

# **BUSINESS PLANS**

## **GUIDEBOOK**

**Release 2.5**

**Eugene B. Lieb  
Michael S. Lanham  
Allan Strawhacker**

**Custom Decision Support, Inc.  
PO Box 998  
Chadds Ford, PA 19317  
Tel: (215) 793-3520  
FAX: (215) 793-2531  
<http://www.lieb.com>**

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## PREFACE

This publication is based on the fifth draft of the Business Plan Guide; revised during April 1992. Extensive changes in the formatting of the guide has been required to allow for on-line publication in Adobe Acrobat.

This document is designed to be a guide for preparing business plans. Since the original publication of this guide a series of planning workbooks have been developed that cover most of this material in a form easier to digest. The business plan is viewed as an evolving document showing the present status of the program and the expected development path. This guide provides an outline of the business plan and some tools for analysis. It is not intended to be a review of techniques. It's purpose is to assist in the preparation of plans. Other references are available to handle strategy formulation as well as in depth discussion of specific topics.

It is unlikely that sufficient information will be available during the early stages to complete major parts of the business and development. A major function of the planning process is the identification of necessary information for the development of the plan. Furthermore, not all sections of this guide will be applicable to all programs. The sections, procedures, and tools described in this guide are targeted toward the business development of valued-added product offerings.

This document is authored by Eugene B. Lieb, Custom Decision Support Inc. and Michael S. Lanham. A large number of former DuPont staff and management personnel help in developing this guidebook. However, the principles discussed in this guide do reflect DuPont practices nor are they necessarily recommended by that firm. George Amoss (former General Auditor of the DuPont Company) suggested and reviewed the sections on internal control. Allan Strawhacker, Harry Defina, and Wendy Strawhacker reviewed the sections on Quality management and made many suggestions. Frank Pater reviewed the information planning section and Richard G. Bennett reviewed the R&D planning sections.

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## 1. GENERAL OUTLINE

A new business plan can be considered as being divided into sections: (1) Executive Summary, (2) Background and Overview, (3) Functional Plans, and (4) Risk and Resource Analysis. The *Executive Summary* is a concise review of the business definition and plans. The *Background and Overview* section consists of detailed description of the business and the opportunity that it represents. The *Detail Function Plans* include the program status and details of all development programs (Marketing Plans, R&D Programs, and the Manufacturing and Quality Plans), as well as the overall plan for the venture. The *Risk and Resource Analysis* section is focused on the resource requirements and the financial and business risks associated with the concept.

For new programs targeted for commercialization beyond the next four years only the Executive Summary is required. Significant effort is required during the initial stages of these programs to define the business and opportunity. The goal would be to amass sufficient information for the construction of the fuller business plan before the program reaches the product and market development stage. Only those businesses targeted for commercialization within the next two years should require a full business plan.

Complete information is almost never available in preparing business plans. The general practice is to guess when there is no other way. Informed estimates, SWAG evaluations, judgement-tempered guesses are key tools for any planning process. However, it is vitally important to note when assumptions and guess are being used.

### 1.1 Title

The title of the business plan is its identification. Since the business plan is expected to change often, the title should reflect the present status.

- |  |   |
|--|---|
| <b>1.1.1 Business Name</b>                 | The several ventures within the firm may approach the same general markets and use similar product descriptions. The business name should be selected to be as unique as possible but still convey the nature of the business. If several business names have been used, they should be noted.  |
| <b>1.1.2 Organizational Identification</b> | The specific organization that is involved in the business should be identified. Several businesses in Du Pont may be involved in similar areas, but involving very different business concepts. The names selected are usually specific to the Operating Department, Division or Business Group. It is, therefore, important to identify that group. |
| <b>1.1.3 Product Name (s)</b>              | The product name or names should be given to clearly distinguish it from other internal business areas.   |
| <b>1.1.4 Date</b>                          | Since the plans will be updated continuously, the date of the plan is critical. The date or version of the business plan should appear at least on the title page and if possible on all pages of the plan document.  |

### **1.1.5 Security; Notice**

All portions of the business plan are company confidential. If the plan includes any information on investment and specific operational plans, or any acquisition or joint venture agreements, then the plan must be handled under "special control".

Notice of the security requirements should be included in the first pages of the plan document.

### **1.1.6 Multiple Versions**

For security reasons, multiple versions of the business plan may need to be prepared. The full version should include the specific customers, proposed development partners, and joint venture and acquisition candidates. A limited version may also be prepared for wider circulation with this information excluded.

## **2. EXECUTIVE SUMMARY**

The *Executive Summary* is a presentation of the present status of the program. It is designed to be reviewed by Divisional and Departmental management. It should be a summary of the detailed programs compiled later in the business plan. Consistency with the programs is extremely important. If the detailed plans are being prepared, the executive summary should be written afterwards.

### **2.1 STRATEGIC OVERVIEW/MISSION**

The purpose of the strategic overview is to review the fit of the business concept with the other business. Its main function is to define the concept.

#### **2.1.1 PRODUCTS, APPLICATIONS AND MARKETS**

Products, applications and markets should be defined as groups. Broad characteristics are satisfactory in this section. It is useful to impose limits where potential conflicts in responsibility may be suggested. Focus on the key products and markets to be served and the services that are to be rendered.

#### **2.1.2 FINANCIAL SUMMARY**

The executive summary should include key financial projections, if available. These might include: sales, price, costs, revenues, and earnings. Either graphs or tables may be used. The financial projections, however, should only be a summary, Footnotes or references to the detailed section should be included if they exist.

If only rough guesses are available, they can be included with appropriate disclaimers.

##### **2.1.2.1 Sales Projection**

An expected sales forecast is usually included with the financial summary. Several scenarios are often developed and discussed in detail in other sections of the business plan. The executive summary usually only contains the "most likely" or "expected" performance. This usually is a trend projection or a table of expected sales.

##### **2.1.2.2 Price/Cost Projection**

Forecasts of both price and cost are included if available. Again, several scenarios may be developed during the planning process. The one included in the financial summary typically is the best reasonable estimate. Care should be taken to assure that the forecast is not overly optimistic.

##### **2.1.2.3 Investment Projection**

An estimated venture investment consistent with the sales, price, and cost forecasts should be included. This investment should include working capital as well as plant and equipment.

##### **2.1.2.4 Financial Projection**

A financial summary of the projections should be included. This summary usually includes: (1) cash flow, (2) discounted cash flow, (3) present value, (4) internal rate of return (IRR), and (5) return on investment.

#### **2.1.3 MISSION**

The business mission statement relates a simple set of objectives for the business. It is often stated in terms of growth or earnings goals as well as a time frame. It is used as a general direction for the business concept.

**2.1.4 COMPETITIVE  
ADVANTAGE**

The reasons why it is believed that the firm can compete successfully in this business should be explicitly stated. These should include: any cost advantages, market position, technology, size, and synergy.

**2.1.4.1 Patents, Copyrights  
& Trademarks**

Any possible patents and copyrights should be reviewed as potential competitive advantages. The strength of a trademark can generate easy customer recognition.

**2.1.4.2 Know How - Trade  
Secrets**

Special trade secrets or technologies, even if not patented or patentable can provide competitive advantage.

**2.1.4.3 Special Customer  
Relationships**

Customer relationships in the form of relationships or partnerships provide competitive advantage and should be identified.



## 2.2 PROGRAMS

The programs for the business are briefly outlined in the executive summary. Usually only the major highlights are reviewed, with key milestones and targets identified.

### 2.2.1 STRATEGY

An outline of the development and business strategy should be included. The includes the general approach for the business as well as identifying specific participants. For example, if a close affiliation with specific customers is being used, it should be stated and the affiliates identified. Alternatively, if the business is being developed solely by the firm, that should be stated.

### 2.2.2 ORGANIZATION

The nature and organizational structure should be identified. Included should be the relationship with the firm's staff organizations that are contracted to the venture as well as the staff that has been directly assigned. The informal organization structure should be recognized and identified.

### 2.2.3 MARKET DEVELOPMENT

The review of the marketing plan usually focuses on the development of partnerships and sales commitments. If promotional campaigns are planned, their objectives and cost should be included.

### 2.2.4 PRODUCT RESEARCH & DEVELOPMENT

Key events and dates for product development should be included as well as the identification of any development affiliates.

### 2.2.5 MANUFACTURING & QUALITY ASSURANCE

Investment schedules and production projections should be included if appropriate and available. A schedule for quality assurance programs should be outlined.

### 2.2.6 TARGETS AND MILESTONES

Key targets and milestones for all programs should be identified in a chart for easy review.

### 2.2.7 RESOURCE REQUIREMENTS

Funds and resources that have been assigned or are requested should be stated. At minimum, an optimistic two year projection should be included. If longer term commitment is required, the total resources for the term of that commitment should be identified.

## 2.3 CONCERNS AND ISSUES

The concerns and issue section summarizes key risks associated with continuing and terminating the program. It is not intended to fully describe all possible risks, but should focus on those issues of which management should have awareness.

