such as manufacturing, marketing, distribution, promotion, customer training and support are often more important than the product or service itself. For example, a study by a venture capital fund indicates that 90 percent of new business failures are caused by problems other than product design.¹

During the process of integrating the innovation with the other parts of your business, do not neglect to consult with your customers and your suppliers. It is common today to involve both in multifunction teams charged with making sure that the innovation becomes part of a seamless process that moves easily from those who supply your company with inputs to those who buy its products or services. As previously mentioned, your "lead customers" — the most demanding and sophisticated of your clients — are especially useful during this stage. Prospective users may have innovative ideas of their own or they may be able to help you refine the innovation plan.

Research the Innovation

You can minimize costs, time and effort during the definition stage of the innovation process by using readily available "secondary" research. This allows you quickly to reject those innovation concepts that are impractical for any reason — too few customers, competition too difficult, technology too costly, etc. Those innovation ideas that pass the review at the end of the definition stage require more thorough "primary" research during the design stage.

Gathering the information to answer key questions about the innovation's prospects is the primary task of the design stage. There are many questions to answer.

- What impact will my innovation have on my market?
- What effect will it have on the product or service features that my customers care about?

¹ Ian Craig and Arsen Vukovic, "Strategic Perspectives on Innovation," *Management Focus* 4 (1): 10.

- Should I develop the technology I need myself or should I simply acquire it?
- What legal requirements must I meet to bring my product to market?
- How can I raise the funds I need to implement the innovation?
- What impact will this have on the price of my product or service?

The answers to these questions should be complete and accurate. Before you invest in the innovation, develop prototypes or mount a pilot project, you need the most comprehensive and precise information possible.

To get it, you may have to conduct or buy in-depth research. Innovators often take a relatively narrow view of the research they need. They think of it as relating primarily to scientific and technological questions such as the best materials or processes to be used in the innovation. In fact, your innovation plan needs a much broader range of research that includes:

- **market research** to identify the market impact of your innovation, its influence on market share and growth; to connect the innovation to customer needs; and to learn from other companies in the same business
- **technology research** to identify products, processes and/or service technology required as well as potential sources
- **legal research** to determine whether your innovation meets all the requirements for health, safety or technical standards and whether it can or should be protected through patents or registrations
- **resources research** to identify sources of assistance, potential partners and financial backers for your project.

It is important to organize your research program carefully to minimize costs and maximize the usefulness of the information collected. Be precise about the questions you're asking. It is not particularly useful to know if potential customers like or dislike the internal processes you propose to adopt in order to implement the innovation. It is extremely useful, however, to know how they are likely to react to the product or service that results from those processes. With such information, you can act to improve the result in order to make it more appealing and valuable to customers.

PRIMARY AND SECONDARY RESEARCH

Primary research involves original data you collect yourself or commission someone else to collect. Secondary data (desk or library research) involves making use of already available research.

Secondary data is less time-consuming and more cost-effective as a source of basic information. Before you take the expensive step of gathering or commissioning primary research, it pays to check out all the secondary data sources you can find. The following organizations are examples of suppliers of useful sources of secondary data.

Statistics Canada: StatsCan has available studies on almost every industry in Canada as well as demographic data from the census.

Libraries: A good university library has research on virtually every aspect of business in Canada. It also has current and back issues of trade magazines dealing with specific industries.

Local Chambers of Commerce and Business Associations: These may be able to provide you with information about your industry, suppliers, competitors and customers.

After gathering available research, you may still need to invest in primary or original research to ensure that you have comprehensive and up-to-date information. Few entrepreneurs have the expertise to conduct primary research in every area relevant to an innovation, such as legal research for patent searches, technology prospecting for applicable product or process technology, market research to analyze customer needs or resources research to find sources of financing. Be prepared, therefore, to consider getting outside help.

Depending on your research objectives, primary research can be sophisticated or straightforward. You can get help by hiring a specialist such as a market research firm, a consulting engineer or a lawyer. It may even be possible to recover a portion of the costs of doing so. The federal government offers various programs that can cover some of the expenses associated with researching innovations (see Annex). For example, the National Research Council of Canada's Industrial Research Assistance Program (IRAP) provides expertise and financial assistance in technology development. You may also reduce some of these costs by doing much of the legwork yourself and using the research expert only for specialized knowledge in research design and analysis. Another solution to lowering costs is to hire a student working under the guidance of an experienced professor.

Market Research

Market research is one of the most important aspects of any business yet it is often short-changed or even overlooked entirely. When introducing innovations into your company, the kind of market research you need may not differ much from what was required when you set up your business in the first place. But be careful to distinguish between the type of research needed to establish the viability of a new or improved product or service and what is involved if you intend to modify your internal processes.

A new or improved product, for example, should be tested directly with customers. However, your customers may never see an internal process modification. The process modification will have an impact on what you deliver to customers or how you deliver it, and it is this impact — not the modification itself — that market research should test.

The market research you conduct during the design phase may have one or all of the following objectives:

- identify and describe the impact of your innovation on the market in terms of market share and growth
- analyze customer needs so the innovation can be designed to meet those needs
- learn about your competitors, the products/services they offer, how they offer them and the way you can differentiate your own products/services to make them more appealing and valuable to customers

USING MARKET RESEARCH FOR INNOVATION

Founded in 1988, Statpower Technologies Corporation of Burnaby, British Columbia, has won between 5 and 10 percent of the North American market for stand-alone power inverters. The company used market research to determine that there was a window of opportunity for a new inverter in the 500–600-watt range as long as the device was technologically sophisticated and was not large and heavy like traditional inverters. Working with Angle Design Ltd., an industrial design firm in Vancouver, Statpower Technologies developed the PROwatt 600, which converts 12 volts from a battery or other energy source to standard 115-volt AC household power. The PROwatt 600 can be used to run small microwave ovens, televisions, VCRs, power tools, computers or fax machines. The five-pound PROwatt 600 is designed for non-experts and has built-in safety features to protect both users and batteries. As a result, the company is developing a consumer market for power inverters, a product traditionally thought of as industrial equipment.

- learn from and improve on the practices of other businesses to ensure that your enterprise will be competitive in the marketplace.

Market research, then, basically consists of two types. The first is customer intelligence — learning as much as you can about your customers. The second is competitive intelligence — getting to know the strengths and weaknesses of your competitors and of their products and services. You need an in-depth understanding of both to design a winning innovation.

WHAT DO YOUR CUSTOMERS CARE ABOUT?

In designing the business, you need first to focus on the precise needs of your customers. *Most customers care about similar things, but they care about them to different degrees.* The specific priorities of your customers depend to a large extent on the nature of your business. Every customer cares about quality, price and timely delivery, but the weight each assigns to these factors varies according to which of the following categories your business belongs.

- If you are a manufacturer of intermediate products (e.g. components, parts), your customers are manufacturers of end products who will be impressed by the timeliness with which you deliver your inputs into their production processes.
- If you are a manufacturer of end products, your customers may be retailers who appreciate product documentation, marketing support and after-sales service or repairs.
- If you are a provider of services, your customers may appreciate responsiveness, reliability, the development of an ongoing relationship and follow-up.
- If you are a retailer, your customers may demand timeliness, an appropriate ambience in your sales outlet, helpful sales staff and after-sales service.

Competitive Benchmarking

An important part of your research is to analyze your competitors. What are their strengths and what can you learn from them? Comparing or benchmarking your performance against that of competitors and industry leaders can be an important guide to innovation.

Firms that have adopted benchmarking as an integral part of their strategy compare every function in their business against the best practices in the industry. If their

performance is substantially behind industry leaders in a key area, they have an opportunity to make improvements. The industry leader's example can also guide them on how to introduce such improvements.

Benchmarking is employed by some of the world's biggest corporations. The Ford Motor Company set out to make the Taurus the "best in class" in more than 400 design elements. By Ford's reckoning, it achieved that goal for 77 percent of these elements.

Small firms too can find winners to imitate. A supermarket with a reputation as one of the best-run food stores in the world regularly takes groups of a dozen or so employees on field trips in the company minibus. The employees travel to competing stores. Each employee is expected to find one area in which the other supermarket outdoes them and then to suggest ways they can do as well — or better.

The company you benchmark against need not be in the same business. It merely has to be an industry leader in functions you both perform. For example, Xerox Inc. improved its warehousing operations by benchmarking them against the U.S. mail-order clothier L. L. Bean Ltd.

Five Steps to Benchmarking

1. Identify your major problems.

Both formal and informal market research can help you determine where your biggest challenges are in satisfying customers and staying ahead of competitors.

2. Find organizations that are solving the major problems you face.

In your search, talk to suppliers, customers, trade associations, consultants and competitors.

3. Visit and study these organizations.

You should be clear about your objectives and use a written list of questions so that you can be sure to accomplish the objective of learning how to overcome your biggest challenges.

4. Implement the changes in your company.

Implement the superior practices you've learned about. Create action teams if your business is large enough. You'll need to set clear goals and measure your progress.

5. Repeat the cycle.

Once you see results, identify further improvement opportunities and seek more firms for benchmarking.

MODERN METHODS OF MARKET RESEARCH

During the design stage, modern methods of market research can help identify market opportunities and target markets as well as specify the product and service features that appeal to customers.

Random sampling represents the high end of market research. Although it's expensive, random sampling will give you data representative of your entire group of potential customers. Proper sampling and follow-up analysis generally require the skills of a professional market researcher. Some of the most sophisticated forms of analysis, such as **psychographics**, segment potential customers into a series of smaller subgroups based on their psychological and social profiles. Psychographic analysis helps determine each subgroup's specific preferences and needs. You can then design your product or service to appeal to a range of subgroups.

Less comprehensive and accurate — but also less expensive — market research sampling methods include **convenience samples** and **quota samples**. If, for example, your innovation is targeted to construction businesses, you might survey people in the business at the annual meeting of the Canadian Construction Association. This is a convenience sample. In a quota sample, you first determine how many people have certain characteristics you want to sample, say, people who ride the bus to work. You or your interviewers then find these people and interview them.

Interviewing can be **face-to-face**, over the **telephone** or by **mail**. Face-to-face is the most informative and reliable, but also the most expensive. Mail is the most cost-effective way to reach a large number of people, but you may experience long delays and low response rates — 30 percent is an extremely good response to a mail survey.

Although their results are not statistically significant, **focus groups** are an increasingly popular form of market research. In a focus group, a carefully selected sample of potential clients is brought together in one location for a few hours. Group members are then asked to react to products or services, either prototypes of your innovation if they're available, or similar competing products or services from other companies. The results of a focus group conducted by a skilled interviewer can be extremely enlightening. You can determine the features of the product/service you need to produce to meet client needs and the pitfalls to avoid. A focus group can also help you design the best method for promoting, pricing and distributing your product or service.

MARKET RESEARCH CHECKLIST

Following are the some of the questions an innovator needs to answer about potential customers and competitors. Use this checklist only as a guide. Depending on your innovation and target market, some questions can be deleted, while others need to be added.

Your True Customers — End Users Versus Buyers

Who are the buyers of your product or service? Are they different from the end users of your products or services?

What are the characteristics of those who make the decision to purchase your product or service? How do those characteristics differ from those who use the product or service?

What are the specific end-user needs your product or service meets? Does anyone else meet them?

What are the buyer needs that it meets? Are these the same as or different from end-user needs? Does anyone else satisfy them?

What are the criteria end users of your product or service apply in deciding whether or not to use it?

What are the key criteria your buyers use in deciding whether or not to purchase your product/service?

How big is the market for your product/service? How big is the market for similar products/services? What market share can you realistically anticipate capturing?

What price are buyers willing to pay for your product/service? Given your projected market share and sales volume, is this enough to support the business and make a decent profit?

What changes (innovations) would make your product or service more attractive to buyers? To end users?

What changes (innovations) would expand the target market for your product or service?

What innovations could you realistically implement that would create an entirely new market for your offering?

Benchmarking

What do you see as the major problems and challenges in your proposed business?

Who are the leaders in your industry? What market shares do they have? What are their key competitive strengths and weaknesses?

What practices of industry leaders are applicable to your own business?

What differentiates their product/service/process from others? What do they concentrate on in their business?

What is their pricing strategy — high, low, sales, discounts? What is their profit margin?

How do they promote their product/service — advertising, free samples, contests? How much do they spend?

How do they distribute — sales force, agents, mail order?

Successful benchmarking starts with the recognition that other companies may do things better than you do. This may be difficult for many business people to admit, especially about their competitors. Once you have faced up to the possibility, however, you are ready to start benchmarking. Find the companies that do the very best job in the key tasks your business depends on. Then, study them carefully to learn everything you can.

Technology Research

The technology revolution of the past two decades has exerted a pervasive influence on virtually every aspect of business — design, manufacture, distribution, marketing, sales and service. Applications such as computer-integrated manufacturing, automated order and inventory systems and advanced telecommunications have radically transformed virtually every business process.

As noted previously, technology refers to the tools we use to solve business problems. Not every company needs to develop its own technology, and not every innovation needs to depend on technology. However, because technology has played such an important role in improving the productivity and competitiveness of so many businesses, no innovation plan would be complete without at least considering whether or not technology has a role to play in implementing that innovation. Whether in manufacturing or services, virtually all businesses can benefit from some application of advanced computing and telecommunications technologies, even if that application is restricted to internal processes. Advances in other areas such as biotechnology or new materials are also beginning to exert a widespread influence in some specific industries. *Regardless of the industry they are in, all companies can benefit from the intelligent application of appropriate technologies.*

Technology research is essentially a three-step process.

- **Technology needs analysis** tells you what areas of your company's operations may be improved with technology.
- **Technology prospecting** can help you learn what technologies are available.
- **Technology sourcing** research helps you find the optimum technological solution for meeting your needs.

Technology Needs Analysis

Many different needs can be met through the introduction of new technologies into a company. The following are some of the factors that can drive the search for new technologies:

- customer requirements (see box next page)
- competitive pressures to lower costs
- difficulties or inefficiencies in current production processes
- a need to improve quality
- environmental pressures
- requirements to conform to government or other standards
- competitive pressures to exploit new technologies or new market niches
- new products that demand new technologies
- a company's desire to grow more rapidly
- declining markets for current products and services
- too little diversity in current products or services.

Earlier SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis conducted during the definition phase of

the innovation process may have pointed to the existence of one or more of these factors and may have articulated the kind of innovation that would be required in response. During the design phase, you can determine whether or not the innovation requires new technologies.

In conducting a technology needs analysis, it is useful to keep in mind that the best technology is not necessarily the newest or the most complex available. Instead, it is the technology that is appropriate to the specific needs of the business using it. Those needs may not require the most advanced, the most sophisticated or the most expensive solutions. A small operation may benefit more from using slightly older but proven technology instead of seeking costlier, more experimental and therefore riskier solutions. This issue is not restricted to high-tech companies. For example, restaurant owners may have to decide the extent to which their businesses require computerized cash and accounting systems.

Technology Prospecting

Technology prospecting means gathering information about technologies that are potentially useful to your business. Technology needs analysis will have identified some innovation opportunity that can be realized through technology. Technology prospecting identifies the technologies available to do so and how they might be used.

Desirable technologies are those that can be used quickly and cost effectively to enhance the value of your innovation to customers and to improve your competitive advantages in the marketplace.

Many small and medium-sized enterprises (SMEs) that are successful innovators keep aware of technology developments relevant to their business and their industry. They attend conferences and symposia, keep abreast of the literature and maintain personal contacts with experts in their field from the business and academic world as well as government agencies such as the National Research Council of Canada's Industrial Research Assistance Program. Their objective is to identify appropriate technologies that will give them an advantage over their competitors.

It is true that leading-edge technology can give a company an important competitive advantage. The first company into a market with a new product, process or service can establish a commanding lead and can be very difficult for competitors to dislodge. However, there are also disadvantages associated with being a technological leader. You must bear the costs of implementing and debugging new and unproven technologies; competitors who come along later may gain from your experience at no cost and with little risk.

A TECHNIQUE FOR DETERMINING CUSTOMER TECHNOLOGY NEEDS

A key to determining technological requirements is to match customer needs with product/service features and then to find the best technological solution for delivering these features. One simple but powerful technique for organizing and performing this task is, Quality Function Deployment (QFD), an increasingly popular design technique pioneered in Japan.

To understand how QFD works, imagine a grid such as the one shown below. In this simple example, a company is working on the design of a new pencil. Along the left side of the QFD grid are listed market expectations or customer demands, such as "easy to hold," "does not smear," etc. This information is gathered from customer surveys and salespeople. Along the top of the grid are the pencil's key features or functional characteristics — length, time between sharpening, etc. These characteristics come from an analysis of the pencils already in the marketplace or of the innovator's product/service plans and prototypes.