### **2.3.1 POTENTIAL JOINT VENTURES & PARTNERSHIPS**

If a joint venture or formal partnership with any outside company is under consideration, it should be mentioned in this section. Potential consequences of such formal relationships should be included in the exposure section of the summary.

### **2.3.2 EXPOSURE**

Exposure relates to the potential loss to the firm in terminating the program. It consists of any residual costs to partnerships, joint ventures, and customer commitments as well as unrecoverable costs. Both monetary and relationship costs should be reviewed. Potential damage to other programs and sales of products should be reviewed.

### **2.3.3 MANAGEMENT ISSUES**

All businesses exist within a management environment. In the nicest sense of the word, that environment can be political. This section addresses the key management issues of control, authority and working relationships with other corporate organizations.

Management style may also be discussed in this section. If the business is radically different from normal corporate businesses, a different management style and organization may be needed. The key difference should be outlined, including changes in authority and responsibility.

### **3. STRATEGIC OVERVIEW**

The strategic overview is considered a part of the summary but typically contains greater detail. It with the opportunity analysis stand as the introduction to the detailed plans. The strategic overview provides the clear statement of the definition of the business and outline of the business approach.

#### **3.1 BUSINESS DEFINITION**

The specific business is defined by function and in terms of: (1) the products it sell, (2) the customers it services, and (3) the techniques it uses in the process.

##### **3.1.1 PRODUCTS & SERVICES**

The products and services that the business provides should be explicitly defined for the purposes of the business. Usually a general description is sufficient. For example, a business may provide automotive window drive or a class of plastic resins for an industry or application.

##### **3.1.1.1 Scope of Enterprise**

It is important to exclude business products that will not be exploited. For example only specific types of mechanisms or plastic resin will be sold. Limiting the scope of the enterprise serves to reduce conflict with other venture concepts and provides avenues for further development programs

##### **3.1.1.2 Specific Offerings**

The specific products being considered need to be described in some detail. For example, specific designs for an automotive window drive or the specific characteristics of the plastic resins will be described. The uniqueness of the specific products should be explained.

##### **3.1.2 MARKETS**

The markets are described in general. A detailed description of the market and segments is included in the marketing plan. This description is a summary, with specific details that are relevant to the overview.

##### **3.1.2.1 Market Definition**

The market has to be defined in terms of specific customers and type of customers. If preferred customers have been identified or if development customer affiliations either have been formalized or are being contemplated, they should be mentioned.

##### **3.1.2.2 Market Segments**

The marketing strategy and detailed plans are formulated by considering customers as homogeneous groups. These segments should be discussed in detail in the marketing plan.

##### **3.1.3 MEANS OF PRODUCTION**

A business only exists if it has products and services to sell. The means for producing the products and services are described in this section. The purpose of the section is to provide a overview of manufacture. Details are described in the manufacturing plan.

##### **3.1.3.1 Processes**

Description of the processes of manufacture should be summarized. The general type of facilities necessary should be described.

### **3.1.3.2 Facilities**

If existing corporate facilities are contemplated for use, they should be identified. If external resources are to be used, such as contract fabrication, the potential suppliers should be identified. The present status of all contraction agreements should be stated. Details of the agreements should be covered in the manufacturing plan, and needed not be reviewed here.

### **3.1.4 MEANS OF MARKETING & DISTRIBUTION**

The main methods for marketing the product and its physical distribution should be described. Specific distribution and marketing channels need to be described. If marketing and distribution partners or affiliates are envisioned, they need to be described. If formal agreements have been prepared or direct discussions are underway, the participants need to be identified.

## 3.2 MISSION AND STRATEGY

The mission and overall strategy is a general outline of the objectives and the process of running the business.

### 3.2.1 SCOPE AND CONSTRAINTS

The scope and constraints state the limits of what is included in the business and what is excluded. This section is particularly important if the business enterprise will impinge on other businesses or will require the assistance of other businesses.

The relationship of this program with other development programs should be mentioned if appropriate.

### 3.2.2 MISSION STATEMENT

The business mission statement is usually a broad, optimistic set of objectives for the business. Both general and specific goals are usually included, such as a certain size business by a specific time, or a specific margin or return on investment within a certain time frame.<sup>1</sup>

In some cases, the development of a series of business ventures is envisioned. Under this condition, the mission may be to explore the opportunities in new markets or with new products as well as to form a profitable business. Such conditions should be identified.

### 3.2.3 OVERALL BUSINESS AND DEVELOPMENT STRATEGY

The strategy focuses on the general approach of developing the business. The choice of parallel or sequential market and product development and the reliance of partnership versus in-house resources should be discussed.

#### 3.2.3.1 Development Strategy

The development strategy focuses on the key questions that need to be addressed, in order to assure viability of the business. Prioritization of key issues should be reviewed and timing for key decisions discussed.

#### 3.2.3.2 Marketing Strategy

The marketing strategy should be reviewed here. A detail discussion of the strategy should be discussed in the detailed marketing plan.

#### 3.2.3.3 Manufacturing Strategy

The general manufacturing strategy should be summarized here. The details of the strategy and plans should be covered in a latter section.

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<sup>1</sup> For start-up activities, an implicit mission is the evaluation of the business concept feasibility. This mission normally does not have to be stated.

## **4. OPPORTUNITY**

The opportunity represents the stake that the firm has in the development of this business concept. That stake translates into future earnings for the firm. The two general types of opportunities are recognized on the business development level: future products from the continued development of technology, and future earnings derived from the this business.

### **4.1 PRODUCT AND TECHNOLOGY**

The development of new products, beyond the scope of the immediate business is speculative at best. Since it may impact the general desirability of business development, it should be discussed if appropriate. This discussion may include a technology forecast and a potential market assessment.

### **4.2 MARKETS AND APPLICATIONS**

#### **4.2.1 MARKET OPPORTUNITY**

The opportunity consists of all measures of the potential worth of the business concept to the firm. The term "opportunity" usually refers to the revenue opportunity as a measure of the worth or importance of the business.

##### **4.2.1.1 Sales Forecasts**

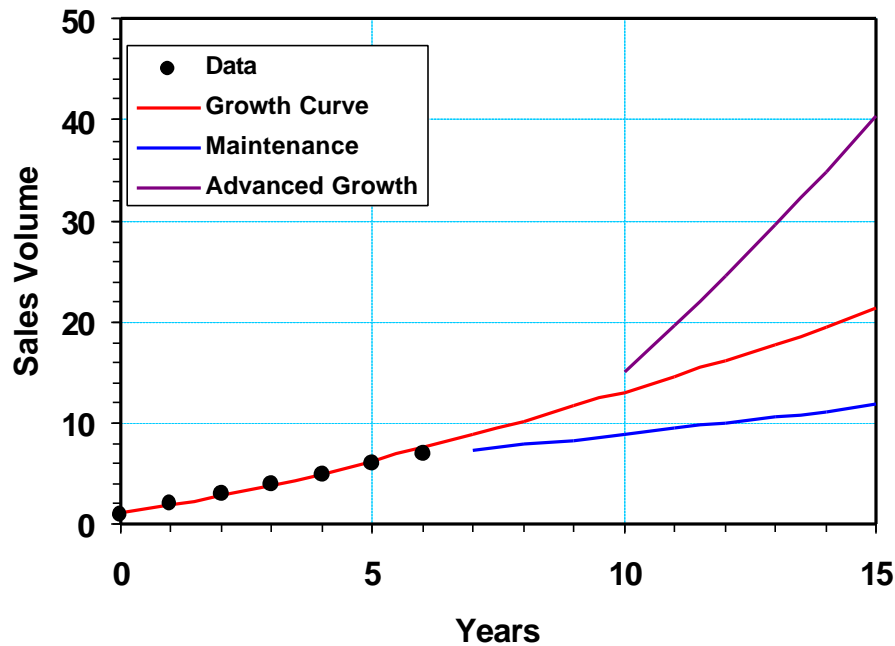
Five year sales forecasts are the traditional measure of opportunity. Both longer and shorter forecasts are given. It is useful to present the forecast along with a number of scenarios indicating a range of uncertainty or the result of various development options.

There are two common methods of obtaining the sales forecast: (1) field or expected specific sales and (2) trend extrapolation.

##### *4.2.1.1.1 Field Sales Forecast*

Expected sales obtained from the sales force or listings of specific probably sales are used as a forecast. Unfortunately, sales force information can be highly optimistic. This optimism is usually a characteristic of a good sales staff. Even after review and modification by sales management, the field figures can be overly optimistic. We recommend that such figures be used only with historical projections as a validity check.

Figure 1, Sales Forecasting



#### 4.2.1.1.2 Historical Projections

If historical data is available, it can be extrapolated to give a range of possible forecasts. This is traditionally done as a check of field data or for long term forecasts (5 to 15 years out).

Unfortunately for new businesses historical data is not available. An alternative approach has to be used based on the functional potential.

#### 4.2.1.1.3 Functional Potential

Sales forecasts can be developed from the functional potential based on the sales growth characteristics of similar products. The functional potential is the total market that product can satisfy at the targeted price. This figure must be reduced by expected market share and the rate penetration. The penetration curve is estimated based on either similar products or a general form.<sup>1</sup>

### 4.2.2 ALTERNATIVE SCENARIOS

Scenarios need to be developed that reflect the possible range of "successful" possibilities. Success here refers to the assumption that the business will be developed. Clearly, if no substantial sales are realized, then the program will be dropped. Even within the bounds of possible

<sup>1</sup> Curve fitting is usually done using the logarithm of sales. This makes fitting easier and reduces the apparent error.

The *General Sales Growth Curve* has been found to be a fairly reliable model of product penetration. It represents an upper bound in the rate of penetration of many products. Only the starting date and the operating market potential are necessary for making an estimate. The *General Sales Growth Curve* can be applied either by tracing a standard curve or by curve fitting. Other "S" shaped curve, such as the *Logistics Curve*, can also be used.

businesses, there is a range of probable results.

It should be noted that where the business ends up is not at the hands of fate. Which of the scenarios is realized will depend to a great extent on the development plan and its implementation. The scenarios represent the results of both uncontrollable and controllable factors.

#### 4.2.2.1 Share

Market share depends on the definition of the competition. Usually there are at least two type of competition: (1) in-kind and (2) functional competition. The appropriate definition of market share depends on the use of the product.

##### 4.2.2.1.1 In-Kind Competition

For examining direct (head-to-head) competition, in-kind market share is used. Even here the definition of in-kind can be either very tight or very loose. In general, in-kind competition consists of "drop in" competitors. Any competitor whose product can be substituted for the firm's product, without major reformulation or technology changes, can be viewed as In-Kind competition.<sup>2</sup>

##### 4.2.2.1.2 Stable Market Shares

Market shares with in-kind competitors in specific geographic areas tend to stabilize at certain levels. The maintenance of these stable shares tend to indicate an orderly market. One of the most successful guide lines for market share is the "Broken Stick Rule".<sup>3</sup> This rule indicates that share should approximately follow this order:

- Two competitors: 75%, 25%
- Three competitors: 65%, 25%, 10%
- Four competitors: 55%, 25%, 15%, 5%

##### 4.2.2.1.3 Functional Competition

Functional competition extends beyond direct competitors. For manufactured products, these include totally different methods to obtain the same customer function. In identifying potential functional competition, it is critical to identify the function that the customer is satisfying. Changing the technology or means for satisfying the customers function may change the benefits that he demands. Therefore, one needs to look at the function in a broader context. The further afield the competing technology the longer and more difficult it is to substitute. As a general rule, only similar technologies should be viewed as meaningful competitors.

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<sup>2</sup> It should be noted, that this definition goes beyond the same composition of matter definition often used. The same material sold by a competitor may or may not be an in-kind competitor depending on the ease of conversion by the customer. Only the other hand, a different composition of matter product may be viewed by the customer as directly competitive.

<sup>3</sup> The "Broken Stick Rule" is based on rank order statistics and was identified by John Reith formerly of the Fibers Department.



#### 4.2.2.2 Bubble Diagrams

Bubble diagrams are used to analyze relative attractiveness of market-product segments.<sup>4</sup> The horizontal axis shows a measure of market strength. Traditionally, the relative market share is used. Other measures of market strength may be more appropriate in some business, such as relative business unit size.

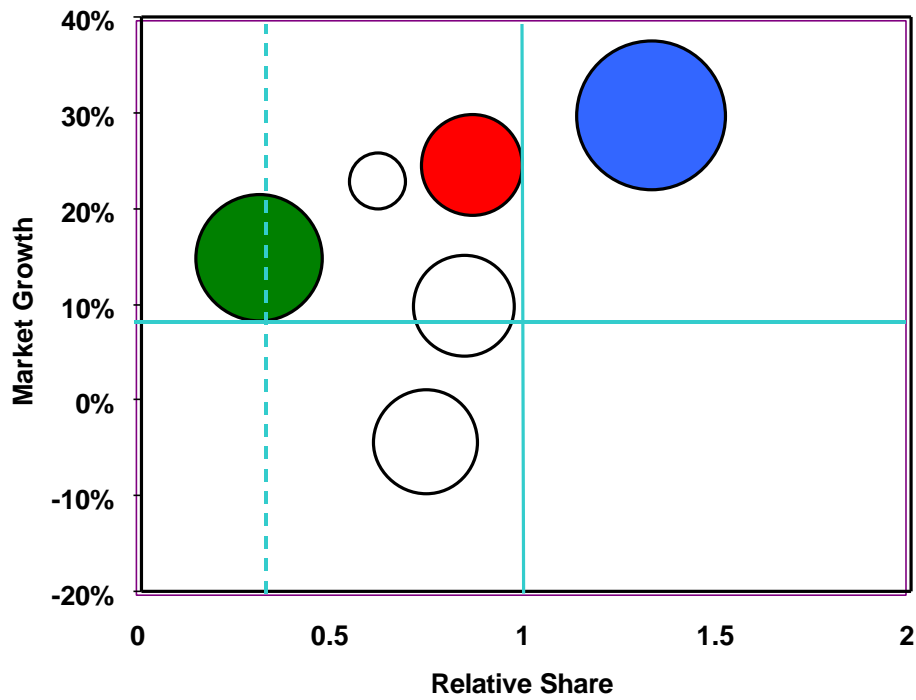
The vertical axis shows some measure of the market attractiveness. This is usually measured by market growth. But here again other measures such as profitability and margin may be used.

A circle is used to identify the position and the size of the circle is set proportionally to the importance of the business. Sales volume is usually used for this purpose. Other measures such as earnings and potential size can be used.

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<sup>4</sup> The Bubble Diagrams were derived from the "Shell Matrix" procedures. Several consultant firms, notably *The Boston Consulting Group (BCG)*, have established particular forms of the bubble diagrams for analysis. We do not recommend using these forms in all cases. Business situations vary which make a single set of measures inadequate measures of attractiveness.

Figure 2, Bubble Diagram, each circle presents a business unit



## 5. DETAIL PLANS

The detail plan contains: indepth descriptions of key aspects of the business venture, alternative views of the business, operational plans, and the logic behind the selection of this venture.

### 5.1 PROGRAM STATUS

Status, condition, and time frame are discussed in this section. In the status section, the precision of the information available is often discussed. Available data and plans for business concepts in their early stages of exploration may be sparse but adequate for initial decisions.

### 5.2 MARKETING

The marketing plan contains all aspects of the market development program, sales, promotion, and pricing, but not physical distribution. Since inventory control is usually assigned to the manufacturing function, physical distribution is covered in manufacturing and quality plans. Because of its potential size, the marketing plan may be prepared as a separate document or included with the business plan as an appendix.

The planning process starts by the analysis of the marketing segments. The activities for each of the segments will then be combined into the functional plans for pricing, promotion, and sales effort.

#### 5.2.1 OVERALL MARKETING GOALS

The overall marketing goals target on specific outcomes that are desired and their timing. These usually involve commercialization dates and the number of development partners or segments to be explored. Established business marketing goals may include profit and sales targets.

#### 5.2.2 MARKET SEGMENT STRATEGIES

Marketing focuses on the customer. As such planning usually starts on the level of the customer or convenient groups of customers, termed market segments.

##### 5.2.2.1 Segment Description

For planning purposes it is useful to divide the total market into "homogeneous" groups of customers. In some cases, the segments may be individual customers or types of customers with an industry, such as design engineers. The key is to focus on the customers and how they can be influenced in a uniform manner. Each segment must be described in detail.

Segments are usually defined by common characteristics of the potential customers. These could include: (1) uses, (2) benefits, (3) environment, (4) decision rules and methods, and (5) product competitors.

##### 5.2.2.1.1 Potential Customers

The specific customers that make up the segment are to be described. Major customers may be listed by name.

*5.2.2.1.2 Customer Benefits*

The specific major customer benefits that are derived from the product in use should be described for each market segment. Note that several segments must be involved for a single purchase. Purchasing agents, design engineers, and administrators may be considered separate market segments, though each is involved in the purchase decision.

Customer benefits relate to the gains to the customer for using the product, not the product attributes. They are usually noted as reduced costs, labor savings, or improved performance.

*5.2.2.1.3 Purchase Characteristics*

The purchase characteristics for each segment include: (1) the time frame for decisions, (2) the complexity of the decision process, (3) people involved, (4) the preference for marketing style, and (5) key issues.<sup>1</sup>

*5.2.2.1.4 Industry Opinion Leaders*

For most industrial sales, word-of-mouth and industry validation is extremely important. Identifying and involving individuals and firms that are widely acknowledged to be the industry opinion leaders in the marketing process can be critical. These individuals give credibility to the marketing programs and can greatly expedite the development process.

*5.2.2.1.5 Product/Market Matrix*

It is useful to split the business into market/product elements, where each market element is an independent group of customers and the products are identifiable offerings. The Product/Market matrix facilitates the identification of planning elements and aids in the consolidation of the marketing plan into overall product and market strategies.

**5.2.2.2 Product Position**

The product position reflects the degree to which the firm's product sold to the market segment is perceived to satisfy specific customer benefits compared to alternatives. Since the perceived degree of satisfaction can be influenced by the way the product is presented, marketing can reposition the product to some extent.