At the points on the grid where the vertical and horizontal features intersect, developers assign a degree of correlation between the market need and the product/service characteristic — using symbols to indicate whether the correlation is strong, medium or weak. Strong correlations between customer demands and features indicate areas where designers need to concentrate their efforts. When there is no correlation, design work is less critical.

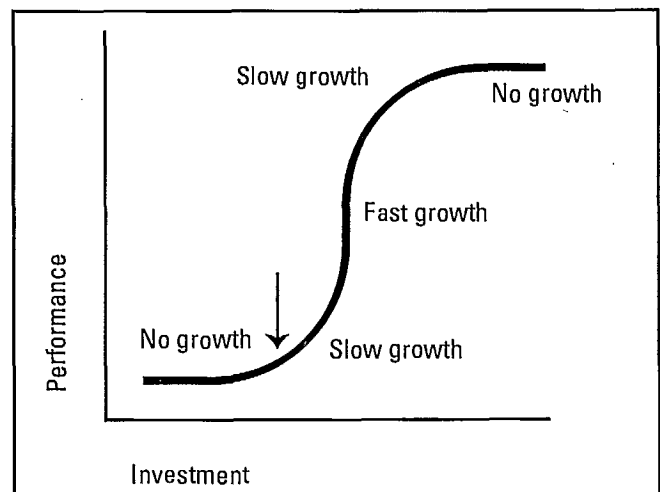
CUSTOMER DEMANDS	FEATURES			
	Pencil length	Time between sharpening	Lead dust	Hexagonality
Easy to hold	Medium			Medium
Does not smear		Medium	Strong	
Point lasts	Weak	Strong	Medium	
Does not roll	Weak			Strong

Once a chart like this is complete, the next in a series of QFD charts is produced. QFD analysis proceeds in this way, with a series of charts leading from customer needs to increasingly refined and precise product specifications as well as technology, production and other business requirements. Because of the accuracy and detail of QFD analysis, entrepreneurs who achieve the targets established by QFD can be reasonably confident that their innovation is superior to competing offerings in the marketplace in satisfying customers.

An alternative strategy is to be a technological follower — waiting until other companies have developed and commercialized leading-edge technologies before you adopt them. Indeed, you may forge your own competitive advantage by being an innovator in areas such as marketing, after-sales service or training rather than in technology.

The familiar S-curve serves as a useful tool in technology prospecting (see Figure 4). It can help to indicate the best time to adopt or implement a technology. During the early stages of applied research and development, there is a good deal of investment in and limited returns from a technology. This is the no-growth stage represented by the initial, flat part of the S-curve.

Figure 4 — Technology Life Cycle



Next, the technology is embodied in some early marketable products, processes or services. These early models tend to be expensive, market penetration is relatively small, and returns are low. This is the part of the cycle represented by the S-curve as it begins to turn up — the slow-growth phase.

Then, the technology takes off. The products, processes or services using the new technology begin to have an impact on the marketplace. This is represented by the steep climb in the S-curve. After this period of rapid expansion, growth slows as wide market penetration is achieved. The curve begins to level off. Finally, market saturation with products/processes/services using the new technology has been reached, and the curve flattens out once again.

What successful small business innovators look for in the S-curve technology cycle is the inflection point just before the curve starts to trend up quickly (see arrow on Figure 4). The ideal is to be first to embody the technology at this point in order to give the company's products and services the kind of price and performance characteristics that, in the eyes of consumers, make them superior to those of their competitors.

Successful technology prospecting for small businesses means monitoring new technological developments but holding off from investing in them until they are ripe for full-scale commercial application. At that point, the innovator must be prepared to move quickly, leapfrogging competitors who have spent resources developing the technology through its early stages.

This type of strategy carries relatively small risks, requires relatively low investment and demands short lead times. At the same time, the returns are large and relatively certain because the products/services/processes using the new technology have already demonstrated their potential. Entrepreneurs who employ this strategy systematically are able to beat competitors to the market time and time again with successful new or improved offerings.

Technology Sourcing

Most SMEs adapt and adopt the technologies developed by others; they do not perform their own basic or applied research. Once they identify their technology needs, they need ways of acquiring that technology externally. If you are not developing technology yourself, you have a choice of **contracting out** certain functions, **purchasing** technology or **licensing** it. Each of these approaches has different implications.

Contracting Out: Most companies now realize that they do not have to do everything themselves. Companies can narrow their own activities to those areas where they enjoy an edge, thereby achieving a highly competitive, even world-class position, while committing only the minimum necessary to technology development. On the other hand, a careful cost-benefit analysis is required to determine the implications of contracting out. Though contracting, like leasing, avoids upfront capital outlays, is the company better off in the long run? Or should it develop the technology and expertise required in-house?

Technology Purchasing: The purchase of technology requires a careful matching of company objectives and available methods of meeting them. Once your objective is clear, consider the alternative methods. These alternatives should then be set against the criteria according to which you want to make your decision. Distinguish between "need to have" and "nice to have" and assign relative weights to the different elements. This allows you to rank the alternatives and make a final choice.

A key factor in your technology purchasing decision is a cost-benefit analysis of the purchase. A lot depends on whether you consider your technology purchase as an expense or as a long-term investment and asset as well as on what relative weights you assign to issues such as:

- effect on indirect costs
- impact on product quality
- effect on market

FINDING THE RIGHT SOURCE OF TECHNOLOGY

Established in 1985, Dominis Engineering Ltd. of Gloucester, Ontario, is successfully exporting an innovative software program used in hydrodynamic and ship research. This system, known under its trade name GEDAP™, is used in model studies of ship hulls, offshore platforms and submersible structures as well as coastal and near-shore engineering. The original technology used in the system was developed by the National Research Council of Canada and was licensed to Dominis. As company vice-president Slobodan Gospodnetic says, "The reason for the company's software system export success is the excellence of the technology developed by the Hydraulics Laboratory of the National Research Council of Canada and licensed to our company, which, coupled to determined perseverance on our part, is demonstrating to the world that Canada is highly innovative in the field of marine equipment and marine services."

THE RESEARCH AND DEVELOPMENT CONTINUUM

To perform technology prospecting profitably, it is useful to recall some basics about the research and development process. Technology research is usually viewed as a continuum moving from very pure scientific research (also called fundamental or basic research) to applied research and finally to new product, process or service development.

Basic research ➡ Applied research ➡ Product/process/service development

Each of these three types of research has a very different purpose. The goal of pure or basic research is to discover fundamental laws and characteristics of nature, e.g., the speed and properties of light. Applied research aims to develop technologies that apply basic scientific knowledge to the solution of practical problems, such as ways that laser (highly focused) light can be used to carry information. Finally, development embodies these technologies in new products, processes and services, such as laser bar code readers in supermarkets.

It is rare, even in the very largest companies, to develop a new technology from the ground up or to invest substantial funds in basic research. The uncertainty, the long lead times and high costs associated with most fundamental research mean that the risks are simply too high relative to likely returns. Moreover, basic scientific principles cannot be protected by intellectual property rights. Once discovered and published, breakthroughs in basic science are equally available for competitors to use. Thus, basic research is unlikely to give the discoverer a sustainable competitive advantage.

Some commercial research funds are spent in applied research using existing scientific knowledge to develop new technologies. However, this tends to be limited to the very largest companies. This is because applied research typically carries high risks, substantial costs and long lead times that only companies with deep pockets can afford.

A good example of applied research on a huge scale is the billions of dollars leading Japanese electronics firms are reportedly spending on developing optical information technologies that use light waves rather than electrons to communicate. If successful, these firms could revolutionize the computing and telecommunications industries and could give their developers virtually unbeatable competitive advantages. However, success is very uncertain, the research is very expensive, and lead times are estimated to be a decade or more.

In this country, even firms that are large and research-intensive by Canadian standards, such as Alcan Aluminium Limited and Northern Telecom Canada Limited, spend the bulk of their R&D effort on product/process/service development — on adopting and adapting existing technologies to new or improved products, processes and services. This is especially true of small and medium-sized Canadian firms that lack the resources or the expertise to undertake any basic or applied research.

Most SMEs do not develop their own technologies; they focus their efforts on innovative applications of the technology developed by others. While a small number of SMEs are actually developing proprietary technologies, the focus of effort is on short-term commercial application, not on speculative exploration of longer-term possibilities. Most SMEs simply do not have the people, time and money to devote to activities that do not have an immediate commercial payoff.

- ability to design new products
- ability to market new products
- position of the competition.

Licensing: In a licence agreement, the owner of a technology provides the licensee with the right to use or exploit a technology in exchange for a royalty. In an exclusive licence, the licensor cannot grant similar licences to anyone else, nor can the licensor use the technology; the licensee purchases sole rights to the technology. In a non-exclusive licence, the licensor can grant additional licences to others and can also use the technology apart from the licensee. In a sole licence, the licensor can use the technology but cannot grant other licences.

There are many reasons why firms prefer to buy technology licences instead of developing technology themselves.

- They pay a fixed and predictable price and avoid the uncertain costs involved in the development of new technologies.
- They benefit from guarantees and warranties.
- Prior use of the technology has demonstrated its feasibility, so the licensing company is not taking a gamble on something untried.
- Licensing is a form of sharing development costs.
- It provides a window on new technology.
- The technology can be brought on-stream more quickly.

Technology Search: Sources and Resources (see Annex for details)

The following are some of the places you can look for information, referrals, advice and assistance in your technology search:

- suppliers
- industry contacts
- industry associations
- trade literature
- trade shows
- meetings/seminars
- technology centres
- patent office, database or agents
- Industry Canada sector specialists
- IRAP officers
- Technology Inflow Program officers at Canadian embassies
- other government R&D programs
- university laboratories
- specialized research centres
- specialized technical consultants
- foreign government technology specialists
- database consultants
- commercial and technology databases
- technology newsletters
- technology search consultants
- companies already using the technology
- inventors.

- The licensing company may lack the internal technical capability, time or resources to do so itself.
- The company may prefer to focus its efforts on maintenance and incremental improvements.
- Occasionally, a licence is needed before in-house work can continue.
- Licences allow companies to experiment with alternative technologies before selecting one on which to focus.

Perhaps the single most important element of successful licensing is the legal agreement between a licensor and a licensee. This requires expert legal advice, and companies pursuing licensing options should secure experienced counsel.

Legal Research

You need to undertake legal research to ensure that your innovation meets legal standards regarding health, safety and the environment. Together with other developed industrialized countries, Canada has an extensive and growing body of regulation designed to protect consumers and the environment. In addition, there are emerging technical standards that are set either by the government or by industry associations. In evaluating the legal implications of your innovation, consider the following issues.

Health: Does any aspect of your innovation involve the health of consumers, distributors or your employees? For example, does it involve or affect the ingredients in items meant for human or animal consumption? Does it involve production processes or chemicals that might affect the health of those working in your company?

Safety: Does your innovation conform to all relevant safety requirements? If it is a product such as an electrical appliance, is it safe to operate? If it contains hazardous materials, can it be safely transported and stored?

Environment: Does your innovation have any impact on the environment? Is it recyclable? Is the packaging biodegradable? Do the processes involved produce emissions or other wastes? Are these appropriately controlled?

Consumer Protection: Does your innovation involve issues such as advertising or positioning the product in the marketplace? Does it conform to requirements to avoid misleading potential buyers? For example, if you are repackaging a product, does the package present an accurate idea of the contents?

Technical Standards: If your product embodies technology, does it conform to the performance standards generally accepted within your industry?

You will also want to consider the legal implications of the innovation for your company. For example, will it involve some alteration to your corporate structure, tax situation, accounting procedures or insurance requirements? You will likely want to discuss these questions with your accountant and lawyer. An important legal concern for many innovators is intellectual property rights such as patents and copyrights. Without this type of legal protection, the competitive advantage conferred by an innovation could well be short-lived. Evidence suggests that competitors can acquire detailed information on most product innovations within a year and that new processes are even harder to protect. So without intellectual property protection, there is a real danger that competitors, rather than the firm itself, will reap the benefits of its innovations.

TECHNOLOGY RESEARCH CHECKLIST

Technology research is a three-step process. Defining which technology is "best" involves careful technology **prospecting**. Then you need to determine your technology **needs**. Finally, you need to find the "best" technological **solution** for meeting those needs.

Technology Prospecting

List technologies that are key to your business.

Draw an S-curve, and for each technology, label the point on the curve that represents its stage of development.

Can you find a technology that has gone through the early product development stages and is now ripe for full commercial exploitation?

How can you use this technology to enhance customer value and give your innovation a sustainable competitive advantage in the marketplace?

Determine Technological Needs

What are the specific customer needs your product/service/process meets? What characteristics of your offering are customers particularly satisfied with? What characteristics are customers dissatisfied with?

What improvements in your offering would most contribute to increasing customer satisfaction?

- | | |
|-------------------------------|---------------------------------|
| • lower prices | • easier to purchase |
| • better quality | • better upgrades |
| • faster delivery | • more customer training |
| • new features | • more economical to operate |
| • easier to use | • more environmentally friendly |
| • more aesthetically pleasing | • greater energy efficiency |
| • better service | |

What changes in your product/service/process characteristics would most contribute to making these improvements?

How can technology best be used to make or contribute to these changes?

What specific technologies do you need to make these changes?

Determine an Appropriate Technological Solution

What technological solutions would most contribute to enhancing customer value?

What technologies can best be used to give you advantages over your competitors? What is the best way to acquire technologies that deliver customer value and give you sustainable competitive advantages (developing internally, contracting out, purchasing, licensing or partnering)? Why?

Is the best solution open or proprietary technology? Why?

In many cases, however, formal protection for an innovation is less important than the speed with which the innovation is introduced. In today's highly competitive environment, few innovations are likely to confer permanent competitive advantages. Successful companies take advantage of innovations by being first into the marketplace with them. Then, while competitors struggle to catch up, the successful company moves on to the next innovation.

As a potential innovator, examine competitive conditions within your industry to see whether the pace of change makes securing intellectual property protection irrelevant.

Intellectual Property Protection

Canadian law offers four types of intellectual property protection: patents, copyrights, trade-marks and industrial designs. In addition, Canadian common law provides protection for trade secrets in respect of confidential, commercially valuable information.

Intellectual property rights are granted in Canada under Canadian law. Companies gaining such protection in Canada may also be protected in other countries with which Canada has signed bilateral and multilateral agreements on intellectual property. The underlying principle of these conventions is that each state must provide the same protection to nationals of the other member states as it gives its own nationals. In some countries, however, it may be necessary to apply for protection in order to have it enforced.

Patents: Patents are the most frequently used of all types of intellectual property protection by small business innovators. Issued by the Canadian government, a patent describes an innovation and gives the inventor or patent owner the right to prevent others from making, using and selling the invention within Canada for 20 years after filing. Patents are granted for articles, machines, chemical compositions and processes. The grant of a patent is based on three criteria:

- novelty — the invention must be the first such thing in the world.
- utility — it must serve a useful function and it must actually work.
- inventive ingenuity — it must display a technological improvement or development that would not be obvious to someone skilled in the particular field.

The process of applying for a patent is both complicated and time-consuming. As a small business innovator, you may find it advisable to use the services of a registered patent agent — someone who has been trained to deal with the patent law and Patent Office procedure. On request, the Canadian Patent Office (see Annex for address) will provide a list.

You can use your patent to make a profit by selling it, licensing it or using it as an asset to negotiate funding. In exchange, as part of your patent application, you must provide a full description of the invention so all Canadians

Is It Worth Protecting?

A key issue for SMEs to consider is whether or not they should pursue some form of intellectual property protection for their innovation. Among the questions to ask yourself are the following.

Is the innovation significant enough to be worth the trouble of protecting?

Can the innovation be protected?

How long would it take to secure protection? Would the innovation still be viable at that point or would it have become obsolete (and the protection of no practical value)?

What are the costs (time, people) involved in securing protection?

What concrete advantages are likely to accrue to the firm as a result of protecting its innovation (e.g. does the company intend to license the innovation)? Do these potential advantages outweigh the real costs of securing protection?

can benefit from it. This promotes the sharing of technology and knowledge while giving you a monopoly on your creation for 20 years.

Patenting isn't a get-rich-quick scheme. It usually requires a significant investment of time and money. Statistics Canada found that, on average, an inventor spends nearly two years between initiation of an invention and application for a patent — and then a further 2.4 years before obtaining the patent.¹

Copyrights: A copyright is a form of protection that is provided by a federal statute and is automatically given to authors and creators of original works, such as books, records, films and works of art, against a variety of unauthorized uses, such as reproduction. It does not prevent others from using or copying ideas embodied in the work. Copyright protection generally lasts for the life of the creator plus 50 years. A work does not need to be registered to be given copyright protection, although there are advantages to registration, especially in other countries.