The product position statement is a prioritized list of customer benefits that we will try to convey to the customers.

*5.2.2.2.1 Competitors*

Within each segment are competing products and technologies and alternative approaches. These need to be listed. Note, that in some cases, "doing nothing" is a viable alternative and therefore, a competitor.

*5.2.2.2.2 Determinants of Success*

This section is a summary of what are believed to be the key determinants of success for marketing into this segment. These include the type of marketing, the message, price, and any other pertinent issue.

**5.2.2.3 Segment Marketing Objectives**

The segment marketing objectives focus on the specific behavior that is desired from the customers. These can include development relationships, agreement to purchase at a desired price, purchasing of the product.

**5.2.2.4 Desired Market**

The most effective means of meeting the segment marketing objectives should be identified. These may include: level of personal selling,

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<sup>1</sup> Key issues includes the importance of specific attributions such as "quality".

**Segment Strategy**

promotion campaign, development of partnerships, and suggested pricing.

**5.2.3 INTEGRATED  
MARKETING STRATEGY**

The individual segment strategies reflect the best approach for the segment. They may not be consistent or efficient. They need to be combined integrated to get the best effect with limited marketing resources.

**5.2.3.1 Interrelation of  
Market Segments**

The way market segments are combined is to focus on the interrelationship of the segments and economies of joint action. The market segments were selected to be actionable. That is, they were selected to allow marketing plans to be drawn up and implemented. These segments are not likely to be totally separable. Aspects of marketing programs may be best targeted to a group segment rather than individual segments.

*5.2.3.1.1 Dependence  
Segments*

The degree to which a decision to buy the product in one segment is separate from any other is the measure of its independence. If for example, we had selected purchasing agents as one segment and design engineers as a second for the same industry, their decisions would be tied together. Groups within segments should be totally dependent on each other. Most segments are selected with a fairly high degree of independence.

*5.2.3.1.2 Isolated Segments*

The isolation of a segment reflects the extent individuals in segments communicate with other segments regarding these products. In particular, we are interested in product perception and pricing. Low isolation, allows for cross development of market segments, but limits price differentiation.

*5.2.3.1.3 Synergies*

Geographic, media and method considerations can generate synergies in combining segment marketing activities.

**5.2.3.2 Market Segment  
Priority**

The market development programs of some segments are more important than others. This prioritization covers development time, time frame, potential size, potential profitability, and perceived difficulty, and resource requirements. Generally, the segment data are listed on a table and priorities are assigned.

**5.2.3.3 Scenarios**

Selecting which markets are to be developed first can generate scenarios for sales by segment. Each scenario represents an outcome for a particular marketing effort program. A list of operating scenarios should be developed. Indicating the assumptions for each.

*5.2.3.3.1 Segment Sales  
Forecasts*

Sales forecasts for each segment and each scenario should be developed.

*5.2.3.3.2 Collective Sales  
Forecasts*

The collective sales forecast is the key for identifying the impact of each set of assumptions.

#### **5.2.3.4 Product Name(s)**

The name of the product and its formal description can convey the product position. The choice of the name can be a complex involving considerations of multiple uses, availability of the trademark, and confusion or misunderstanding in other languages. Normally it is assumed that the product will be globally marketed. The name should be useable on a worldwide basis.

##### *5.2.3.4.1 Trademarks*

The status of application for trademarks and copyrights should be reviewed.

## 5.2.4 PRICING

Pricing is both one of the key marketing tools and a determinate of business success. Price conveys value to the customer and, to some extent, controls the range of market penetration. Unlike other marketing tools, it has a direct impact on the profitability of the business.

The present price provides a base point for future prices. Customers will expect that future prices will not be significantly higher than present price and will expect some long term real price reduction. Therefore, establishment of price effects sales, the profitability for the present year, and customer expected price in forthcoming years.

Several measures of price are usually used as guides for setting pricing strategy. Two classes are used: (1) Cost Based Pricing which is an introspective approach, and (2) Value Based Pricing, which focuses on the customers' value.

### 5.2.4.1 Cost Based Pricing

Costs form the lower limit of reasonable pricing. One normally does not expect prices fall below cost. Pricing based on costs is traditional and gives a solid basis.

#### 5.2.4.1.1 Average Cost

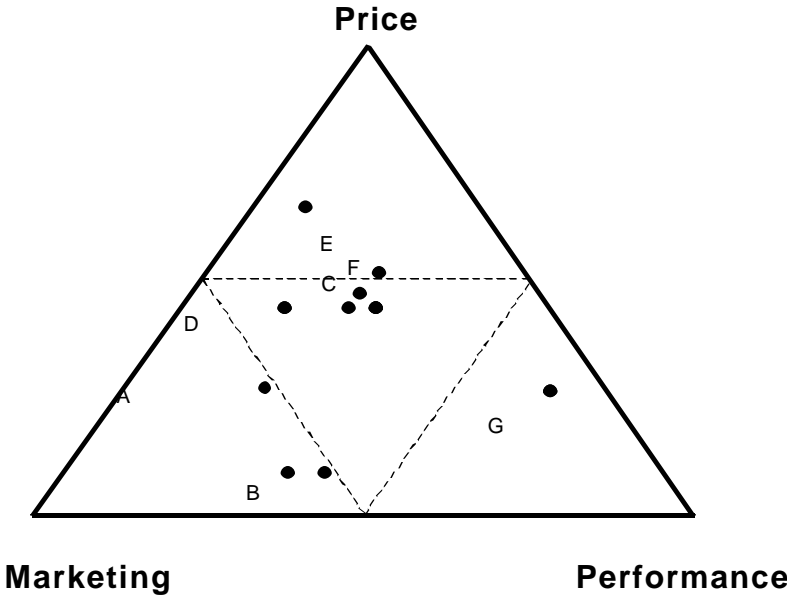
*Average or Full Cost* represents the total cost of sales to the firm for the specific product. This includes all costs and burden that are assigned to the product. Generally depreciation costs are included with this cost estimate.

#### 5.2.4.1.2 Variable Cost

The variable cost is the sum of specific expenses that can be uniquely assigned to the production and distribution of the product. Limited marketing costs are often included. Fixed costs are excluded. Depreciation, management costs, burden, and development expenses are also excluded.

The variable costs represent the lowest assignable costs. In general, we refer to the difference between the variable cost and the selling price as the contribution. The contribution represents the additional funds to the firm above bare production and distribution costs.

Figure 3, Pricing Scheme





#### 5.2.4.1.3 *Cost + Price*

A traditional method for estimating "reasonable" price is to use average cost plus a fixed return on investment or a fixed margin. In many companies that fixed return on investment for new businesses has been 20% after tax. This is usually considered a target price. Since depreciation is included in the average cost, the actual return is somewhat higher than 20%.<sup>1</sup>

The general *Cost Plus* pricing method is an approved method for U.S. Government Department of Defense development contracts. However, the specifics for those contracts are unique. We suggest that pricing of Government development work should be reviewed with the appropriate staff organization.

#### 5.2.4.1.4 *Experience Curves*

Costs are expected to decrease with the experience of producing product. This is due to both economies of scale and the results of improved process development. Prices also tend to decline with sales, though the rate of decline may be different than that for costs. An useful tool is for forecasting costs is a plot of the logarithm of the average price against the logarithm of the accumulated production. Historical data should be useful for making the extrapolation.

It should be noted that the experience curve is not the destiny of price, but it does represent a customer expectation. Various strategies may be undertaken to maintain price and counter this expectation.

#### 5.2.4.2 **Value Based Pricing**

Price can be based on the products value to the customer. Under these conditions, the price may be very much higher than the cost. It should always be noted that the customer must receive value above his costs from using your product. Therefore, it is not reasonable to expect to an extraction of the total value with your price.

#### 5.2.4.3 **Reference Price**

The reference price reflects the expectation of the customer. It is how much the customer believes such a product should cost him. Generally, this price is approximately equal to the competitive price. It may differ, depending on his perception of value and quality. For example, plastic parts may be perceived as less expensive than metal parts.

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<sup>1</sup> The *Cost Plus* price can be roughly estimated by assuming the level of investment in the business. In general, the total historical investment is roughly equal to the annual sales in high capital investment businesses. The historical investment includes some old business and most involved significant permanent investment.

For some new businesses utilizing external manufacturing sources, most of the investment should be in working capital and development. The working capital consists of: cash, inventories, and accounts receivable. Collectively, these usually do not exceed 40% of annual sales. We might, therefore, suggest that 50% annual sales could be used as an estimate for new investment. This would give a Cost Plus price of 10 - 15% above the average total cost of sales.

Figure 4, Forecasting Price, Learning Curves

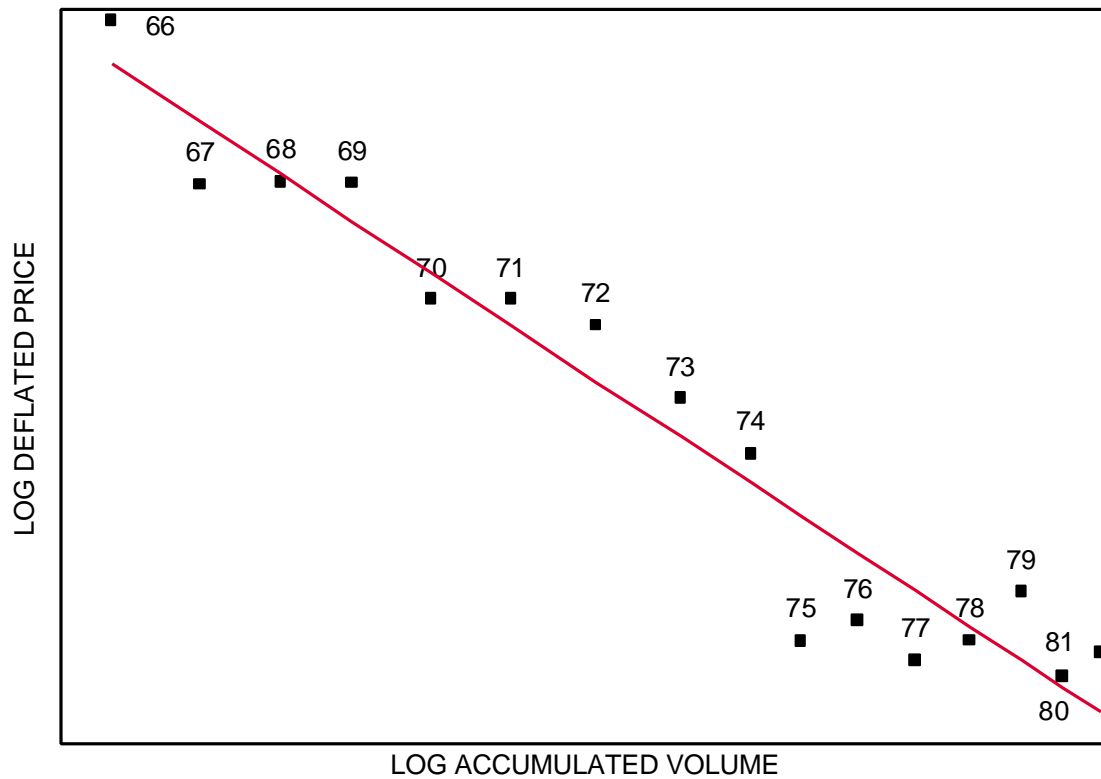
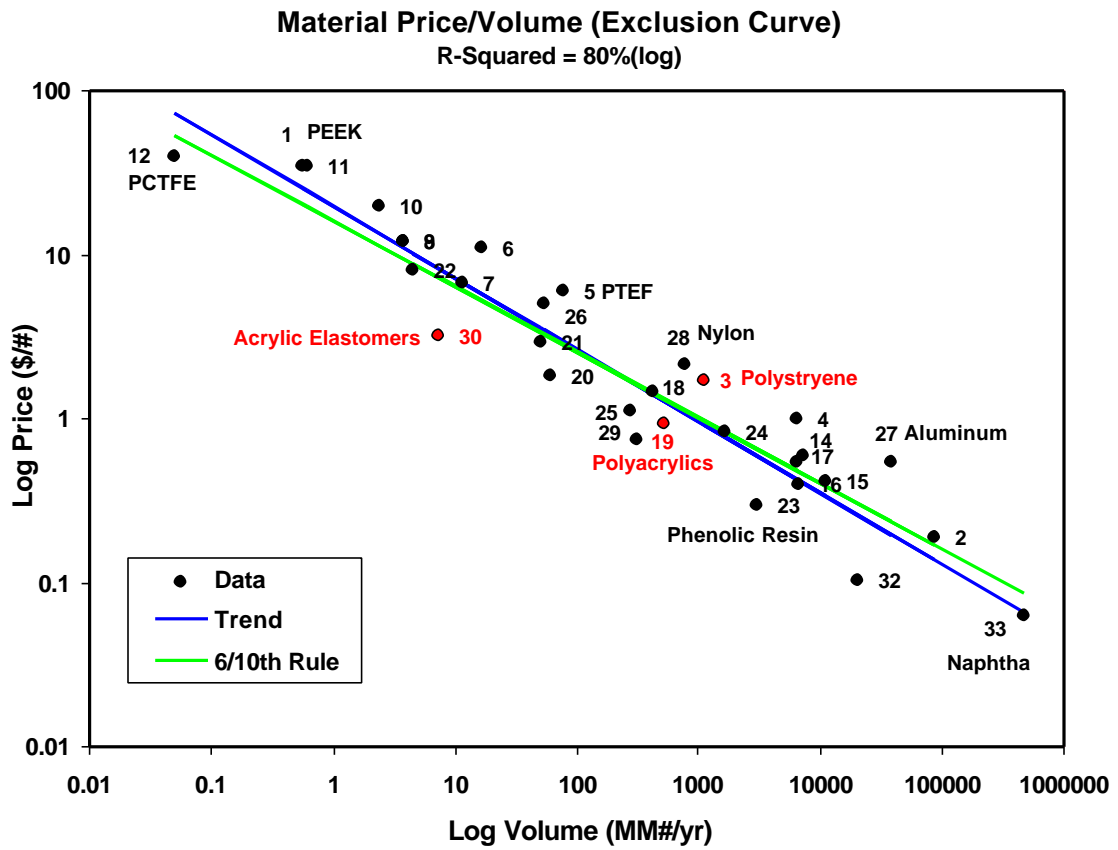


Figure 5, Forecasting Price, Price/Volume Curves



#### 5.2.4.3.1 Competitive Price

Competitive price is the price of the most competitive product to the customer. Generally, the leading competitors price is used as the reference. The choice will depend on which competitor is most directly in competition with the business offering or is the greatest threat to the business.

#### 5.2.4.3.2 Price/Volume Analysis

In many cases, functional competition can be as or more important than in-kind competition. It is expected that the price of such a competition will depend on the volume of the business. In some areas, particularly for plastics, there appears to be a stable price/volume relationship.<sup>2</sup> This relationship shows up as a straight line on logarithmic plot of price versus volume, with a slope of -.4 (inter-product price elasticity of 2.5). This curve can be used as an alternative to the experience curve for extrapolating future price.

#### 5.2.4.3.3 Value in Use

Value-in-Use is a derived price based on calculating the economic worth of the offering to the customer compared with his best alternative. Only economic value is included in the analysis. This type of value can be considered an "engineering" evaluation since it focuses directly on the derived benefits of the product.<sup>3</sup>

#### 5.2.4.3.4 Perceived Value

There are usually attributes of the offering that can not be evaluated in terms of economic benefits. These include: quality, service, and the integrity of the firm as a supplier. These attributes as well as the economic benefits, have a perceived value or cost to the customer. These values can be measured, though not as precisely as other measures.

#### 5.2.4.3.5 Price Premium

The price premium is the additional value of the offering over the next best alternative. It is related to the value analysis in that it reflects the additional value imparted by the product to the customer.

For developing pricing strategy, the premium represents the indifference of the customer to a price change.

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<sup>2</sup> The *Price/Volume* curve for polymeric materials has been stable since 1947 and is referred to as the "*Exclusion Curve*". The Fibers Department has extended the curve analysis to include all materials. There is some evidence that a set of parallel curves can be constructed, each with the same logarithmic slope. The vertical position of the curve represents the extent of manufacture.

<sup>3</sup> The *Value-In-Use* is calculated as:

$$\text{Value-In-Use} = \{\text{Cost of Using the Product} - \text{Cost of the Best Competitor}\} / \text{Units of Measure}$$

Generally the costs are divided into specific groups and evaluated as changes versus the competition. Typical groups include changes in: (1) direct costs, (2) labor costs, (3) waste, (4) inventory and working capital, (5) new facility costs, and (6) added value, usually reflected in premium price of end use product

**5.2.4.4 Pricing Strategy**

Price or share maintenance or growth are often the general market goals. The pricing strategy focuses on the accepted pricing policies that will be followed.

**5.2.4.4.1 Segment Strategies**

The pricing strategy for each isolated market segment should be clearly stated. Vastly different strategies may be selected for each of the segments depending on the receptivity of the segments to prices and the relative insulation from direct competition.

**5.2.4.4.2 Overall Pricing Strategy**

The extent that market segments can be differentiated is limited. Need to maintain consistent policies, ethical, and legal conditions can limit the extent that customers can be given different price treatment. A general pricing policy is usually desirable.

**5.2.4.4.3 Discounting**

Price discounting is used both to promote the product and to allow quantity discounts. The discounting strategy and policies should be discussed. Discounting will effect the perception of price, the revenues, and the expected long term price. Any legal issues regarding discounting should identified.

**5.2.4.4.4 Financial Terms**

Financial terms can be as important as price in determining the attractiveness of an offering. The financial terms should be discussed and compared with those traditional for this market.

**5.2.4.4.5 International Pricing**

If the product is to be sold internationally, the international pricing policy should be discussed. Under most conditions, the international business is viewed as a separate business concept, with its own business plan

**5.2.4.4.6 Expected Competitive Reaction**

In almost all cases there exists some form of competition, either in-kind or in function. The pricing strategy may competitor pricing. It is necessary before setting pricing strategy to consider the reaction of competitors. Contingency plans may be needed if adverse competitive reaction is a strong possibility.