The Canadian *Copyright Act* was recently amended to extend copyright protection to computer programs, strengthen the right of artists to control who uses their work, and establish systems allowing creators to collect copyright fees more easily.

¹ Louise Séguin-Dulude and Claude Desranleau, *The Individual Canadian Inventor* (Ottawa: Statistics Canada, November 1989), Catalogue No. 88-510.

PATENTING INNOVATION

Established in 1983, Creo Products Inc. of Burnaby, British Columbia, has developed, manufactured and marketed the world's first optical tape recorder, a device that allows for compact, cost-effective and indelible archiving of large volumes of data. Data are recorded on 30 cm (12 inches) reels of optical tape. Each reel holds a terabyte, the equivalent of half a billion sheets of standard paper or a thousand 13.3 cm (5.25 inches) optical disks. The trade journal *R&D 100* called the product one of the most significant technical innovations of 1990. Creo conducts its own R&D and manufacturing in its 1 400 m² (15 000 square feet) facility and has protected its technology discoveries through some 18 current or pending patents. As a result of its innovative success, the company had sales of more than \$13 million in 1992, it has accumulated assets worth \$14.5 million and it employs more than 120 people.

LEGAL RESEARCH CHECKLIST

Which of the following types of law apply to your innovation?

- health
- safety
- technical standards
- environmental regulations
- intellectual property
- consumer protection
- other.

Are you in conformance with all legal requirements affecting your innovation?

Should you contemplate any new legal structure to your business as a result of the innovation?

If the innovation is to result from a partnership, have you made the required contractual agreements and registered the partnership in an appropriate manner?

Does your innovation qualify for any of the forms of intellectual property protection available in Canada?

Is it a new, useful and ingenious device (product or machine), formula or process that is liable for patent protection?

Have you developed a new computer software, written materials as part of a service to clients or prepared a videotape, any of which might be copyrighted?

Does your innovation involve a new public image complete with logo or trade-mark that should be registered?

Have you created a unique design approach for products that might qualify as a distinctive industrial design?

Trade-marks: A trade-mark is a visible sign, symbol, word or picture that serves to distinguish the wares or services of an industrial or commercial enterprise. No one other than the owner of the trade-mark may use it or any similar mark that would lead to confusion in the mind of the public. The protection for a trade-mark is generally not limited in time, provided that its use continues. Registration is for a period of 15 years, but may be renewed indefinitely for further 15-year periods. Trade-marks are very important to the Canadian consumer products industries and are also used extensively by Canadian manufacturers to market their industrial products abroad.

Industrial Designs: The *Industrial Design Act* gives protection to designers of ornamental aspects of useful articles. The ornamental aspect may be two- or three-dimensional. To be eligible for protection under the act, industrial designs must be original or novel. Protection means that it may not be copied or imitated without the owner's authorization. The term of protection lasts up to 10 years. Industrial design protection is most often employed by low to medium technology manufacturers in the furniture, metal fabricating, electrical products, and scientific and professional equipment industries.

Trade Secrets: In addition to the four statutory forms of protection (patents, copyrights, trade-marks and industrial designs), Canadian common law provides protection for trade secrets in respect of confidential, commercially valuable information. Obligations of trade secrecy can apply to such things as concepts, ideas, factual information, etc. Trade secrecy applies to persons who have acquired confidential information, but not to third parties who have no relationship to the person holding the trade secret.

For Further Information on Intellectual Property

The Canadian Intellectual Property Office (now part of Industry Canada) publishes several booklets to help you understand and obtain Canadian intellectual property rights. You can obtain these booklets free upon request (see Annex for address). The Intellectual Property Directorate will also supply you with a list of patent agents in private practice in Canada. It may be advisable for you to investigate U.S. intellectual property rights, which many Canadian innovators obtain as well. In this case, you are perhaps best to contact a lawyer experienced in the relevant U.S. intellectual property law.

Resources Research

"No man is an island" is as true in innovation as in any other aspect of life. As you proceed with the design of your innovation, you may find that you may lack some vital ingredient for which you may have to rely on external assistance. Research can help you identify sources of external assistance that can fill those gaps.

Virtually every business function involved in the innovation process can be performed internally or contracted to external suppliers (see box on page 33 regarding what external assistance can be contracted). Your market research should have given you a good idea of your own strengths and weaknesses in comparison with those of your competitors. You can then use external partnering to complement your strengths and compensate for your weaknesses.

The Trend to Interfirm Cooperation

With increasingly fierce global competition, many small firms now recognize that they can no longer survive entirely on their own. The result has been a dramatic increase in various forms of interfirm cooperation. Indeed, small business partnerships and networks have gained considerable momentum in the past couple of years. In order to promote your innovation concept, you may find it useful to take advantage of various forms of interfirm cooperation.

What to Look for in a Partner

In looking for partners to help with your innovation, find companies with complementary capabilities. One way of approaching the selection process is to profile your own company and compare it with a similar profile of the proposed partner. The following are the types of information that can go into both profiles:

- number of employees
- annual revenues
- nature of business
- product lines
- competitive advantages
- experience in the industry
- weaknesses
- capabilities
- technical skills and resources
- financial resources
- proposed role in the innovation process
- corporate objectives
- previous experience in cooperative ventures.

Once you have completed a comparison of your own company with the prospective partner, ask yourself the following questions.

How much cooperation will be required between the partners?

Do differences in size or structure require special arrangements?

Can differences in corporate culture and values be accommodated?

Are organizational structures compatible?

Do the partners have a similar attitude to the innovation process, marketing, distribution and customer service?

Are they compatible in the all-important area of finance?

Do they have similar attitudes to risk, the distribution of dividends, reinvestment, the most appropriate debt/equity ratios or tax policies?

Do they have similar employee policies, compensation programs, hiring strategies and attitudes to labour relations?

One expression of this trend is the supplier-group system. This system involves a network of small supplier companies arranged in a pyramid-like series of layers or "tiers." At the top of the pyramid is a large parent corporation that buys subassemblies from the small suppliers and performs final assembly. This system, with small companies revolving like satellites around a dominant lead corporation, is now being adopted in many sectors of the North American economy including auto making, telecommunications and computing. The corporation at the top of the pyramid can often play a critical role in the innovation process, both as a source of new ideas or as the chief customer for innovations.

In other sectors, such as software and construction, constellations of small businesses are organized in a less hierarchical fashion. These horizontal networks of specialty producers work together in many different aspects of production. Similar horizontal, small business networks are now sprouting up throughout the industrialized countries.

Networks of small and medium-sized firms (sometimes called "virtual corporations") have many advantages. They can achieve the economies of scale and scope that accrue to large firms. At the same time, they can stay close to customers and respond quickly to their changing needs with innovative products and services.

As decentralized collaborative enterprises such as these spread, dense regional clusters of highly specialized small firms flourish. Ottawa, with its "Silicon Valley North" concentration of high-tech firms, is an excellent example. Small firms that can plug into these small business networks can form many complementary and profitable partnerships with other small firms. A small business network can answer many of an entrepreneur's needs for outside expertise and assistance.

What External Assistance Is Available?

Almost any operation within a company can be provided by external suppliers or partners. Companies can concentrate on their core competencies and what they do best, leaving the remaining tasks to others. Activities that can be performed outside the company rather than inside it include the following:

- | | |
|-----------------------------|-----------------------------|
| • logistics | • finance |
| • applied research | • quality control |
| • process design | • market research |
| • product design | • marketing and advertising |
| • plant engineering | • sales |
| • warehousing | • distribution |
| • manufacturing | • repair |
| • payroll and accounting | • after-sales service |
| • human resource management | • data processing. |

External sourcing and partnering can dramatically reduce both the costs and time involved in an innovation. It can also give you access to expertise and resources you may not have inside your company. On the other hand, with outside sourcing, you may have to sacrifice some measure of control, continuity and confidentiality. There is no set rule, and decisions must be made on a case-by-case basis.

FINDING THE RIGHT HELP

Steele's Cabinets of Comox, British Columbia, makes kitchen cabinets and vanities using wood and laminates. Its most popular styles, however, required curved cutting for the doors, a slow, labour-intensive process using a woodshaper. The alternative was to use commercial routers, which are expensive and in short supply. To solve its problem, Steele's first contacted the Discovery Innovations Centre in Vancouver, a provincial agency, and determined that the answer was computer-controlled technology. The centre referred Steele's to the Computer Aided Design and Manufacturing Group at the University of Victoria. With financial assistance from the National Research Council of Canada's IRAP, the group modified the woodshaper so it could be controlled with a personal computer. Standard drafting software was adapted to Steele's design needs, and this allowed the operator to design the shape of the cut, save the instructions in the computer and let the computer control the woodshaper cutting operation. These modifications gave Steele's the efficiency offered by much more expensive machinery at a fraction of the cost. As a result, Steele's has increased its sales while continuing to work with the University of Victoria to improve the machine's flexibility and operating range.

Sources of Financing

A critical part of the research preparations for your innovation should be to identify appropriate external sources of financing, either in the form of loans or equity investment. The following is a summary of some common possible sources.

Sources of Loans

- six major chartered banks
- foreign banks
- trust companies
- finance companies
- insurance firms
- potential customers and suppliers
- leasing companies
- government financing programs (federal and provincial)
- the Federal Business Development Bank
- caisses populaires and credit unions.

Equity Investments: Loans are less appropriate for longer-term ventures characterized by risk. In such cases, a better financing strategy is to find equity investment for the company. In looking for equity financing, innovating small businesses can turn to family and friends, business associates, private investors or investment firms, or government sources such as the venture capital division of the Federal Business Development Bank.

A company looking for equity capital may seek out the assistance of intermediaries who develop financing options for entrepreneurial firms. Intermediaries can provide guidance on how much capital an innovator might need, the type and the source. Apart from putting together a financing package, the intermediary may also play a role as a "mentor" to the business.

Venture Capital Funds: The formal venture capital industry becomes a potential source of financing for placements above \$500 000. Venture capital funds look for very rapid growth and large-scale returns, which may be difficult for a smaller company to achieve. In addition, venture capitalists generally avoid start-up and early stage financing, preferring to focus on leveraged buyouts, management buyouts and merchant banking for more established firms.

Informal Capital Market: Most small firms seeking a partner or investor to finance an innovation turn to the informal capital market, probably the most likely pool of risk capital available to small businesses. It consists of networks of wealthy individuals and successful business people interested in investing directly in business ventures. Investment-oriented publications and databases have attempted to bring together investors and business opportunities, and such services are growing. There are also financial firms that will act as matchmakers, introducing companies to potential investors as well as local economic development organizations that can arrange introductions.

Write a Draft Innovation Plan

At the end of this second or **design** stage of the innovation process, the research you've conducted needs to be collected and organized into a **Draft Innovation Plan**. An innovation plan is a type of business plan that focuses on a specific innovation. In so doing, it avoids much of the contextual detail that would be found in a normal business plan but includes highly detailed information about implementing the proposed innovation. Regardless of similarities and differences, an innovation plan should always be integrated into the company's larger business strategy.

An innovation plan is absolutely essential if you are looking for external financing for the innovation. Even if you can finance the innovation internally, the plan is useful as a reality check and as a tool for communicating the innovation concept to partners, key employees and business associates.

The innovation plan can be simple or elaborate and emphasizes certain features of the innovation over others, depending on its purpose. You may even have to draft different versions for different audiences. For strategic planning purposes in a small organization, a short, simple document is probably best.

Indeed, brevity is generally the soul of good business planning. 3M, a company with vast innovation experience, limits innovation proposals to one or two pages. Based on this short document and a presentation, the executive committee decides whether or not to fund a project. However, if you are trying to raise funds from a lending institution or from venture sources, you need a more elaborate plan with detailed financial projections.

The quality of the Draft Innovation Plan depends on the research conducted during the design stage. If you've done a good job researching your market, possible technologies, legal requirements and available business resources, the plan should be easy to write. Remember, however, that the plan is a living document, constantly changing throughout the course of your innovation. The plan you complete during the design stage is a **draft**. You will write a more complete version after the **development** stage, when results from piloting and prototype testing will be available.

The main purpose served by the Draft Innovation Plan is to assist you in deciding whether or not to proceed to development — the third stage in the innovation process. This is an important decision to make as development implies a significant increase in investment and risk.

Benefits of an Innovation Plan

Writing a Draft Innovation Plan has three main benefits.

- It forces you to take an objective, critical, unemotional look at your business project in its entirety.
- The completed plan is an operating tool that, properly used, will help you manage your business and work toward its success.
- The plan is the means for communicating your ideas to others and provides the basis of your financing proposal.

Get your innovation plan reviewed by as many people both inside and outside your company as you can, particularly people with relevant expertise. Find out from them whether they think your idea is viable. Discount the nice things they say and listen closely to their criticisms. When you have their input, look objectively and critically at your plan again, paying close attention to their criticisms. Ask yourself if the potential rewards outweigh the risks and the costs of proceeding by a large enough margin. If you have any doubts, it is much better to cut your losses at this stage than to proceed with a poor or marginal plan.

On the other hand, many innovators waste considerable time composing a far more elaborate business plan than they need. Once you're confident of your basic business **design**, you're best to move as quickly as possible to stage three of the innovation process, **development**, and to actual pilot testing.

The checklist on the next page outlines some possible requirements for an innovation plan. Additionally, you should also draw up:

- a scheme and schedule for the development phase of the innovation with all key elements in place, including testing procedures to be used, prototype and piloting personnel and facilities, and testing logistics
- a detailed strategy and schedule for the deployment phase of the innovation, including a plan to have ready all the key elements involved such as manufacturing, distribution, marketing, sales, training and service.

CHECKLIST FOR THE DRAFT INNOVATION PLAN

The following checklist presents an outline that you can use in drafting your innovation plan. It is intended only for guidance. In writing an innovation plan, start by defining your purpose and your audience. Don't get bogged down trying to compose the definitive plan. Ultimately, success or failure will not hinge on the cosmetics of your plan, but on the strength of your innovation.

Cover Page: Names, addresses and phone numbers of the project champion(s).

Executive Summary: An outline of your proposed innovation including:

- a brief description of the product/service/process and its intended impact on the market
- financial information on investments in the innovation to date, requirements for additional funds, collateral for a loan and projected increases in earnings as a result of the innovation.

Background Information: Your and/or your company's relevant experience and expertise both with the general process of innovation and with the specific innovation being proposed.

The Industry: A description of the industry, your competitors and the role your innovation will play in it, including:

- key characteristics of the industry such as total sales, markets, growth and trends
- who the main competitors are, their market share, and their strengths and weakness
- your competitive position within the industry and market niche.

The Innovation: A detailed description of your innovation, including:

- strengths and weaknesses of the existing product/process/service
- a comparison of your offerings with those of your competitors in terms of key success factors such as packaging and presentation, quality, ease of use, ease of purchase, features, price, training, after-sales service, warranties, image, training, etc.
- competitive advantages created by the innovation; how the innovation contributes to improving your product, process or service; how it will differentiate them from competing offerings; why customers will buy from you
- intellectual property protection through patents, trade-marks, etc.

Business Operations: A description of the innovation's effect on your business operations including:

- an organizational chart and a description of the impact of the innovation on key personnel and/or departments
- a work flow chart showing details of your manufacturing and/or service delivery system, quality control, inventory control and supply system and how the innovation will affect them.

Impact on Marketing: A description of the innovation's impact on the market including:

- the size and projected growth of the market and your market share (this information should also be integrated into your corporate marketing plan)
- information on advertising and the promotional plan (position the innovation either as improving your products or services or improving your ability to deliver them)
- details of the media you intend to use, the target audiences, messages and costs.

Human Resources: An outline of the qualifications of management and other key personnel, additional human resources requirements and sources (e.g. hire or train), remuneration and benefits including:

- personnel requirements and your plan for meeting these requirements through, e.g., promotion, hiring and/or training
- a brief résumé of each of the key players emphasizing relevant experience and expertise
- job functions, salaries and benefits.

Technology and Equipment Requirements: A description of your technology strategy including:

- whether you're aiming to be a technology leader or follower
- what technology and equipment your business requires, particularly any technology in your product/service/process that will give your innovation a competitive edge
- how you intend to acquire the equipment and technology (internal development, lease, purchase or partnership)
- what other corporate assets and facilities are involved in the innovation.