**5.2.4.4.7 Pricing Authority**

A key issue in pricing policy is who has the authority to quote price to customers. In most cases it will need to be on a sales manager level.

**5.2.5 PROMOTION**

The promotional plan includes all advertising, sales aids, product information, and exhibit programs. These programs can be developed either on an aggregate or toward specific segments. In general, during development, only targeted promotional campaigns are undertaken. If the technology is broad based and exciting, it may be useful to solicit ideas using promotional campaigns.

**5.2.5.1 Promotional Objectives**

Clear promotional objectives must be identified and related to the segment marketing objectives, listed above. These usually target on improving awareness and willing to buy.

**5.2.5.2 Promotional Mix**

The decision on which media to use and the break down in channels of communications should be discussed. The method and schedule for coordinating promotional programs and sales should be outlined.

**5.2.5.3 Product Names**

The product name can convey the image or position of the product to the customer. The selection of an effective name can be a critical issue in the development of the product. The product name, the objective in its selection, and the state of trademark certification should be discussed.

**5.2.5.4 Overall Promotional Plan**

The specific promotional program should be described, including the target audience, the message, and the specific program objective. The objectives may include details on the number of desired contacts to be made. These program objectives should be viewed subordinate to the general objectives of the programs.

*5.2.5.4.1 Resources*

Resource requirements should be listed with specific allocations to each program. Breakdowns of costs to internal and any outside agencies, and direct charges should be listed.

*5.2.5.4.2 Agencies*

The identity of all major outside advertising and promotional agencies should be listed.

**5.2.5.5 Promotional Elements**

The elements and components of the promotional campaign should be discussed including: (1) the target of the program, (2) the specific objectives for the program in terms of its impact on potential customers, (3) method of execution, (4) the cost, and (5) means of measuring specific results. Many of the promotional elements involve activities of more than one business. These joint activities allow the use of expensive techniques by small businesses. The resources assigned to the element and its objectives should reflect the share assumed by the business, not the total cost.

*5.2.5.5.1 Packaging*

Product packaging should be considered a promotional element as well as a means of delivering the product. The form and design of the package need to be considered as well as the means of production.

*5.2.5.5.2 Labels*

Package labels and inserts have both promotional value and legal requirements. Both issues should be discussed.

*5.2.5.5.3 Sales Aids*

Sales aids include both tools and materials supplied to the sales force and point of sales materials such as promotional labels. The type and method of delivery are important in determining their effectiveness.

*5.2.5.5.4 Product Information*

Product information includes public relations activities and collection of data for other data publications such as data books and data sheets, not otherwise covered as sales aids.

*5.2.5.5.5 Exhibits and Shows*

Trade shows and exhibits are major marketing routes for industrial and consumer products. Portable exhibit displays are usually prepared for these shows. Costs and arrangements should be discussed.

Exhibits, in particular, are usually undertaken by several product groups in conjunction. Costs for this activity should reflect only the share assumed by this business.

- 5.2.5.5.6 Articles* Technique articles in either trade or scholarly journals can be used to promote the product. Their release and/or sponsorship should be reviewed.
- 5.2.5.5.7 Advertising* Advertising campaigns in either popular magazines or trade journals should be reviewed. The identity of the target audience, the coverage, message, and the media should be discussed. The objective of the campaign, its coordination with sales, and its cost need to be reviewed.
- 5.2.5.5.8 Commercials* Commercials, either on television or radio, are usually not used for industrial products. Special targeted media, such as air line movies or for Corporate Image promotion, commercials have been used. Television commercials are widely used for consumer products, such as carpeting.
- Because of the high expense involved in national advertising, such campaigns need to be reviewed in depth in separate documents. Only a general review of the campaign and its costs should be included in the business plan.
- 5.2.5.5.9 Public Affairs* Public affairs include public releases and high visibility development programs not targeted to produce significant direct sales.
- 5.2.5.5.10 Sales Meetings* Sales meeting may be included in the promotional budget or in direct sales. If they are included in the promotional budget, they should be reviewed in this section.
- 5.2.5.6 Testing Results and Effectiveness** A program to validate the effectiveness of the promotional campaign should be undertaken if it is cost effective. This usually involves some type of marketing research program. For small programs, adequate information can be obtained from the sales force.

## **5.2.6 SALES EFFORT**

The sales effort plan focuses on direct contact with potential customers and partners. The sales plan should be coordinated with the other elements of the marketing mix. Action items and milestones are covered in the general marketing plan as indicated above.

### **5.2.6.1 Technical Product Support**

Technical product support may be part of the marketing or the technical function. If it is part of marketing, it should be included with the sales force.

### **5.2.6.2 Sales Objectives**

The specific goals and objectives of the sales effort activities should be listed. The sales effort goals are usually a subgroup of the marketing objectives and consist of a list of actions of the customers that are desired. In addition, specific action oriented objectives may be included, such as call frequencies.

### **5.2.6.3 Sales Program**

The timing and nature of the sales calls should be outlined. Coordination of sales effort and other marketing and development programs should be indicated.

#### *5.2.6.3.1 Handling Sales*

Mechanisms for handling sales must be available before sales programs can start. These includes having invoicing, and account receivable accounting systems in place and integrated into an overall accounting system.<sup>1</sup>

#### *5.2.6.3.2 Resources*

The sales effort is often managed as a separate function from marketing. A separate budget and man-power requirement may need to be specified.

## **5.2.7 PARTNERSHIP**

There are at least five types of partners that are useful for developing new business: (1) customer partner, (2) manufacturing partner, (3) distributor partner, (4) joint venture or acquisition, and (5) internal partner. Issues regarding a joint venture or acquisition are covered earlier in the business plan and are only covered here if they pertain to specific marketing plans. The manufacturing and distributor partners are covered in subsequent sections. Only the customer and the internal partners need to be covered here.

### **5.2.7.1 Customer Partnerships**

Customer partners are potential customers of this business who wish or will wish to work with the firm in developing the products and services. Some agreements are necessary to assure agreement on price and sharing of expenses. The identification and development plans for these arrangements should be outlined.

### **5.2.7.2 Internal Partnerships**

Internal partners consists of other internal organizations who wish or will wish to participate in the development of this market. Their roles should be outlined as well as the commitment of resources.

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<sup>1</sup> The sales somehow have to enter the *Corporate General Ledger*.



**5.2.8 QUALITY**

Quality is defined as "meeting or exceeding customers' reasonable expectations". As such, it is vital to identify the determinants of quality to the customers and convey that information to the organization. The marketing plan should provide a means of obtaining and conveying this information.

**5.2.9 Conformance with Standards**

The ability to market to many customers depends on the ability of the business to conform to certain quality standards. For example quality standards have been set for dealing in the European Community (ISO 9000), with the US Department of Defense (105D) and with the Ford Motor Company, Q-1. The marketing must address appropriate standards as part of the plan.

**5.2.10 Personnel**

The management of human resources is a key factor for success in marketing and sales. The policies and programs for managing this resource should be identified.

**5.2.10.1 Professional Performance**

Marketing for each business may require special skills in its professional personnel. If these skills are unique in to this business any way they should be identified.

**5.2.10.2 Reward Systems**

A system should be established to reward conduct and behavior which is of particular advantage in marketing in this business. These may include quality, safety support, innovation, implementation and any other special conduct or skill necessary to this business. It is the intent of the reward system to positively and publicly reinforce advantageous behavior.

**5.2.10.3 Career Progression**

Career progression programs should be reviewed. Availability of promotional positions and the need for turn-over as the business grows are areas for discussed.

**5.2.11 ACTION ITEMS**

All key action items should be outlined, usually in table form. This outline should show specific activities, a time frame, and responsibility.

**5.2.11.1 Research Needs**

Marketing and advertising research needs should be identified. These generally consist of a list of unaddressed questions for which independent marketing inquiry could be useful. Resources required for this activity should be estimated.

**5.2.11.2 Milestones**

Key milestones such as reports, expected sales, or customer decision points should be noted.<sup>2</sup>

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<sup>2</sup> The automotive industry, for example, has specific target dates for model design decisions. Such relevant data should be included in the marketing plan.

*5.2.11.2.1 Gantt Chart*

Gantt and Critical Path charts graphically show the status of action items on time lines. These charts should be used if appropriate.

### 5.3 TECHNICAL (RESEARCH AND DEVELOPMENT)

The development plan is critical for the assessment of feasibility and the development of products and processes. The development program should be viewed as evolutionary. During the early phases of the business, the research and development comprises the totality of activities, focusing on the evaluation of the concept and the refinement of product definition. As the business is defined and its feasibility firmed, the development activity focuses on support for manufacturing and marketing rather than on feasibility analysis. Nature of the activities, the resources committed, and the make-up of skills can be expected to change throughout the development process.

#### 5.3.1 DATE

Because of the potential volatility of development programs, a date should appear with each version of the Research and Development plan.