Finances: A comprehensive analysis of finances aggregating the costs and expected returns of the innovation as well as financial requirements and sources including:

- funds spent to date on the innovation and sources
- projected cash for at least one year as a result of the innovation
- projected income statement with expected sales and expenses for at least one year
- break-even calculation
- identification of shortfall and financing requirements, sources of financing, collateral and repayment proposal.

THE THIRD D: DEVELOP

*Recognize the Importance of Testing
Produce Prototypes and Pilots
Build a Multifunction Team
Write a Revised Innovation Plan*

The Goal of Development

The third of the Four Ds of the innovation process is **development**. *The development phase ensures that the innovation concept formulated during the definition stage and the innovation plan made during the design stage can be profitably realized in practice.*

During development, not only are processes piloted, product prototypes manufactured and tested, and services tried out, but also as many other elements of the innovation plan as possible — including training, marketing, distribution, promotion, installation and so on — are tested in real-world circumstances.

Tests and trials are conducted to push an innovation to its limits and beyond, thus exposing its weaknesses. Indeed, the basic idea behind testing is to make mistakes as quickly and as early in the process as possible so that they can be corrected relatively easily and cheaply. In this way, the innovation will have a much better chance of a successful **deployment**.

At the end of the development stage, the test data are incorporated into a **Revised Innovation Plan**, an improved version of the draft plan produced during the preceding design stage. This revised plan is reviewed by the entrepreneur. Potential partners, investors and lenders may also use the plan to evaluate prospects for the innovation and to decide on their further participation in the project.

Deployment of an innovation often requires the investment of substantial resources and personnel. Before proceeding, the company, its partners, investors and lenders must therefore be fully convinced that the innovation has an excellent chance of succeeding in the marketplace. The testing done during **development** provides them with the data they need to make a rational, fact-based decision.

Recognize the Importance of Testing

The essence of successful innovation is constant experimentation. Plans and research are important, but frequent piloting and testing are more important. Innovation is inherently unpredictable. The unpredictability cannot be removed or even significantly reduced by excessive planning. It is therefore important to waste as little time as possible. Test your new business idea — at least as much of it as you can — in the real world as quickly as possible. If it is impractical or impossible to test the way the innovation functions as a whole, break it into parts and test the parts.

Testing is the data-based, rational and “scientific” approach. Decision making by proposal churning alone is an unscientific route. Unless you conduct experiments, trials, pilots, prototypes and tests — unless you actually try your idea out — you will not know if it actually works and you will not learn how to improve it.

Adequate and thorough testing during development is critical because decisions to proceed to the next stage — to deployment — involve a major escalation in a business’s commitment to the market. Decisions based on inadequate testing not only threaten the firm’s investment, but also can harm its reputation with customers.

On the positive side, thorough testing enables the innovator to discover defects and opportunities for improvement early so that adjustments can be made as quickly as possible, before deployment starts. The trick is to test first on a small scale or in a small market. This way, if you fail, you can learn from your mistakes without undermining the whole organization.

Small, quick testing also shortens the innovation cycle. It helps you get to market much quicker than big traditional mass-market companies that tend to do extensive planning. Big plans and big projects belong to our mass-production, mass-market past. Today’s companies have discovered a different route to sustained success, one that relies on

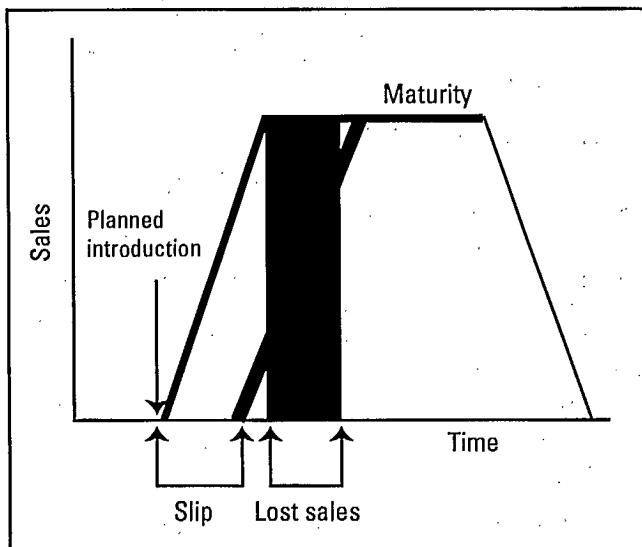
continuous incremental innovation rather than on big-bang breakthroughs.

A small business can spend too much time and money on planning, consulting, writing the perfect innovation plan, drawing detailed organizational charts or making financing proposals. Some planning is necessary, but do not get paralyzed by the planning process.

Competition today is increasingly time-based and, as an entrepreneur, you have no time to waste. Competitiveness demands fast turnover and continuous improvement in services, processes and products. You have to pilot your innovation as quickly as possible and then deploy it in the marketplace. As Figure 5 illustrates, as product life cycles become shorter, any delay or slippage in the innovation process cuts dramatically into mature sales. Fewer sales can take a serious bite out of profits and ultimately threaten the project's viability.

In summary, then, you need to become engaged in collecting real-world data from real-world tests as fast as possible. Then you can move forward on the basis of evidence and hard facts, not on the basis of speculation.

Figure 5 — Product Life Cycle



Produce Prototypes and Pilots

During the development stage, the entrepreneur produces a series of prototypes. Based on customer and other research, the **Draft Innovation Plan** written at the end of the design stage identified and described factors that were key for a successful innovation. The question to be answered during **development** is whether or not the initial versions of the innovation capture the essence of the specifications. You want to be sure that the innovation functions as intended and that you identify those areas needing improvement as you move on to build further generations of prototypes and into **deployment**.

It is important to remember that innovation has to be integrated into every aspect of your business and that prototyping and pilot testing must include as many of the key linkages as possible — marketing, training, after-sales service, etc., in addition to the product, process or service itself.

The testing process will differ radically depending on the type of business you own. If you manufacture products, you will need to develop and test prototypes. If you are in a service-oriented business, you will need to run trials of your proposed new services. If your innovation consists of introducing a new process into your business, you will have to pilot it in some controlled way. Obviously, a new restaurant, a new piece of software, a new mutual fund, a new internal process control system and a new children's toy all require different approaches to prototypes, pilots, trials and tests.

Nevertheless, there are some broad principles that can be applied to producing prototypes or mounting pilots, no matter what the business.

First and foremost is the principle of focusing on appropriate segments of your existing business when innovating. In most cases, an innovation will grow out of your previous experience. For example, a custom software developer who has written several office management programs for physicians may decide to produce a generic software package for medical office management. Any innovations should address an entire coherent segment of the business.

Each business segment will include a set of activities that might involve discrete areas such as production, service delivery systems, accounting procedures, administrative structures, distribution channels and so on. By adapting the useful aspects of these activities and integrating them with the innovation, you avoid development costs, shorten the innovation cycle and gain the advantage of using something you are already familiar with.

FACING THE F-WORD — FAILURE

Tom Peters, business guru and co-author of the classic *In Search of Excellence* (New York: Warner Books, 1982), vehemently argues that business people need to get over the F-word — “failure.” Peters claims that a key part of successful innovation is “to make *more* mistakes, *faster*”:

To increase the speed of innovation and dramatically accelerate product development cycles as required by competitive conditions, we must quickly come to grips with the word “failure” and the issue of failure. The timely achievement of anything new entails vigorous public support of failure — not just support for “good tries,” but public support for failures themselves.

Peters quotes with approval from Soichiro Honda, founder of Honda Motor Company, on the role of failure in innovation: “Many people dream of success. To me success can only be achieved through repeated failure and introspection. In fact, success represents the 1 percent of your work that results only from the 99 percent that is called failure.”

Peters adds that it is important to move quickly to pilots so you can fail quickly, learn from your failure and adjust. His point is that only by rolling up your sleeves and actually trying the idea out will you have a chance of improving it. “There is an almost irreducible number of failures associated with launching anything new. For heaven’s sake, hurry up and get them over with!”

A second and equally important principle in prototype production, testing and piloting is that, when you don’t have a reusable chunk of your own business to apply to the innovation, adapt and adopt chunks from others. Sometimes innovators are reluctant to do this, suffering from the “not invented here” syndrome. However, you should overcome any false pride and borrow good ideas whenever you can find them — without, of course, infringing on intellectual property rights.

Benchmarking (described in the preceding section on design) is one useful technique for learning about good business practices you can borrow. Surprisingly, companies will often invite you to visit them to show you some aspect of their business of which they are particularly proud — such as a just-in-time (JIT) inventory control system. Take advantage of these opportunities and borrow from the best.

Reusing segments, modules and subsystems from existing businesses is vital to successful innovation. Incorporating proven pieces into an innovation can shorten the innovation cycle, reduce costs, minimize the number of defects, and

thus ultimately lead to more satisfied customers and a more profitable business.

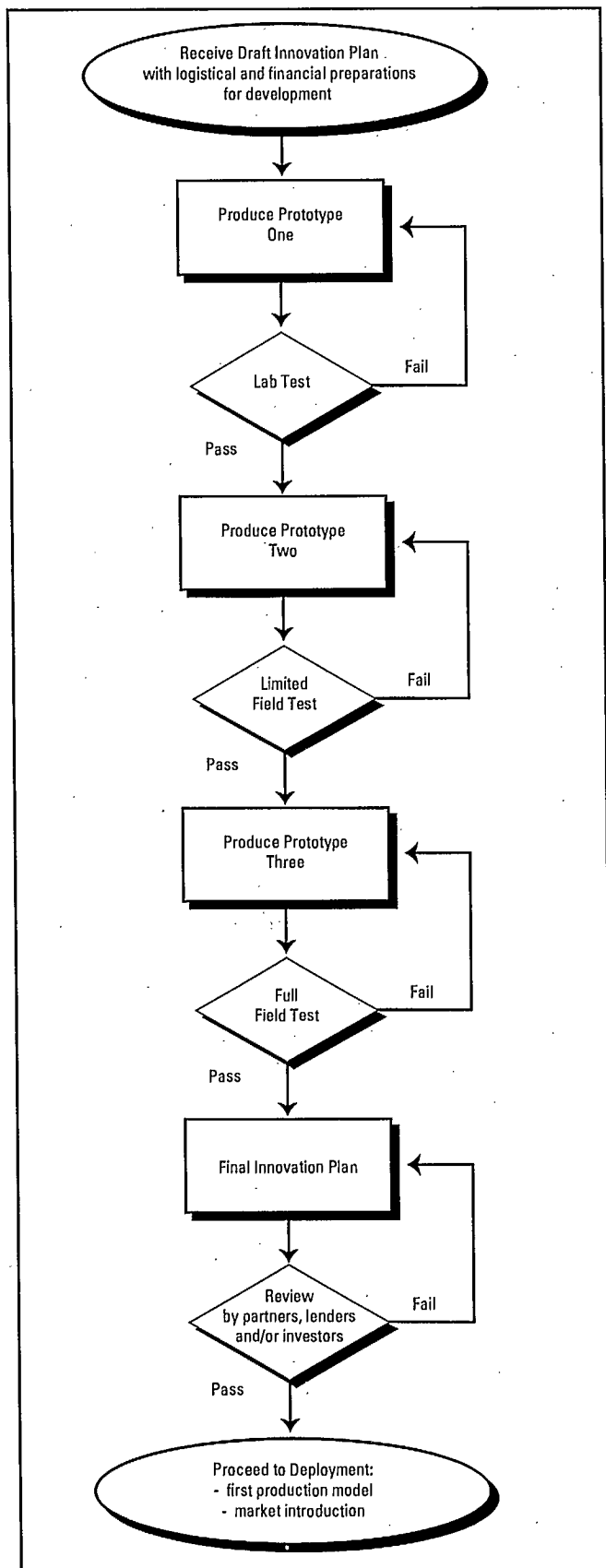
Figure 6 flowcharts a simple model of the development process based on standard industry practices. During the preceding design stage, a Draft Innovation Plan was produced, and logistical and financial preparations were made for testing the innovation. With these preparations, the innovator is ready to undertake prototyping, trials or pilots.

The development process involves the production of increasingly sophisticated prototypes, the running of more elaborate and sophisticated service trials or the application of a process to larger parts of the business. Each of these approaches involves tests that get progressively more rigorous and comprehensive. As a result of these steps, the innovation undergoes an iterative process of continuous testing and incremental improvement. At the end of development, test results are incorporated into a **Revised Innovation Plan** and this plan is reviewed. If the innovation passes the review, the entrepreneur is ready to proceed to deployment and the launch of the innovation into the marketplace.

Of course, in actual practice, depending on the nature of the innovation, the development process may have fewer or more steps, and may be simpler or more complex than the model used here. However, this model of development is a succinct summary of standard practice in many different industries, and can serve as a useful starting point for prototyping and testing most innovations.

Internal Testing: The first prototype, service trial or process implementation is a quick and dirty version of the innovation designed for carefully controlled testing. The purpose of testing at this stage is to determine if the innovation meets the paper specifications developed in the design stage. In the case of products, for example, you might test them in a lab by taking them to their breaking point to see what safety tolerances they possess. In the case of a service, you might try to anticipate all of the demands, options or constraints imposed on the service, especially during peak times or emergencies. In the case of processes, you might test how well they hold up under conditions of extremely high volume or accelerated deadlines.

Figure 6 — The Development Process



In some businesses, it may be possible to use computer simulations to test your idea quickly and cost effectively. These are now becoming more common, and many industries now make extensive use of simulations to model and test an innovation before actual production of a prototype or testing of a service or process. For example, software is now readily available for functions such as project management, building or machinery design and financial planning. Depending on your business, you might investigate the availability of software that can help you in testing and developing your innovation.

Limited Field Test: The second prototype, which in some industries is called the “alpha” version, is subjected to limited field testing. Such tests mark the first time the entrepreneur has a chance to learn how the innovation performs under actual operating conditions.

The sites and subjects for these first field trials are typically few in number and are carefully chosen. People using the innovation at this stage are often members of the company developing it or are from associated friendly companies — suppliers, distributors or strategic partners. Since there will typically be numerous teething problems with the first field test version of an innovation, it is important that testers and test sites are sympathetic and secure. Word of mouth is the most effective form of advertising, but it can also be the most destructive. No entrepreneur wants potential customers judging an innovation by hearsay regarding the inevitable failures of an early version prototype.

Since this is the last test before the innovation goes to full field trials with potential customers, developers usually produce several iterations of the prototype to ensure that it is ready for wider release.

Full Field Test: The third prototype, often called the “beta” version, and the full field testing it undergoes, represents the first chance the entrepreneur has to see how potential customers from the target market respond to the innovation under real-world conditions.

In some cases, full field testing is done with lead customers — the company’s most demanding and advanced customers. Lead customers may be interested in participating in field trials if they believe that early use of the innovation will be beneficial to them — if, for example, a business believes the innovation will give it a competitive advantage in the industry.

Focus Groups in Prototype Testing

Focus groups are a form of "lab" testing that is used to determine if the early prototype meets customer expectations and if it should still undergo improvement. A dozen or so people, often representing different segments of the target market, are brought together in a focus group. A skilled moderator introduces them to the prototype product or service and to competing offerings. (Using several competing products or services without identifying the one of particular concern is considered essential in getting frank and spontaneous responses.) The focus group is then led through a loosely structured series of questions comparing the different offerings and identifying their strengths and weaknesses. Typically, the session is videotaped, and key people from the innovation team watch the proceedings through a one-way mirror.

One interesting version of the focus group "lab" test developed by a Canadian high-tech company is so-called "discovery learning." The company that developed this test wants to be sure that its products are so user friendly that they can be used even without the manual — that they are self-explanatory. To evaluate the product's ease of use, the company puts two people from the target market in a room with a prototype of the product, but with no written or verbal instructions on its use. The two people are then asked to work together at figuring out how to use the product. The people comment to each other about the difficulties they are encountering and they make verbal suggestions to each other about the product's operation. Team members find that the communication between the two subjects gives them valuable insights into the product's ease of use as well as pointers for improving it.

In other cases, full field testing is done with a sample of potential customers selected to be representative of the entire target market. Consumer products are often tried out in test markets — circumscribed geographic areas that are generally representative of the larger regional, national or international target market.

When Is Testing Finished?: The degree to which an innovation is field tested and perfected before moving to deployment varies according to the nature of the offering and the risks and rewards associated with it. If, for example, you are a corporate trainer with a few large customers and you develop a new course for your clients, you will have opportunities to modify your offering continuously during deployment. Indeed, every time you deliver the course, you will no doubt customize it to meet that particular client's needs. Thus, your innovation does not need to be "bulletproof" before deployment.