#### 5.3.2 PRODUCT DESCRIPTION

As progress continues on developing the product, the description of the product can be expected to change. These changes reflect both specific characteristics in the design of the product to meet particular customer needs and in the general definition of the product. The general definition reflects the breadth of the product concept. This will expand with the identifications of new applications and contract as other business concepts are spun-off.

The product description section gives a short description of the product from a research perspective. This perspective usually focuses on the embodiment of technology.

##### 5.3.2.1 Product Patent Situation

The product patent situation should be reviewed in terms of the underlying technologies. The potential for basic, composition of matter, and application patents should be discussed.<sup>1</sup>

##### 5.3.2.2 System Design

The product functions with a system. A review of the functioning of the system and the part played by the product is useful at this point.

##### 5.3.2.3 Materials

A large number of businesses are based on materials. The choice of materials is viewed as a separate key issue. A section should be devoted to material selection. These materials include those in the final product and precursors.

##### 5.3.2.4 Uncertainties

Technological uncertainties need to be reviewed. These should be divided into those that are testable through feasibility studies and those with inherent uncertainties.<sup>2</sup> During the early stages in the business development, market and manufacturing uncertainties can be considered, since most feasibility issues will be viewed under R&D.

###### 5.3.2.4.1 Alternative

Alternative schemes to produce the same result should be examined. These alternatives are usually within a given genre. The examination of

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<sup>1</sup> The relative strengths of patents are not easily assessed without court action. Assessing strength of a patent position is usually limited to judgement calls, with the assistance of the Legal Department.

<sup>2</sup> Inherent uncertainties usually surround alternative functional approaches that competition could use.

*Technologies*

alternative technologies reflects the risks associated with the technological uncertainties.

*5.3.2.4.2 Potential  
Competitive Position*

Assessing the potential competition is an ongoing process. Technological aspects should be undertaken by the technical staff as part of the research and development effort.

**5.3.3 DEVELOPMENT  
QUALITY**

The firm's customers expect a series of new products and a consistent development program. The impact on the expectations and perceptions of the customers coming in contact with the development activities should be reviewed. Care should be taken not to overly encourage customers expectations for new products whose feasibilities are still being assessed.

**5.3.4 DEVELOPMENT  
OBJECTIVES**

It is expected that the development objectives will change rapidly as information is compiled on new business concepts and more slowly during the long term development and support. Development objectives should be viewed as tentative during the initial time period.

**5.3.4.1 Product Objectives**

Product objectives focus on the definition and development of specific product concepts.

**5.3.4.2 Process Development**

Process development is usually concurrent with the development of the product. Effective product design must focus on the ease of manufacture.

**5.3.4.3 Needs for Invention**

While invention cannot be scheduled, it is useful to identify technological gaps where such invention may be useful.<sup>3</sup>

**5.3.4.4 Timing**

Time limitations should be noted. Business concepts usually have some "window of opportunity" for which the business concept is thought to be viable. That time frame sets the limits for which information should be gathered.

**5.3.5 DEVELOPMENT  
STRATEGY**

The development strategy should focus on meeting objectives within the resource and time constraints. The strategy section usually focuses on the general approach, i.e., prototyping, alternative technology feasibility studies, or concept testing.

**5.3.5.1 Concept and Business  
Tests**

Concept and business tests for new products and application concepts. These tests should be, at least partially, the responsibility of the research and development program. These tests should be described in sufficient detail to assure a reasonable evaluation of business viability.

**5.3.5.2 Prototype  
Development**

Programs to development of functional prototype products should be identified. The objective of these prototypes should be clearly stated, i.e., market development, concept testing, process testing, etc.

**5.3.6 RESEARCH**

The research strategy should focus on developing competitive advantage through the accumulation of superior technical knowledge. Research

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<sup>3</sup> What is an invention for one business, may already exist in other businesses. A "Need" or wish list may identify existing technological strength.

**STRATEGY**

programs are undertaken either in support of large ventures or to support a number of smaller ones. In general, the technical support needs of several businesses are combined to form the basis for the long term research program.

**5.3.6.1 Core Technologies**

Core technologies are the basis for business. They may be in the product or in the process used to make it. It is the superior knowledge of the core technology that gives technical competitive advantage to the business. In general the technologies focus on specific ways of doing things.

**5.3.6.2 Measurement**

It is "conventional wisdom" that new technologies can be thought to develop from new ways to "see the world". New methods of measurement tend to lead to new ways of controlling the physical world. The better we can measure key factors the greater our chance to identify potential new technologies. Programs of improved measurement are often the entry into new technology development.

The need for new measurement techniques for both fundamental and quality assurance activities should be identified. Priorities for development should be suggested, if they are expected to be funded under this business.

**5.3.6.3 Prediction**

Theory or the ability to predict physical phenomena can lead to new ways to use technology or to identify limitations in existing approaches. It is also "conventional wisdom" that theory leads to alternative approaches.

Key theoretical and model issues should be identified, if they are expected to be funded under this business.

**5.3.6.4 Research Programs**

Research programs supported by this business should be identified. The reviews should include: (1) objective, (2) general approach, (3) nature of the measurable results, and (4) the resources allocated.

**5.3.6.5 Information Transfer**

For the information to be useful, it must be transferred to personnel associated with the business. Information transfer activities must be integrated into the Research program. These may include informal exchange with support functions and formal reporting.

**5.3.7 TECHNICAL  
PRODUCT SUPPORT**

Technical product support may be part of the marketing or the technical function. If it is handled as a part of the technical function, it should be noted separately.

**5.3.7.1 Objectives**

The objectives for the Technical Product Support should be identified in terms of the customers who will be support. The products and the nature of the support should also be identified.

**5.3.7.2 Resources**

Resource requirements should be identified. This should include laboratory support as well as man-power and funding.

**5.3.8 PLANT TECHNICAL  
SUPPORT**

Plant technical support may be part of the manufacturing or the technical function. If it is handled as a part of the Technical function it should be noted separately.

**5.3.8.1 Objectives**

The objectives for the technical product support should be identified in terms of the customers who will be support. The products and the nature of the support should also be identified.

**5.3.8.2 Resources**

Resource requirements should be identified. Manufacturing support is usually included with the manufacturing function and not included here. Semi-works facilities may be included here if not covered in manufacturing.

**5.3.9 PERSONNEL**

The management of human resources is a key factor for success in research and development. The policies and programs for managing this resource should be identified.

**5.3.9.1 Professional Performance**

Research and technical support for each business requires special skills among its professional personnel. If these skills are unique to this business in any way they should be identified.

**5.3.9.2 Reward Systems**

A system should be established to reward conduct and behavior which is particularly advantageous. This may include quality, safety support, innovation, implementation, and any other special conduct or skill necessary to this business. It is the intent of the reward system to positively and publicly reinforce advantageous behavior.

**5.3.9.3 Career Progression**

Career progression programs should be reviewed. Availability of promotional positions and the need for turn-over discussed.

**5.3.10 ACTION ITEMS**

All key action items should be outline, usually in a table form. This outline should show specific activities, a time frame, and responsibility.

**5.3.10.1 Resource Requirements**

The targeted resource requirements envisioned at this time for completing the specific objectives should be noted. The time frame for both the expense of the resources and the accomplishment of the tasks must be listed. Resources include man-power, standard costs, and any external expenses. Resource requirements cover all activities, no matter who performs them. Therefore, the resource should include non-R&D and technical expenses.

**5.3.10.2 Milestones**

Key milestones such as reports, expected prototype products and product demonstrations should be noted.

**5.3.10.2.1 Gantt Chart**

Gantt and Critical Path charts graphically show the status of action items on time lines. These charts should be used if appropriate.

## 5.4 MANUFACTURING & QUALITY ASSURANCE

Manufacturing and quality assurance are key factors of success. Individual plans are usually prepared for manufacturing, quality, and distribution. However, these plans and the marketing plan are all interrelated. Manufacturing, quality, and distribution are usually viewed together as an integral production program. This integral production program must complement the marketing plan.

### 5.4.1 MANUFACTURING PLAN

The manufacturing plan includes all aspects of process development and the manufacture of the products. Because quality may be a critical issue it is handled as an separate plan. However, the quality, manufacturing, and distribution plans should be viewed together as a integral production program. Neither of the three functions can be considered to be successful without the success of the other functions.

#### 5.4.1.1 Process Description

The present and any proposed process for manufacturing the product should be described. A series of flow diagrams with discussions, are usually sufficient to describe the process. Existing and proposed facilities should be identified.

##### 5.4.1.1.1 *Development Partners*

If phases of the manufacture will be done in non-firm facilities, the process and identity of the processor should be made known. The conditions of the contract and the businesses' expectations should be explained.<sup>1</sup>

##### 5.4.1.1.2 *Process Patent Situation*

The process patent situation should be reviewed in terms of the underlying technologies.<sup>2</sup>

#### 5.4.1.2 Objectives

The objectives of the manufacturing functions should be stated in terms of production, timing, and costs. The reasons, alternatives, and costs of not meeting objectives should be discussed.

#### 5.4.1.3 Manufacturing Strategy

The general approach toward process development and manufacture should be discussed. This involves decisions of where and how the development and manufacture should be done. Trade off's among costs, financial exposure, and risks should be discussed.