If, on the other hand, you are developing a widely distributed consumer product such as a new computer game, you will want the product to be as free of defects as possible. Once a mass-market consumer product is released, defects and weaknesses are extremely difficult and expensive to repair.

PROTOTYPING AND TESTING CHECKLIST

Prototyping and testing is essentially a three-step process. The first prototype is lab-tested primarily to determine conformance with specifications. The second prototype is used in limited friendly field trials. The third prototype is used by a select group of real customers in real-world situations.

First Prototype and "Lab" Test

Devise tests that determine whether your innovation performs as intended. Does it meet the performance specifications you developed during the design stage?

Second Prototype and Limited Field Trial

Based on the data you obtained from your "lab" tests, develop an improved prototype and then test it in a few friendly operating environments. Does the innovation perform as intended? Does it satisfy users? What areas need improvement?

Third Prototype and Full Field Trial

Produce a third prototype of the business that is as close to a finished version as possible within resource and time constraints. Field test it in real-world circumstances with lead customers or in a test market situation. Does the innovation perform as intended? Does it satisfy and delight customers/users? Where are opportunities for improvement in the business? In controlling costs? In meeting customer needs? In outflanking competitors?

Build a Multifunction Team

Competition today requires shorter development times and the ability to deliver a range of new products to market quickly. Successful firms have responded with a new approach to the innovation process. Instead of performing the Four Ds of innovation sequentially, one after the other, innovating small businesses now save time by performing them concurrently or simultaneously. Moreover, by creating teams embodying different skills and capabilities, innovators are able to anticipate and eliminate defects at an early stage in the process, before they grow into major problems. Such multifunction teams are easy to set up in small companies where one individual may already have responsibility for several different functional areas.

Sequential problem solving is, in fact, a major weakness of traditional innovation systems: the manager has an idea and assigns someone to design it; the design is then handed off to someone else, perhaps an engineer, who translates the idea into detailed specifications; the specifications are then passed on to people in manufacturing who only then begin to worry about how the product is to be made; then the idea is presented to the purchasing department, which orders the needed supplies; from purchasing, it goes to marketing; and from marketing to field service and sales. One group essentially finishes its "higher order" task before passing the job "down" to the next-level executor. Interaction among functions is minimal; what's done is always within the context of the hierarchy of functions — design, then engineering, at the top; manufacturing and sales at the bottom.

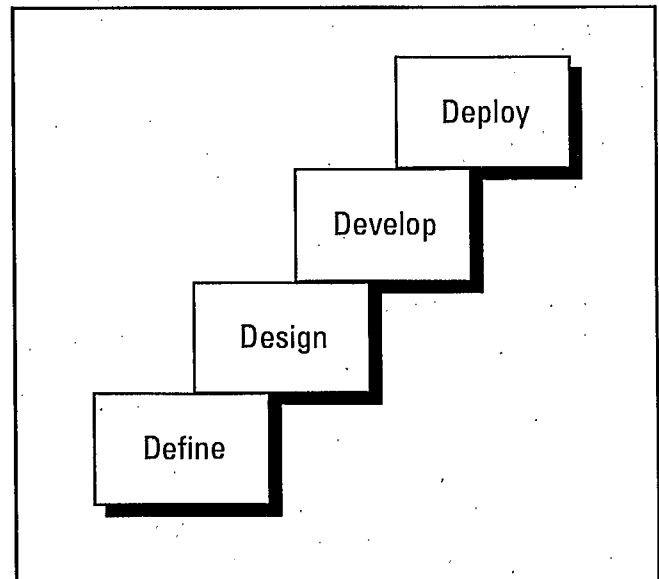
There are many problems with this sequential approach to innovation. Projects are often late because the idea runs into unexpected snags and has to be sent back to an earlier stage in the process for reworking. For example, the manufacturing division discovers that something cannot be produced as designed and has to send it back to the engineer for a different approach. Even then, it may still be riddled with shortcomings — hardly surprising in a system in which products and services are defined, designed and developed in isolation or with little input from those who ultimately produce, sell and use them.

Moreover, because of the isolation of each step from every other, defects often pass through the process undetected until the product or service is in the market. A small mistake that would cost a few dollars to fix at the design stage can cost millions if it requires a product recall or the redesign of a service.

Companies have overcome these drawbacks by moving to **concurrent innovation** (see Figure 7) supported by a **multifunction innovation team**. This cuts development times and ensures that innovations meet and exceed customer expectations.

The multifunction team really comes into its own during prototyping and testing; that is, during the development stage. This is where every aspect of the business must be tried out in real-world conditions. A broad spectrum of expertise is required if the company is to learn all it can from these experiments.

Figure 7 — Concurrent Innovation



However, building the multifunction team should start right at the beginning of the project, during the definition stage. The core team formed at the beginning at a minimum should have people representing all the key functions involved in the innovation including a designer, a developer, a producer (manufacturer), a purchaser, an accountant, a marketer and a salesperson. Also desirable are a supplier, a dealer or other representative of the distribution channel and a customer/user. Of course, in a smaller business, several of these functions may well be represented by one person. As the project proceeds from definition to deployment, the core team remains the same and stays with it. Other people join and leave the team as required.

A key benefit of the multifunction team is that it builds a feeling of commitment and ownership. Every member takes responsibility for the success of the project as a whole. Moreover, concurrent innovation dramatically increases a company's ability to respond to fast-changing market conditions — an essential prerequisite in the new economy. By moving quickly to trials with prototypes in the marketplace, it can be discovered early in the innovation process — before significant investments are made in production, marketing and distribution — if the new or improved product, service or process actually enhances customer satisfaction and increases the company's profits. Information from these early trials can then be fed back into the innovation process to further refine the product, service or process being developed.

Multifunction teams are much easier to assemble in a small organization — many small firms work this way instinctively. But they can also have spectacular success in big traditional organizations that are willing to change. Facing substantial losses in the early 1980s and threats to its very survival, the Ford Motor Company radically changed its innovation processes during the development of the Taurus. Team Taurus included, among others, designers, engineers, manufacturing people, lawyers, marketers, dealers, suppliers, representatives of insurance companies and customers. The result has become a classic in the new multifunction approach to innovation.

Systematic studies as well as cases like Ford's Taurus confirm the superiority of the team approach. For instance, one study of new product launchings in high technology firms found that a critical distinguishing factor between success and failure was the "simultaneous involvement of the create, make and market functions" from the outset of the project.¹ Similarly, analyses of Japanese successes emphasize their team approach to new product introduction, which includes the location in one place of engineers, designers and production staff.

In summary, today's successful innovators rely on a process in which every one of the Four Ds takes place concurrently and with the participation of all members of the multifunction innovation team. People from every stage of the process — from manufacturing, marketing, sales, service and even customers and suppliers — all participate from the earliest stages of the innovation process, from developing the concept and setting design specifications to final deployment and delivery in the marketplace.

Write a Revised Innovation Plan

By the time full field trials are finished, you should have thoroughly tested the innovation — not only the product, service or process, but also its impact on all other aspects of the business. The last remaining question to answer is whether or not it is worth actually investing the resources needed to fully deploy a finished version of the innovation.

At this point, you should revisit your Draft Innovation Plan. As Murphy's Law suggests, you have undoubtedly encountered a number of unanticipated "surprises" during testing — surprises that require substantial revisions to the original plan. Incorporate the prototype test results into a Revised Innovation Plan that includes hard data from the tests and trials on as many of the key aspects of the innovation as possible.

Using the revised plan, you and your partners, lenders or investors will be able make an objective assessment of the innovation's viability. Such a review and approval is vital if you are seeking outside financing and assistance. Even if you have no partners or outside financing, you should subject your plan to as rigorous a review as possible. Where feasible, you might talk to external experts or colleagues with extensive experience in your industry.

There are many considerations to be taken into account in assessing an innovation's business viability. An innovation may be "successful" with customers, but not profitable enough to justify deployment — perhaps because the market is too small, distribution is too difficult or profit margins are too low. You should also consider alternative investments of the resources required for deploying the innovation. Although an innovation may be a viable business, there may be alternative investments with superior risk/reward characteristics.

¹ Cited by Tom Peters, *Thriving on Chaos: Handbook for a Management Revolution* (New York: Alfred A. Knopf, 1987), p. 26.

CHECKLIST: ARE YOU READY FOR DEPLOYMENT?

After prototyping and testing, the business plan is revised in the light of data obtained from the tests. Use the Revised Innovation Plan and the following checklist to determine the future of the project.

Set up a scorecard with the key factors for success you've identified. Rate how well the final prototype succeeds in tests on each of these factors.

Assess the responses of potential customers/users to the innovation during trials. Does it meet and exceed customer/user expectations?

In terms of what you now know (after testing) about the likely costs and difficulties involved, review your assessment of the project's financial viability. Can the innovation contribute to the profitability of your business?

Ask associates, partners, employees, suppliers, customers and consultants with expertise in the industry to review your Revised Innovation Plan and to assess the business's prospects for success.

Based on all these inputs — the trials and tests, the Revised Innovation Plan, assessments by knowledgeable people and your own analysis — determine whether the business is viable and whether or not you should proceed to deployment.

THE FOURTH D: DEPLOY

*Select a Deployment Strategy
Manage the Deployment Process
Implement Your Marketing System
Make Innovation Continuous and Concurrent*

The Goal of Deployment

The final stage of the Four Ds of the innovation process is **deployment**. The goal of deployment is to scale up the innovation from the product prototypes, services trials and pilot processes of the previous development stage to full-scale business operation.

A good business functions like a well-oiled machine, delivering value to customers and profits to the entrepreneur. The challenge in deploying an innovation is to keep that machine functioning smoothly. The **Revised Innovation Plan** serves as the blueprint for achieving this objective.

Scaling up from product prototypes, services trials and pilot processes during deployment is not as simple as it might seem. Indeed, increases in scale often create unanticipated consequences and serious management challenges. Without careful preparation, a business may be in for unpleasant and costly surprises when it moves from small-scale test runs to full-scale implementation.

The challenge of scale-up occurs not in physical processes only but in every aspect of a business from human resources to administration and finance. With increase in size, you gain economies of scale and scope, but you can also lose efficiencies through layers of management and increasing complexity.

Select a Deployment Strategy

A key issue is how quickly to deploy the innovation. There are two basic strategies to choose from. One is to move as quickly as possible — to come out with all your guns blazing. The other is to take a gradual approach, implementing the innovation slowly and moving cautiously.

Strategy One — Fast, Full Deployment: Moving quickly to full deployment is a high-risk, high-reward approach. If you launch quickly and fully into a high-growth market, you can sweep away your competitors and achieve

substantial profits. On the other hand, if you misjudge the situation, you can experience significant losses in a very short time. Movies, for example, are typically launched with major publicity campaigns and then quickly put into wide release. Many of them lose money or make only a small profit. However, a few succeed spectacularly, racking up enormous profits in a very short time.

There are a number of circumstances in which fast, full deployment is the preferred strategy. For example, in cases where your innovation can be easily copied, competitors may seize any markets you haven't addressed so you are best to hit them all at the same time. In this case, there may be no choice but to deploy the new product, service or process as broadly and as quickly as possible. In addition, for fashion and fad products — popular articles of clothing and recordings — the product's life cycle is so short that you need to move to full deployment as quickly as possible. Otherwise you'll miss the market opportunity entirely.

Strategy Two — Slow, Staged Deployment: Deployment in small incremental steps minimizes risks but it also precludes you from achieving an explosive increase in markets and profits. A phased approach to deployment is worth serious consideration in many smaller businesses with limited resources. It is especially worth considering if the company's innovation enjoys some form of patent or other protection that can delay imitation by competitors.

A Combined Approach: It is possible to combine elements of the two basic deployment strategies. Some successful innovators launch a series of product or service variants into the market as quickly as possible. The first or penetration model will often be comparatively simple and low priced. Its purpose is to establish a significant market presence quickly. Cash flow from the penetration model can then be used to modify the product or service in line with market reactions and to evolve it rapidly toward full-featured systems tailored to specific market segments. By shortening intervals and getting several versions of the product or process into the market quickly, a business can rely less on forecasts and more on actual market responses.

This is precisely the strategy Japanese companies used to capture market after market in North America, from consumer electronics to automobiles. For example, the "econobox" cars used by Nissan, Toyota and Honda to penetrate the market were the butt of jokes in North America when they were first introduced in the 1960s and early 1970s. Twenty years later, these manufacturers have diversified their portfolios and have moved up-market, capturing large shares of the demand for mid-size and luxury cars.

Manage the Deployment Process

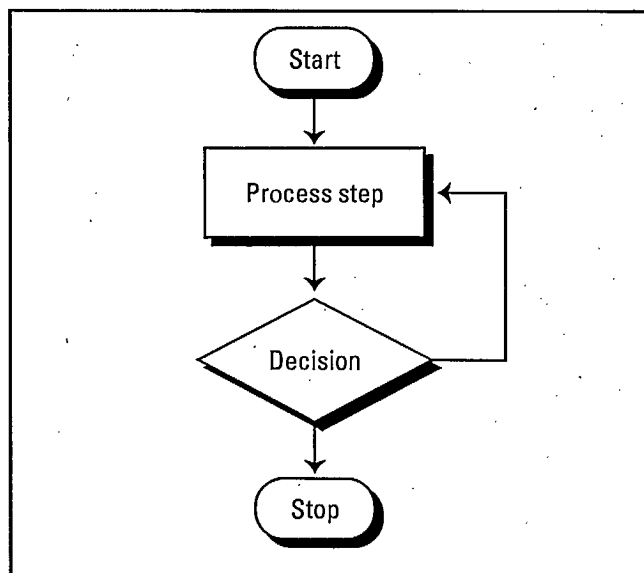
Once you have a deployment strategy worked out, you are ready to tackle the deployment process itself. Managing deployment is the most complex and administratively challenging task of the innovation cycle. During deployment, all the systems required for the innovation must be put into operation. Depending on the type of innovation involved, this may include manufacturing, marketing, distribution, sales, service, training and so on. The deployment process can be broken into three steps:

- **Detail the innovation.**
Describe in detail the operation of the innovation you are establishing — the goal you are aiming to achieve during deployment.
- **Plan the innovation start-up.**
Plan the project needed to build the innovation — the actions you need to take to get the innovation up and running.
- **Implement the start-up plan.**

Detail the Innovation: In order to deploy the innovation, you must prepare a detailed description of how it fits into your business. The Revised Innovation Plan contains a detailed description of the innovation and how it should link to the company's other operations. Members of the innovation team should make sure that they all understand these details in the same way, after which they have to develop a description of everything that has to be done to make it happen.

One technique that has proven very effective in conceptualizing business processes is the flow chart. Using recognizable symbols to represent different types of steps in any process, flow charts provide excellent documentation and are a useful tool for examining how various steps relate to each other (see Figure 8).

Figure 8 — Flow Chart Model



Flow charts can be used to describe an entire business (and therefore show how an innovation impacts on the business) or they can be used to describe the process by which an innovation is implemented. In the preceding section on development, flowcharting was applied to prototyping and testing (Figure 6). Figure 9 is a sample flow chart illustrating the serving of a hospital meal.

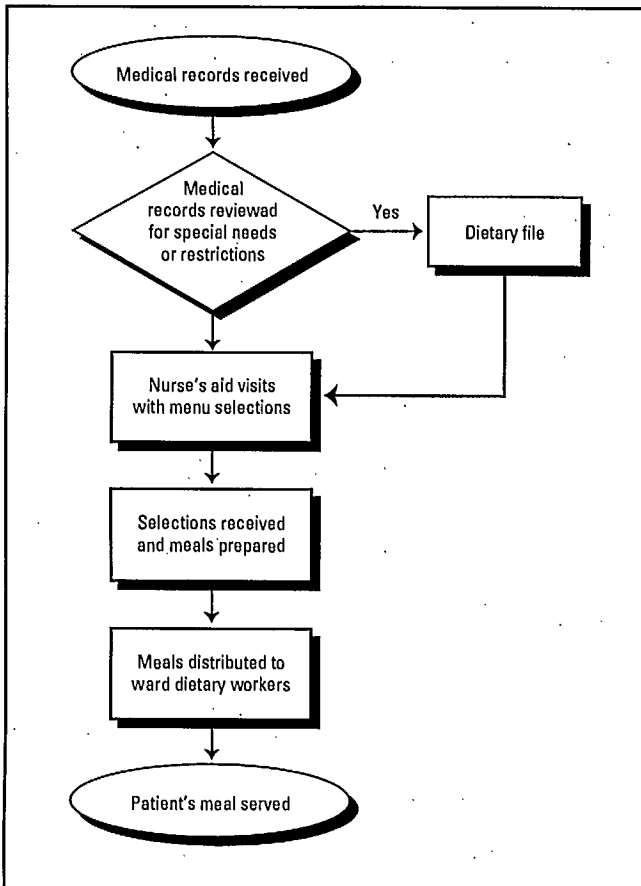
There are a number of benefits to mapping the innovation on a flow chart before proceeding with deployment. First, flowcharting forces those involved in the innovation to be precise about the way the innovation is to operate. And because the flow chart is jointly prepared by everyone involved in the innovation, it brings any potential differences or disagreements out into the open for joint resolution.

Once the team has finished and has agreed on a first-draft flow chart of how the innovation is to operate, team members usually uncover a number of potential sources of trouble or opportunities for improvement. These can be corrected relatively easily at this early point in the deployment process. Indeed, changing the flow chart at the beginning of deployment is far quicker, cheaper and easier than waiting to discover problems later on when the innovation is actually operating.

Plan the Start-up: Once the team has produced a detailed flow chart of the innovation it is deploying, it can move on to the second phase of the deployment process — developing an action plan for implementation. The details of this plan are determined by the nature of your business, the complexity of your innovation and the deployment strategy you've chosen (rapid or gradual).

In some cases, the prototypes or pilots you devised with customers during the development stage will evolve easily into a commercial launch. In others, you may need to jump-start the innovation — perhaps with a well-publicized formal launch. In either case, moving from innovation plans and flow charts to operations is a classic project management challenge and can be tackled with proven project management tools.

**Figure 9 — Sample Flow Chart:
Serving a Hospital Meal**



The heart of project management is coordination. This involves the scheduling of **tasks** — the actions that need to be taken — and the assignment to these tasks of **resources**, including personnel and equipment. The challenge is to handle task and resource assignments and scheduling so that the project gets done in the most economical, effective and speedy way possible.

Dependencies are a key problem in project coordination and scheduling (Task B is dependent on Task A when Task B cannot be started until Task A is complete). You need to look after dependencies to minimize waiting time and to make sure resources are used as productively as possible.

There are some well-established techniques for project coordination and scheduling. The most widely used project management tool and certainly one of the most valuable is the PERT (program evaluation and revision technique) chart. The PERT chart was originally developed for military purposes and is now widely used in industries, such as civil engineering, where complex projects must be managed to a tight schedule. Figure 10 is a simple PERT used in developing a multimedia corporate orientation session.

DEPLOYMENT MANAGEMENT CHECKLIST

Getting the Innovation up and running can be a major project management challenge. The following checklist will help you meet this challenge.

Deployment Strategy

Taking into account comparative risks and rewards, determine how fast you should deploy your innovation. Should you attempt to hit a home run with fast, full deployment? Or should you use a less risky incremental approach?

Describe the New or Improved Business

At a meeting with all members of the deployment project team, delineate in detail the innovation you are introducing. Use a flow chart to ensure a shared vision.

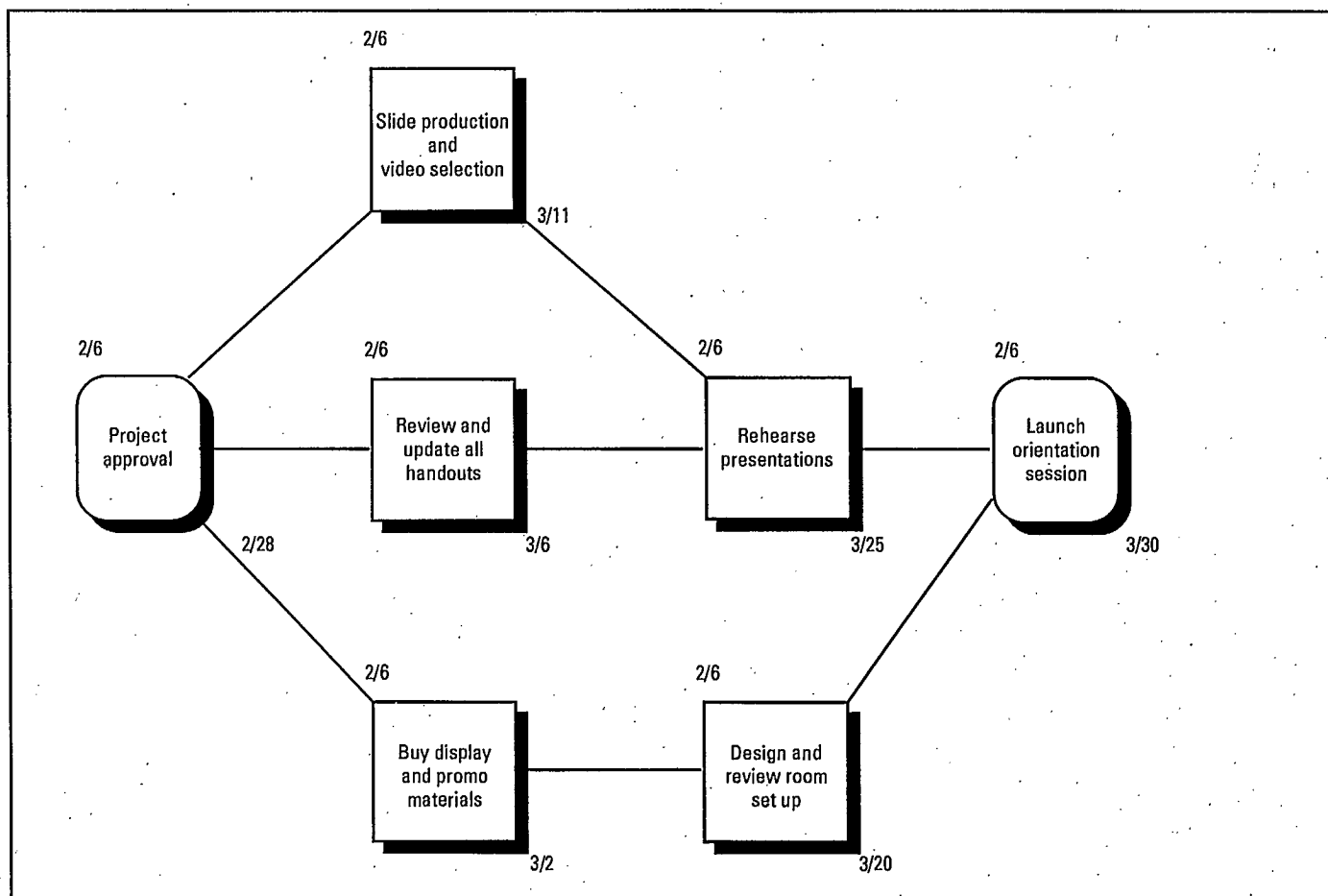
Plan the Business Start-up

Develop a project plan for the innovation start-up. Use a PERT chart to handle coordination and scheduling.

Implement the Start-up Plan

Implement the plan concentrating on good project management, especially communication among team members, to keep the project on time and on track.

Figure 10 — Sample PERT Chart: Multimedia Presentation



Excellent general project management computer programs and other materials are available to help you construct PERT charts. A properly constructed PERT chart shows tasks, resource assignments and the project schedule. It helps manage dependencies and it reveals the **critical path** — the series of dependent tasks that must each be finished on time if the entire project is to be completed on schedule.

Once the project team has a start-up plan in place, you are ready to move to the third and final step of the deployment process — implementing the plan and getting the innovation up and running. Good project management, particularly a highly skilled project leader or project prime, is vital to successful implementation. The leader keeps the project on track and makes sure that the team remains focused and motivated. To manage the project, you need someone with excellent organizational and people skills, as well as a deep understanding of the innovation and a high level of commitment to its success.

If you as the innovator lack these skills, it is critical that you find someone who has them to manage the start-up. Running an innovation once it has been deployed is a far less challenging task than creating it the first time. Deployment is a one-of-a-kind operation that requires someone with unique project management skills, expertise and judgment.

Tips on Successful Project Management

The heart of good project management is ensuring that everyone pulls together as a team. For this, communication is critical. You want team members to be aware of the project's progress and their role in it. Specifically, you want each team member to understand the task to be performed, the deadline for its completion and how it fits into the project.

A useful technique is for the project manager to pin up the project PERT chart in a prominent place where everyone can keep track of progress. Another proven technique is regular meetings, typically once a week, for all project team members. Each person's assignments and progress are reviewed. For those who are falling behind, remedial steps are taken immediately. Good project managers also use rewards and praise. They combine a series of related tasks into a phase with a milestone that, if completed on schedule, is marked by recognition and rewards.

Finally, a good project manager must also be flexible. It is important to meet the schedule and the original project goals, but it is more important to deliver quality. Once implementation is under way, the project manager must continually reassess if the project is doable as originally planned. Then, if required, the manager must have the courage to undertake readjustment and reorientation. Without judicious mid-course adjustments, the project may get farther and farther off track and meet neither deadlines nor quality standards.

Experienced project managers report that a common mistake is to be too optimistic about schedule, resource needs and the pace at which people can deliver. A realistic assessment of resources and of the project's requirements will help avoid this error. Prudent managers also build a minimum 10 to 15 percent margin of error into their project plans.

Implement Your Marketing System

A key element of deployment is putting in place the downstream marketing end of the business including distribution, promotion and sales. Of course, the marketing system associated with the innovation has been defined, designed and developed during the three preceding stages of the innovation cycle. Implementing it as part of deployment, however, is indispensable to the success of the innovation. With effective sales and marketing, you can make a commercial success out of something as seemingly unlikely as a "pet rock." Without them, even the most sophisticated product or service can fail.

A highly recommended strategy is to begin marketing the innovation as soon as possible, preferably well before you begin investing in deployment. Indeed, if you are able to line up customers willing to make advance payments on the basis of the plans made during design or the prototypes built during development, you can use the income to fund part of the start-up. Early sales are also a powerful enticement for potential partners, investors and lenders to participate in the business and to help fund it.

The Marketing Mix: During deployment, a key challenge for the entrepreneur is to put in place all the elements of the business's marketing system. The marketing mix is the term commonly used to refer to the combination of four key elements that form the core of a business's marketing system; the four elements, often called "the Four Ps of marketing," are **product** (or service), **place**, **promotion** and **price**.

Table 2 shows some of the variables included in the Four Ps. As the table indicates, "product" refers as well to service. You develop a **product** or service that, on the basis of research and testing, has been found to satisfy customers. You find a way (**place**) to reach customers. **Promotion** tells target customers about the availability of the service or product that has been developed for them. Then, the **price** is set on the basis of customer demand, competition and costs.

Table 2 — The Four Ps of Marketing

PRODUCT (OR SERVICE)	PLACE	PROMOTION	PRICE
Features	Distribution channels	Sales personnel	Introductory pricing
Accessories	Wholesalers	Selling system	Discounts
Installation	Retailers	Advertising	Geographic terms
Warranty	Storage	Publicity	
Packaging	Transportation		
Brand Name			

THE MARKETING MIX: OUR DAILY BREAD

A good example of the way a company creates a marketing mix for a specific target market comes from the experience of a small bakery that decided to expand its bread-making business several years ago.

On the basis of research, the bakery found that the bread market can be divided into three distinct segments, which it called the Upscale Health-Conscious Consumer, the Doughy Delight and the Value Consumer. Each of these market segments requires a different marketing mix to meet its needs — a different combination of product, place, promotion and price. In the following, the three market segments and the three marketing mixes are described.

Segment I: The Upscale Health-Conscious Consumer wants a high-quality, healthy, gourmet bread. These consumers are well aware of the health benefits of dietary fibre. As well, they are looking for a premium product that appeals to their individual taste.

Product: The bread should offer a unique blend of whole grains, as well as be homemade-looking and unsliced. Packaging should clearly describe the contents and health benefits (no preservatives, etc.). Since the market segment is crowded, the product should be distinctive in presentation and packaging. **Place:** This is a niche market product. Distribution is best in specialty food boutiques, upscale bake shops, health food stores and the specialty food areas of supermarkets where these consumers shop.

Promotion: Upscale lifestyle publications such as travel and gourmet magazines target this group. Tasteful posters displayed in the appropriate retail outlets also reach them. **Price:** The price and profit margins can be high. These health-conscious consumers are willing to pay a premium for a high-quality specialty bread.

Segment II: The Doughy Delight market segment is made up largely of middle-aged and older working-class people. This group is unconcerned about health benefits and buys bread both as a staple and as a comfort food. **Product:** This is the market for the traditional mass-market, sliced white bread. The bread should be doughy, as consumers will squeeze it to check its "freshness."

Place: Distribution is through convenience stores and supermarkets where this market segment shops. **Promotion:** Television advertising builds brand recognition. Prominent placement of the product at the front of the supermarket bread section is critical, since these are impulse shoppers. **Price:** Since this type of bread is an undifferentiated commodity, price competition is fierce. The price must be low.

Segment III: Value Consumers are middle-class family people who want both a low price and health benefits for themselves and their children. They are concerned about value for money. **Product:** This is the market for sliced, whole-wheat bread and high-fibre sliced white. There is some room in this market segment for somewhat higher-quality, more health-oriented breads. **Place:** Distribution is through convenience stores and supermarkets. **Promotion:** Coupons and advertised specials in newspapers cater to people who watch for specials and then buy in bulk. **Price:** Since this type of bread is also an undifferentiated commodity, the price must be low — although its health benefits mean that prices can be higher than those for traditional white, sliced bread.

With the above market analysis in mind, the small bakery decided that it would be best able to compete in the Upscale Health-Conscious Consumer market. It felt it could not compete in the other two market segments where economies of scale are paramount, margins are low, and the big bakeries concentrate their efforts.

Knowing what it did about the market segment, the small bakery gradually built up a line of gourmet breads sold in specialty outlets at premium prices. The company's marketing mix — its combination of product, place, promotion and price — has been very successful in the regional market the bakery serves. Profits continue to grow, and the company continues to expand its specialty bread business.

Marketing Mix Exercise

Refer to the marketing mix case study in Table 2 as an example. Divide your own market into market segments (three to six segments will usually do the job).

Describe the distinguishing characteristics of each of these segments.

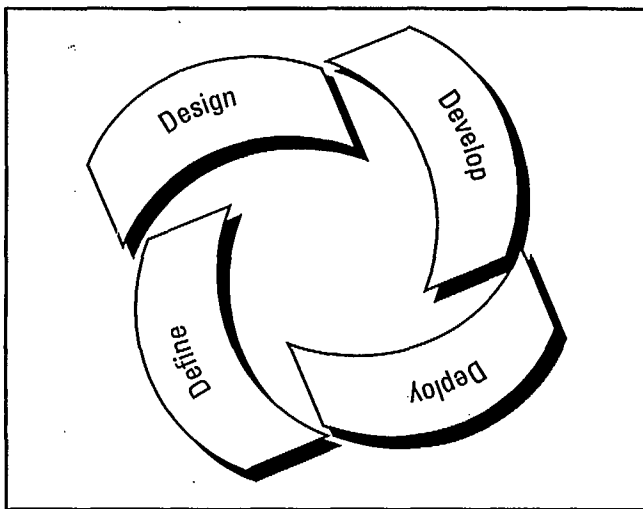
Devise a marketing mix — a combination of product, place, promotion and price — suitable for each of these segments.

Make Innovation Continuous and Concurrent

The preceding section on development explains the idea that innovation is concurrent or simultaneous rather than sequential. In the concurrent innovation system, multifunction teams with members representing all the key functions in the innovation cycle stay with the project from definition right through deployment.

But innovation now has gone beyond simple concurrency. As Figure 11 illustrates, innovation processes today are not only concurrent but also continuous. Definition, design, development and deployment are all carried on in a never-ending cycle. No sooner is a product, process or service launched into the marketplace than the innovation cycle begins again — searching for opportunities to improve the current offering or replace it with a better one (define), planning (design), prototyping and testing (develop), and then launching the innovation into the marketplace (deploy).

Figure 11 — Continuous Innovation



Rather than the end of innovation, deployment is just one stage in an ongoing process that never ends. The objective is to return again and again to each of the Four Ds as you constantly improve your existing business or launch new businesses.

Deployment does not complete the innovator's job; in fact, it has only started. The challenge now is to continue making improvements, large and small, to the innovation. The central role played by continuous innovation or continuous improvement can be traced to the quality movement — the

MAKING CONTINUOUS IMPROVEMENT

Founded in 1983, Shade-O-Matic of Downsview, Ontario, produces a full line of window shades, blinds, pleated shades, roller blinds and California shutters. It began its existence servicing the local market, but over the past decade it has enjoyed rapid sales growth and now employs 160 people in a facility covering 7 250 m² (78 000 square feet). The company is now one of Canada's leading manufacturers of window coverings.

One of the principal reasons for the company's success has been continuous technological improvement. When the company started out, Norbert Marocco, the company's president, found that many of the components available from standard suppliers (mostly imports) were inferior. As a result, he undertook to redesign and fabricate the parts used in his own finished blinds. As his components were of better quality, the final product was also stronger and lasted longer than the competition's. In addition, he invented and patented a corner hinge for a one-piece angle track used in blinds covering bay or bow windows. Previously, such windows required three separate tracks. As a result of this patent and its attention to quality, the company now enjoys annual sales of \$20 million, of which 15 percent are exports.

hottest business management trend in North America for the past decade.

The central idea of the quality movement is continuous improvement. Continuous improvement replaces "Don't fix it if it's not broken" with "How can I make this better?" Quality can be attained only by relentlessly focusing on improving every process in the company.

Continuous improvement means not only fixing defects, but also taking the customer's viewpoint and ensuring that what he or she gets is as good as it can be. It is not based on gut reactions or best guesses. A fundamental tenet is that decisions must be made on the basis of facts, with the reasoning open to scrutiny. Internally established and agreed upon methods of measuring results and external benchmarks fuel the improvement cycle.

The quality movement has formalized continuous improvement methods for both large and small companies. Large companies with their own training departments have complete continuous improvement systems and train their employees in them. Northern Telecom, for example, has developed a continuous improvement process based on a program originated by Motorola. For small businesses, numerous courses, books, videos and pamphlets are available to teach you how to apply continuous improvement methods.

HOW CONTINUOUS IMPROVEMENT BECAME JOB ONE

Continuous improvement is at the heart of the quality movement. The quality movement burst into the North American business consciousness in 1980 when the National Broadcasting Co. televised a documentary titled "If Japan Can . . . Why Can't We?" The program reintroduced North American business to the ideas of the then-79-year-old W. Edwards Deming, the author of the world's leading theory of quality management. Since then, the North American quality movement has continued to grow in popularity and has emerged as the pre-eminent business strategy of the 1980s and 1990s.

Deming's thesis is that companies can compete in today's global marketplace only if they place their top priority on customer satisfaction through continuous improvement of products and services. After World War II, Deming explains, the world's manufacturing capacity was devastated except in North America. Given the pent-up demand for goods, North American companies could sell just about anything they could make. Quantity was much more important than quality.

Now, however, he says, the situation is completely reversed; many countries have the capability to compete globally. Because supply now exceeds demand, the quality of goods and services has become central to competitive success. Excess capacity has created intense global competition driven by quality. Companies do not have a choice whether or not to adopt the new philosophy; they have only varying degrees of time, depending upon the competition. The only survivors, says Deming, will be companies that make the very best.

Deming is outspoken and witty in his criticism of North American managers: "Export anything to a friendly country," Deming once advised, "except American management." On another occasion, he said: "American management on the whole has a negative scrap value. It's like an old refrigerator you can't sell. You have to pay someone \$25 to cart it off."

Although the pursuit of quality dates from the immediate postwar period, its focus has shifted several times. Quality now is defined as satisfying customers. The starting point for quality is outside the company with customers, rather than inside with processes, products or services. That's because customer satisfaction is recognized as the best indicator that a company is providing something of value.

All studies point to one overriding factor: one key to making continuous improvement work is commitment. Businesses that want to join the future and compete through improvement and innovation need to dedicate substantial resources — capital, equipment and personnel. They need to free up people and encourage them to form continuous improvement or innovation teams that cut across departments and functions. They need to give these teams the time and the resources they need to get on with the job. They need to embed innovation and improvement in the business and make it part of the culture — of each person's concept of their job.

CONTINUOUS IMPROVEMENT CHECKLIST

Continuous improvement means that innovation not only is important when you decide to launch a new product, process or service, but also is integral to your company's day-to-day operations. The following checklist will help you use continuous improvement to satisfy customers and enhance your competitiveness.

Analyze your current operations, identifying the product, process or service you provide; your customers and their expectations; your suppliers and your requirements from them. Flowchart your business processes. (Experience has shown that this step is absolutely essential. Many business people lack a firm grasp of their own business!)

Based on your analysis of your business, on consultations with customers, suppliers, employees and partners as well as on research, identify problems and improvement opportunities in your business.

Select the most promising improvement opportunities and devise solutions for them. Establish measurable targets for your improvement/innovation efforts.

Develop and field test the solution in real-world circumstances. Does the improvement/innovation perform as intended? Does it satisfy and delight customers/users? Will it allow you to achieve the targets established during design? Revise the test solution until it achieves significant results.

Implement the solution — depending on the circumstances — either in a slow, step-by-step fashion to minimize risks or all at once to maximize impact.

Monitor, measure and evaluate the results.

Start the innovation/improvement cycle all over again.

CONCLUSION

Customer-Focused, Continuous Innovation

Today in Canada, small businesses are the engine of economic growth, job creation and innovation. As a result, the central issue for Canadian economic development is how to craft and implement policies to encourage innovation by small businesses in all facets of product development and service delivery. For Canadian small businesses themselves, the challenge is to create, protect and strengthen a competitive lead in their industries. And the only truly successful strategy is continuous innovation.

This document discusses many factors important in innovation. However, two that are worth emphasizing again in this conclusion are:

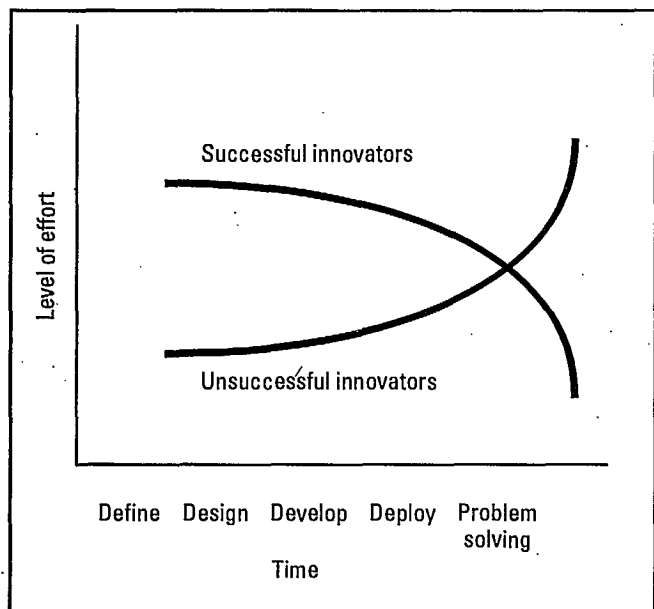
- a focus on the early part of innovation cycle
- a focus on the customer.

Focus on the Early Stages of the Innovation Process: As Figure 12 illustrates, successful innovators recognize the critical importance of the early stages of the innovation process — of **definition** and **design**. Consequently, they invest more resources and time than traditional companies in these processes. In this way, they “get it right the first time.” They ensure that the innovation is carefully targeted and well planned for its market. And they also minimize the number of defects and design errors that must be fixed later in the process, when changes are far more expensive and time-consuming — and when poor performance threatens customer satisfaction and confidence.

Focus on Customers: A focus on customers is the overriding key to successful innovation. At bottom, the problem is a conceptual one. You need to think of your business not in terms of its processes or of the product or service you supply, but rather in terms of the human needs you satisfy. Customers don't really care about your processes, products or services. They have needs to be met and they will pay for whatever you can do — product, service, process or a combination of these — to satisfy their needs better than your competitors can.

A profound understanding of the notion of customer focus leads to a redefinition of innovation. In the end, innovation is not about a new or improved product, process or service. Nor is it really a new or improved business. Innovation is more accurately defined as *a new or improved way of satisfying a human need*.

Figure 12 — Focus on Early Stages of Innovation



The railroad business is often cited as an example of an industry that failed to adapt to the challenge of air travel because it thought it was in the train business instead of thinking of itself as in the transportation business.

Customer-Focused, Continuous Innovation: Continuous innovation is an integral part of the firm's day-to-day operations. Suppliers and customers join the company's multifunction innovation and improvement teams and participate in the innovation process from the definition stage right through deployment.

Moreover, companies that really do make innovation **customer-focused** and **continuous** are never satisfied; they never "leave well enough alone." They maintain a competitive lead in their industry by making their own offerings obsolete well before competitors can.

The net result is that companies in full command of new innovation techniques are far more productive and profitable than their competitors. They can use the same budget to offer a wider range of products and services within their existing portfolio — or they can spend the money they save to develop new businesses and open up new markets.

ANNEX: GUIDE TO FEDERAL GOVERNMENT PROGRAMS AND SERVICES OFFERING TECHNOLOGY AND INNOVATION ASSISTANCE TO SMALL BUSINESSES

CANADA BUSINESS SERVICE CENTRES

The federal government is supporting the creation of a national network of Canada Business Service Centres (CBSCs). They are being established through a major collective effort including business-related federal departments, their provincial counterparts and other institutions serving the business community. This approach is being used to develop CBSCs in at least one major city in every province by the end of 1994. The centres provide individuals and businesses with information about relevant programs and services, referrals to sources of assistance and some diagnostic assistance. A leading example is the government's CBSC pilot in Winnipeg, led by Industry Canada, which links 17 public and private sector organizations in serving small business clients. Business support organizations and services are linked through each centre using a common approach and standards along the lines of a master franchise agreement. The centres provide basic information and specialized services. They are staffed by account managers who understand business. For further information about the services to businesses, call or visit the nearest office listed below.

Newfoundland

Canada Business Service Centre
90 O'Leary Avenue
P.O. Box 8687
ST. JOHN'S, Nfld.
A1B 3T1
Tel.: (709) 772-5740 or 1-800-668-1010
Fax: (709) 772-6090

Prince Edward Island

Canada Business Service Centre
232 Queen Street
P.O. Box 40
CHARLOTTETOWN, P.E.I.
C1A 7K2
Tel.: (902) 368-0770 or 1-800-668-1010
Fax: (902) 566-7098

Nova Scotia

Canada Business Service Centre
1575 Brunswick Street
HALIFAX, N.S.
B3J 2G1
Tel.: (902) 426-8604
or 1-800-668-1010 (toll-free from Nova Scotia only)
Fax: (902) 426-6530

New Brunswick

Canada Business Service Centre
1st Floor, 570 Queen Street
FREDERICTON, N.B.
E3B 6Z6
Tel.: (506) 444-6140
Fax: (506) 444-6165

Quebec

Canada Business Service Centre
5 Place Ville Marie
Plaza Level
MONTREAL, Que.
H3B 4Y2
Tel.: (514) 496-4636 or 1-800-322-4636
Fax: (514) 496-5934
Faxback: (514) 496-4010 or 1-800-322-4010

Ontario

Canada Business Service Centre
4th Floor, 1 Front Street West
TORONTO, Ont.
M5J 1A4
Tel.: (416) 973-4782
Fax: (416) 954-1385

Manitoba

Canada Business Service Centre
8th Floor, 330 Portage Avenue
P.O. Box 981
WINNIPEG, Man.
R3C 2V2
Tel.: (204) 984-2272 or 1-800-665-2019
Fax: (204) 983-3852
Faxback: (204) 984-5527 or 1-800-665-9386

Saskatchewan

Canada Business Service Centre
122 - 3rd Avenue North
SASKATOON, Sask.
S7K 2H6
Tel.: (306) 956-2323 or 1-800-667-4374
Fax: (306) 956-2328
Faxback: (306) 956-2310 or 1-800-667-9433

Alberta

Canada Business Service Centre
Suite 122, 9700 Jasper Avenue
EDMONTON, Alta.
T5J 4H7
Tel.: (403) 495-6800
Fax: (403) 495-7725

British Columbia

Canada Business Service Centre
601 West Cordova Street
VANCOUVER, B.C.
V6B 1G1
Tel.: (604) 775-5525 or 1-800-667-2272
Fax: (604) 775-5520

National Capital Region

Canada Business Service Centre
1st Floor, East Tower
235 Queen Street
OTTAWA, Ont.
K1A 0H5
Tel.: (613) 952-4782
Fax: (613) 957-7942

Note: Businesses in the Northwest Territories should direct their enquiries through the Manitoba CBSC, and businesses in the Yukon should contact the British Columbia office for information or assistance.

INDUSTRY CANADA

Industry Canada is the lead government department mandated to assist industry in developing and applying research and technology by:

- formulating policies and regulations regarding industry, science, telecommunications, broadcasting, information technologies, investment and competition in the marketplace
- providing strategic intelligence, analysis and other vital business services
- helping industry to develop and apply research and technology and promoting business and science participation in international ventures
- ensuring orderly development of advanced communications, broadcasting, and information systems and services.

Industry Canada hosts a variety of programs offering technology assistance to small businesses and others.

Canadian Intellectual Property Office

The Canadian Intellectual Property Office (CIPO) is responsible for granting or registering equitable exclusive intellectual and industrial property rights in Canada and for ensuring that the information acquired, in exchange for such rights, is made available to the public.

For more information on CIPO, contact:

Canadian Intellectual Property Office
Place du Portage, Phase I
50 Victoria Street
HULL, Que.
K1A 0C9
Tel.: (819) 997-1936
Fax: (819) 997-7620

Canadian Patent Office

The role of the Canadian Patent Office in granting patents is to acquire and disseminate technological information and to encourage the creation, adoption and exploitation of inventions.

For more information on the patent protection, contact:

Canadian Patent Office
Place du Portage, Phase I
50 Victoria Street
HULL, Que.
K1A 0C9
Tel.: (819) 997-1936
Fax: (819) 997-7620

Satellite Communications Development Program

The Satellite Communications Development Program (SCDP) fosters the development of advanced satellite communications services through shared-cost contributions for R&D of advanced and innovative product and services aimed at the Canadian and international satellite communications markets.

For more information about SCDP, contact:

Satellite Communications Development Program
Communications Development and Planning Branch
Industry Canada
Room 764, 300 Slater Street
OTTAWA, Ont.
K1A 0C8
Tel.: (613) 990-4299
Fax: (613) 947-2852

Small Business Loans Administration

Since its inception in 1961, the *Small Businesses Loans Act* (SBLA) has provided almost \$9.4 billion in business improvement loans to over 314 000 Canadian small firms. Under the SBLA, new and existing businesses operating for profit can obtain term loans of up to \$250 000 through any authorized financial institution for purchase of fixed assets such as land, premises or equipment.

For more information concerning SBLA, contact:

Small Business Loans Administration
Industry Canada
8th Floor, 235 Queen Street
OTTAWA, Ont.
K1A 0H5
Tel.: (613) 954-5540
Fax: (613) 952-0290

Strategic Technologies Program

The Strategic Technologies Program (STP) provides financial assistance for alliances among companies, universities and research institutes to undertake precompetitive R&D or precommercial development of leading-edge technology in information technologies, advanced industrial materials and biotechnology.

For more information about STP, contact:

Strategic Technologies Program
Information Technologies Industry Branch
Industry Canada
9th Floor, East Tower
235 Queen Street
OTTAWA, Ont.
K1A 0H5
Tel.: (613) 954-3472
Fax: (613) 952-8419

Technology Outreach Program

The Technology Outreach Program (TOP) supports the establishment of technology centres run by private sector non-profit organizations. Centres now in operation include the Textile Technology Centre, the Canadian Plastics Institute, the Welding Institute of Canada, the Strategic Microelectronics Consortium, the Centre for Cold Ocean Resources Engineering (C-CORE), the Natural Gas Technology Centre, SIRICON — Research and Computer Application for the Construction Industry, the Applied Software Engineering Centre in Montreal, the Canadian Centre for Industrial Innovation in Montreal and the Canadian Industrial Innovation Centre in Waterloo. These centres' services accelerate acquisition, diffusion and development of technology and related skills, especially among small and medium-sized firms.

For further information about these centres or about TOP, contact:

Technology Outreach Program
Regional Services Branch
Industry Canada
4th Floor, East Tower
235 Queen Street
OTTAWA, Ont.
K1A 0H5
Tel.: (613) 954-3466
Fax: (613) 992-7499

OTHER FEDERAL GOVERNMENT DEPARTMENTS AND AGENCIES OFFERING RESEARCH AND DEVELOPMENT ASSISTANCE

AGRICULTURE AND AGRI-FOOD CANADA

Agriculture and Agri-Food Canada is responsible for federal policies, programs and regulations relating to agriculture and food. It also delivers market development programs and market forecasting services.

Fairs and Exhibitions Program

The Fairs and Exhibitions Program provides financial assistance to enhance marketing, technology transfer/education, training and development of rural people and agricultural awareness. It funds local, national and international events that showcase and improve Canadian agricultural production.

Genetic Improvement Program

The Genetic Improvement Program helps to improve the competitiveness of the Canadian livestock industry by providing scientific and technical support for the identification, promotion and improvement of genetically superior breeding stock.

National Farm Business Management Program

The National Farm Business Management Program provides funding for projects to improve the farm business management skills of Canadian farm families by delivering farm management training courses, services and information.

Regional Agri-Food Development Initiatives

The Regional Agri-Food Development Initiatives assist the agri-food industry to help identify and develop domestic and export market opportunities, encourage the development of production and processing activities as well as improve the productivity and quality of agri-food products.

For information about any of these programs, contact:

Agri-Food Development Branch
Agriculture and Agri-Food Canada
930 Carling Avenue
OTTAWA, Ont.
K1A 0C5
Tel.: (613) 957-7078
Fax: (613) 957-9047

ATLANTIC CANADA OPPORTUNITIES AGENCY

The Atlantic Canada Opportunities Agency (ACOA) works with Atlantic Canadians to improve the economy of their communities through successful development of businesses and job opportunities.

The COOPERATION Program

The COOPERATION Program consists of multi-year agreements that are cost-shared between the federal and provincial governments or other private sector partners. It is coordinated for the Government of Canada by ACOA, with day-to-day administration shared by ACOA and its COOPERATION partners in the region.

The Coordination Program

Through the Coordination Program, ACOA works to increase the effectiveness of all federally sponsored economic activities by coordinating these interests among federal, provincial and private sector partners.

For more information about ACOA's programs and services, contact:

Head Office

Atlantic Canada Opportunities Agency
644 Main Street
P.O. Box 6051
MONCTON, N.B.
E1C 9J8
Tel.: (506) 851-2271
or 1-800-561-7862
Fax: (506) 851-7403

New Brunswick

Atlantic Canada Opportunities Agency
570 Queen Street
P.O. Box 578
FREDERICTON, N.B.
E3B 5A6
Tel.: (506) 452-3184
or 1-800-561-4030
Fax: (506) 452-3285

Newfoundland

Atlantic Canada Opportunities Agency
Suite 801, 215 Water Street
P.O. Box 1060, Station C
ST. JOHN'S, Nfld.
A1C 5M5
Tel.: (709) 772-2751
or 1-800-563-5766
Fax: (709) 772-2712

Nova Scotia

Atlantic Canada Opportunities Agency
Suite 600, 1801 Hollis Street
P.O. Box 2284, Station M
HALIFAX, N.S.
B3J 3C8
Tel.: (902) 426-6743
or 1-800-565-1228
Fax: (902) 426-2054

Cape Breton

Atlantic Canada Opportunities Agency
4th Floor, 15 Dorchester Street
P.O. Box 2001
SYDNEY, N.S.
B1P 6K7
Tel.: (902) 564-3614
Fax: (902) 564-3825

Prince Edward Island

Atlantic Canada Opportunities Agency
3rd Floor, 75 Fitzroy Street
CHARLOTTETOWN, P.E.I.
C1A 1R6
Tel.: (902) 566-7492
or 1-800-565-0228
Fax: (902) 566-7098

Ottawa

Atlantic Canada Opportunities Agency
4th Floor, 60 Queen Street
P.O. Box 1667, Station B
OTTAWA, Ont.
K1P 5R5
Tel.: (613) 954-2422
Fax: (613) 954-0429

DEPARTMENT OF FOREIGN AFFAIRS AND INTERNATIONAL TRADE

Investment and Technology Bureau

Industry Canada works closely with the Department of Foreign Affairs and International Trade's Investment and Technology Bureau to attract international investment and technology to Canada. The bureau helps Canadian companies to grow through international investment, investment partnerships and the acquisition of offshore technologies.

For more information about the Investment and Technology Bureau, contact:

Investment and Technology Bureau
Department of Foreign Affairs and International Trade
125 Sussex Drive
OTTAWA, Ont.
K1A 0G2
Tel.: (613) 995-4128
Fax: (613) 995-9604

FEDERAL OFFICE OF REGIONAL DEVELOPMENT (QUEBEC)

The Federal Office of Regional Development (Quebec) (FORD(Q)) promotes long-term economic development and sustainable employment and income creation, focusing on small and medium-sized enterprises and the development and enhancement of entrepreneurial talent in Quebec.

The Resource Regions

The programs listed below are tailored to meet the needs of the resource regions.

Assistance Program for Research Establishments

The Assistance Program for Research Establishments (APRE) aims at strengthening Quebec's R&D infrastructure by promoting the creation and development of research institutions in strategic sectors.

Innovation Assistance Program

The Innovation Assistance Program (IAP) helps manufacturing or processing firms acquire new equipment incorporating state-of-the-art technology and for the creation of new or improved products or processes.

Montreal Development Fund

The Montreal Development Fund (MDF) contributes money for strategic development projects in sectors such as high technology, design, trade and international activities, cultural industries, tourism and transportation.

Southwest Montreal Housing Program

The Southwest Montreal Housing Program (SMHP) provides assistance for the renovation of existing housing, housing construction and the conduct of experiments in housing assistance to clients in Southwest Montreal.

Support Program for Technology Development Assistance Centres

This program is designed to facilitate start-up and growth of small businesses working on technological innovation and to strengthen bonds between the research resources of institutions of higher learning or research centres and small businesses.

Special Needs

The following programs are aimed directly at the special needs of industries in Quebec.

Agri-food Testing and Experimentation Program

The Agri-food Testing and Experimentation Program aims at increasing agricultural productivity levels by diversifying the base and production alternatives or product variations likely to be exploited on a commercial basis.

Enterprise Development Program — Industrial Component

The Enterprise Development Program — Industrial Component (EDP-I) encourages business development to strengthen the competitive position of certain manufacturing processing, aquacultural, greenhouse horticulture and scientific services firms.

For further information on FORD(Q) or its programs, contact your local office:

Alma

Federal Office of Regional Development (Quebec)
Suite 203, 170 Saint Joseph Street South
ALMA, Que.
G8B 3E8
Tel.: (418) 668-3084
or 1-800-463-9808
Fax: (418) 668-7584

Drummondville

Federal Office of Regional Development (Quebec)
Suite 502, 150 Marchand Street
DRUMMONDVILLE, Que.
J2C 4N1
Tel.: (819) 478-4664
or 1-800-567-1418
Fax: (819) 478-4666

Hull

Federal Office of Regional Development (Quebec)
Suite 202, 259 Saint Joseph Boulevard
HULL, Que.
J8Y 6T1
Tel.: (819) 994-7442
or 1-800-263-4689
Fax: (819) 994-7846

Laurentides, Montérégie and Outaouais Regions

Federal Office of Regional Development (Quebec)
800 Tour de la Place Victoria
Suite 3800
P.O. Box 247
MONTREAL, Que.
H4Z 1E8
Tel.: (514) 283-7834
Fax: (514) 283-3302

Montreal

Federal Office of Regional Development (Quebec)
800 Tour de la Place Victoria
Suite 3800
P.O. Box 247
MONTREAL, Que.
H4Z 1E8
Tel.: (514) 283-7557
Fax: (514) 283-3302

Northern Quebec Region

Federal Office of Regional Development (Quebec)
800 Tour de la Place Victoria
Suite 3800
P.O. Box 247
MONTREAL, Que.
H4Z 1E8
Tel.: (514) 283-8148
Fax: (514) 283-3302

Quebec City

Federal Office of Regional Development (Quebec)
2nd Floor, 905 Dufferin
QUEBEC CITY, Que.
G1R 5M6
Tel.: (418) 648-4826
or 1-800-463-5204
Fax: (418) 648-7291

Rimouski

Federal Office of Regional Development (Quebec)
2nd Floor, 212 Belzile Street
RIMOUSKI, Que.
G5L 3C3
Tel.: (418) 722-3282
or 1-800-463-9073
Fax: (418) 722-3285

Sept-Îles

Federal Office of Regional Development (Quebec)
Suite 202B, 701 Laure Boulevard
P.O. Box 698
SEPT-ÎLES, Que.
G4R 4K9
Tel.: (418) 968-3426
or 1-800-463-1707
Fax: (418) 968-0806

Sherbrooke

Federal Office of Regional Development (Quebec)
Suite 303, 1335 King Street West
SHERBROOKE, Que.
J1J 2B8
Tel.: (819) 564-5904
or 1-800-567-6084
Fax: (819) 564-5912

Trois-Rivières

Federal Office of Regional Development (Quebec)
4th Floor, 25 des Forges Street
TROIS-RIVIÈRES, Que.
G9A 2G4
Tel.: (819) 371-5182
or 1-800-567-8637
Fax: (819) 371-5186

Val d'Or

Federal Office of Regional Development (Quebec)
906 – 5th Avenue
VAL D'OR, Que.
J9P 1B9
Tel.: (819) 825-5260
or 1-800-567-6451
Fax: (819) 825-3245

HUMAN RESOURCES DEVELOPMENT CANADA

Human Resources Development Canada administers employment programs and services as well as immigration settlement programs which help workers, employers and communities change as the workplace changes. These programs assist people to learn new skills, encourage employers to use human resource planning and employee training to gain a competitive advantage and helps support economic development programs. The following are some of the services offered for small businesses.

Business Development Centres

The Business Development Centres offer technical and financial support to small businesses to increase and maintain local employment.

For more information, contact:

Employment Operations Branch
Human Resources Development Canada
Phase IV
4th Floor, 140 Promenade du Portage
HULL, Que.
K1A 0J9
Tel.: (819) 994-7726
Fax: (819) 953-9354

Workplace-Based Training

In 1994-95, the Workplace-Based Training program offers financial assistance to employers to train workers in designated groups whose skills have become redundant because of technological or market changes.

For more information, contact:

Employment Policies and Operations Branch
Human Resources Development Canada
Phase IV
4th Floor, 140 Promenade du Portage
HULL, Que.
K1A 0J9
Tel.: (819) 994-2399
Fax: (819) 953-9354

NATIONAL DEFENCE

Defence Industrial Research Program

The Defence Industrial Research Program seeks to improve the research and technological capabilities of the Canadian defence industry by helping Canadian companies acquire the advanced knowledge they need to bid competently on defence equipment or study contracts for Canadian or allied forces. The program provides shared-cost funding for projects involving applied research in defence technologies to determine if concepts or inventions are feasible.

For information about eligibility, contact:

Directorate Industry and University Programs (DIUP)
National Defence
7th Floor, 305 Rideau Street
OTTAWA, Ont.
K1A 0K2
Tel.: (613) 992-8938
Fax: (613) 996-0825

NATIONAL RESEARCH COUNCIL OF CANADA

The National Research Council of Canada (NRC) is Canada's principle science and technology organization, supporting national science and engineering activities, R&D and the stimulation of investment in R&D. Through its institutes, the NRC also helps develop and provide vital expertise and knowledge.

Biotechnology Contribution Program

NRC's Biotechnology Contribution Program provides industry with an easy point of access to the expertise in NRC's institutes. It also serves to focus the department's internal activities on projects relevant to industry. In addition to highly qualified researchers and excellent facilities, the program provides biotechnology companies with partial funding for research projects. If the scale of the project or its technical risks put it beyond a firm's financial means, NRC can make up the difference.

For further information on this program, contact:

Contributions Advisory Services
National Research Council of Canada
Building M-58
Room 225 West, Montreal Road
OTTAWA, Ont.
K1A 0R6
Tel.: (613) 998-4588
Fax: (613) 952-9312

Industrial Research Assistance Program

The Industrial Research Assistance Program (IRAP) helps small and medium-sized firms apply technology and promotes the use of technology by Canadian firms. The program provides easy access to a broad range of mature to leading-edge technologies. IRAP can help companies in many ways including providing assistance in development plans and procedures for new technology and R&D projects, arranging for a diagnostic analysis of company operations and establishing links to technology sources both within Canada and abroad.

For further information about IRAP, contact:

Industrial Research Assistance Program
National Research Council of Canada
Building M-55
Montreal Road
OTTAWA, Ont.
K1A 0R6
Tel.: (613) 993-3996
Fax: (613) 954-2524

NATURAL RESOURCES CANADA

Natural Resources Canada contributes to the efficient development and use of Canada's mineral and energy resources, and advances knowledge of Canada's landmass through scientific activities.

Forest Industry Programs and Services

Natural Resources Canada identifies market and trade opportunities, defines the constraints on industrial competitiveness and fosters technological innovation and product development in the forestry sector. It also contributes to industrial research institutes in Canada.

For further information, contact:

Natural Resources Canada
351 Saint Joseph Boulevard
HULL, Que.
K1A 1G5
Tel.: (819) 997-1107
Fax: (819) 953-2104

For information about Natural Resources Canada's policies and programs, contact:

Communications Branch
Natural Resources Canada
8th Floor, 580 Booth Street
OTTAWA, Ont.
K1A 0E4
Tel.: (613) 995-0947
Fax: (613) 996-9094

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA

Networks of Centres of Excellence

The Networks of Centres of Excellence (NCE) program mobilizes Canada's research talent in the academic, private and public sectors and applies it to development of the economy and our quality of life. NCEs are establishing closer links with industries so that they can benefit from privileged access to the networks' research.

For further information about the Networks or about their services to businesses, contact:

Networks of Centres of Excellence
Natural Sciences and Engineering Research Council
of Canada
350 Albert Street
OTTAWA, Ont.
K1A 1H5
Tel.: (613) 995-6010
Fax: (613) 992-7356

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Public Works and Government Services Canada is the chief purchasing agent and central accountant for the Government of Canada. Its functions include procurement, supply, printing and publishing. Other responsibilities are in accounting, payment, audit and management advisory services.

Environmental Innovation Program

The Environmental Innovation Program (EIP) offers Canadian industry, universities, native groups, non-government organizations and interested individuals the opportunity to meet the environmental priorities of the Green Plan by submitting innovative R&D proposals in the areas of natural sciences, social sciences, health sciences and the humanities.

Unsolicited Proposals Brokerage Service

The Unsolicited Proposals Brokerage Service encourages innovative science and technology proposals which may meet the federal science and technology objectives. It is also aimed at fulfilling other federal government priorities such as increasing industrial competitiveness, regional and small business development.

For further information about these programs, contact:

Program Sector
Science and Professional Services Directorate
Public Works and Government Services Canada
Place du Portage
12C1 Phase III
11 Laurier Street
HULL, Que.
K1A 0S5
Tel.: (819) 956-1774
Fax: (819) 997-7352

STANDARDS COUNCIL OF CANADA

The Standards Council of Canada helps business people learn about the standards, regulations and conformity assessment procedures of Canada and its trading partners.

For information on foreign and international standards, contact:

Standards Council of Canada
Suite 1200, 45 O'Connor Street
OTTAWA, Ont.
K1P 6N7
Tel.: (613) 238-3222
Fax: (613) 995-4564

WESTERN ECONOMIC DIVERSIFICATION CANADA

Western Economic Diversification Canada (WD) is aimed at reducing Western Canada's dependence on primary industries. WD supports private sector firms and associations in the western provinces in their efforts to develop new products, services and technologies and ultimately, new markets for those products and services. WD also supports improvements in quality control programs and assistance for businesses to attend major international marketing events.

For more information about WD programs and services to small businesses, contact:

British Columbia

Western Economic Diversification Canada
Bentall Tower 4
Suite 1200, 1055 Dunsmuir Street
P.O. Box 49276
VANCOUVER, B.C.
V7X 1L3
Tel.: (604) 666-6256
Fax: (604) 666-2353

From British Columbia, call toll-free:
1-800-663-2008

Alberta

Western Economic Diversification Canada
Suite 1500, 9700 Jasper Avenue
EDMONTON, Alta.
T5J 4H7
Tel.: (403) 495-4164
Fax: (403) 495-4557

From Calgary, call toll-free:
(403) 292-5382

Saskatchewan

Western Economic Diversification Canada
Suite 601, 119 - 4th Avenue South
P.O. Box 2025
SASKATOON, Sask.
S7K 3S7
Tel.: (306) 975-4373
Fax: (306) 975-5484

From Regina, call toll-free:
(306) 780-6725

Manitoba

Western Economic Diversification Canada
Suite 712, 240 Graham Avenue
P.O. Box 777
WINNIPEG, Man.
R3C 2L4
Tel.: (204) 983-4472
Fax: (204) 983-4694

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