##### 5.4.1.3.1 *Process Design*

The procedures for the process development plan should be outlined and explained. Key issues should be addressed listed.

##### 5.4.1.3.2 *Organization of Manufacture*

Who is to perform the manufacturing steps? Where are they located? Who reports to whom?

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<sup>1</sup> Processing may include formulations, specific toll processing, or full manufacturing.

<sup>2</sup> There is evidence that the existence of strong process patent position gives significant competitive advantage. However, relative strengths of patents are not easily assessed without court action. As such, assessing strength of a patent position is usually limited to judgement calls, with the assistance of the Legal Department.

*5.4.1.3.3 Prototyping*

Manufacturing prototypes are usually produced using the expected process but on laboratory scale facilities.<sup>3</sup> The schedule for prototype products should be listed. The nature and function of these items should be discussed.

*5.4.1.3.4 Equipment and Tool Design*

Special equipment and tools often have to be designed, ordered, and fabricated to produce the product. Procurement of tool and equipment can be a limiting time factor in new product development or plant expansion. The types, timing and costs for new equipment and tools should be specified in general. Additional documentation should be prepared describing the requests in detail and along with the preferred vendor.

*5.4.1.3.5 Equipment Installation*

Installation of equipment can cost as much and take as long as the procurement of the equipment and tools from the vendor. Timing and resource requirements should be identified. These should include building costs and installation fees. Any special labor problems should be identified.

*5.4.1.3.6 Process Prove-out*

The process has to be proven to be effective before it can be used as a assured means of supply. In addition, it is necessary to obtain sufficient early production information for the Quality Capability Assessment. The timing and resource requirements for prove-out should be identified.

*5.4.1.3.7 Market Development Supply*

Market development materials are usually supplied from prototype manufacturing facilities: either a semi-works, or a marketing development facility (MDF). The promotion of any new product or variation may require the use of this type of facility. Alternatively, main manufacturing facilities may be used for market development. In either case, scheduling for development materials can be critical for the expansion of any business.

*5.4.1.3.8 Packaging*

Product package design and the means of packaging should be discussed. Packaging should be considered a part of the Quality program and quality controlled accordingly.

**5.4.1.4 Trade Secrets**

Trade secrets of manufacturing can convey competitive advantage. Procedures to identify and protect process and product trade secrets should be instituted and summarized.

**5.4.1.5 Cost Analysis**

A key business objective is usually cost reduction. To establish reasonable goals, historical and "look-alike" data should be analyzed. At least three elements should be included with the cost analysis: (1) fixed costs including burden, (2) variable costs, and (3) depreciation.

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<sup>3</sup> However, toolings may not be fully developed for the prototype product production. Some hand work may be necessary.



- 5.4.1.5.1 Cost Trend* Cost trends should be analyzed in terms of current and constant dollar costs. Typically, on manufacturing costs are included. Marketing and administration costs are usually excluded. Recently, inventory costs have been included to reflect stream-lining material handling and to determine gains from "just-in-time" programs.
- 5.4.1.5.2 Economies of Scale* Expected effects of economies of scale on costs should be discussed. Separate analyses should be made for total costs and for investment.<sup>4</sup>
- 5.4.1.5.3 Fixed Costs* Fixed costs consist of management, development, and marketing as well as plant operations and other staff functions. The definition of fixed versus variable costs will differ between businesses. For example, labor may be considered a fixed cost for largely automated operations but a variable cost for manual production.
- Included also is a burden charge imposed by Department and Wilmington management to cover Company wide expenses. Unfortunately, these burden expenses are not under the control of the business and are imposed as a tax. The best method to estimate these costs is by comparison to other businesses.<sup>5</sup>
- 5.4.1.5.4 Experience Curves* Fixed costs are expected to decrease with production. Rules for this type of cost reduction have been established. Businesses will differ in the extent to which cost reduction learning takes place.<sup>21</sup>
- 5.4.1.5.5 Measures of Productivity* Measures of productivity should be outlined. These measures should include cost, labor, and material reduction as well as yield.
- 5.4.1.5.6 Variable Costs* The variable costs represent the incremental expenses for producing an additional unit of material. These usually include raw materials, tolling costs, power, and labor. Maintenance costs and inventory holding expenses are generally not included.
- 5.4.1.5.7 Long Term Trends* Variable costs tend to increase a rate slightly less than the inflation rate unless the raw material and power are effected by a significant economy of scale.<sup>6</sup> This represents a long-term increase in current dollar costs, but a decrease in constant dollars.

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<sup>4</sup> A 6/10th power rule is usually used for scaling investment for process equipment. Other standards can be used based on similar business experiences.

<sup>5</sup> Development of fixed costs usually require the completion of the business plan. Estimates are usually prepared early in the venture as a means of estimating business stake and risk.

<sup>21</sup> Unfortunately, some customers expect continued producer cost reduction and subsequent price reduction.

<sup>6</sup> The price of materials tend to have a overall price elasticity of 2.5 this represents a significant reduction in price with increased volume. If this venture, in conjunction with other businesses, can increase the demand for the raw material its price may be expected to fall significantly.

*5.4.1.5.8 Depreciation*

Depreciation is usually considered a separate cost element. It presents a charge for using the facility allowed by the tax codes or by accounting policies. It must be separated, since it does not represent a cash flow from the business.

*5.4.1.5.9 Cost Representation*

Graphical methods of cost estimation, such as experience curves or cost volume curves, should be included in the business plan, if they are critical. The costs are usually represented as a time series over a 5 to 20 year time horizon.

*5.4.1.5.10 Scrap Control & Rework*

Reduction of scrap and rework are prime objective for quality deployment. Programs for scrap and rework reduction should be included in both manufacturing and quality plans.

**5.4.1.6 Cost Reduction and Productivity Programs**

Historical trends do not take place by themselves. Programs have to be put in place to the make cost reductions take place.

*5.4.1.6.1 Debottle-necking*

All processes are constrained by some characteristic. These constraints limit the types of products and the volume that can be produced. The removal of the constraints is referred to as debottle-necking the process. For each of these activities identify: (1) objectives, (2) timing, (3) costs, and (4) any special resources.

**5.4.1.7 Resources**

Resources involve both development and manufacturing man-power and funds. Costs of product manufacture, such as materials, direct labor, and power as well as plant investment are separated from development and administrative costs. A five year forecast should be prepared from both costs and investments for all aspects of manufacture.

*5.4.1.7.1 Plant Technical Support*

Plant technical support may be part of the manufacturing function or the technical function. If it is included in manufacturing, it should be noted.

*5.4.1.7.2 Facilities*

Laboratory, semi-works, and full manufacturing facilities should be described, and cost. Plans for acquisition should be laid out.

**5.4.1.8 Personnel**

The management of human resources is a key factor for success in manufacturing. The policies and programs for managing this resource need to be identified.

*5.4.1.8.1 Professional Performance*

Production and project and personnel management activities for each business may require special skills by its professional personnel. If these skills are unique to this business in any way they should be identified.

*5.4.1.8.2 Reward Systems*

A system should be established to reward conduct and behavior, which is particularly advantageous. These may include quality, safety support, innovation and any other special conduct or skill necessary to this business. It is the intent of the reward system to positively and publicly reinforce advantageous behavior.

<i>5.4.1.8.3 Career Progression</i>	Career progression programs should be briefly reviewed. Availability of promotional positions and the need for turn-over should be discussed.
<b>5.4.1.9 ACTION ITEMS</b>	All key action items should be outlined, usually in table form. This outline should show specific activities, a time frame, and responsibility.
<b>5.4.1.10 Milestones</b>	Key milestones such as reports, expected prototype products and product demonstrations should be noted.
<b>5.4.1.11 Timing</b>	The manufacturing plan must meet the timing requirements of the marketing plan. There are numerous constraints and lead- time, which must be considered.
<i>5.4.1.11.1 Gantt Chart</i>	Gantt and Critical Path charts graphically show the status of action items on time lines. These charts should be used if appropriate.
<b>5.4.2 QUALITY FUNCTION DEPLOYMENT PLAN</b>	The plan for the deployment of a quality program <sup>1</sup> identifies the key issues of quality that need to be addressed. It also outlines the integration of all functional plans (i.e. marketing and manufacturing) to assure customer satisfaction. The focus of the plan is the establishment of a system for identifying, monitoring, and improving issues that are determinate of customer satisfaction. <sup>2</sup>
<b>5.4.2.1 Organization</b>	
<i>5.4.2.1.1 Quality Authority</i>	The initial criteria in organizing for the management of Quality, is the establishment of a "Quality Authority" within the organization. This most often takes the form of a Quality Resource or Quality Manger who reports to the "top" of the organization, and/or a quality committee. <sup>25</sup>
<i>5.4.2.1.2 Quality Teams</i>	Effective Quality planning must utilize appropriate teams to integrate the development, maintenance, and improvement efforts. All business disciplines should share common focus and goals in order to meet customer needs and expectations. All appropriate disciplines and levels in the organization should be included in the quality team.
<b>5.4.2.2 Quality Program</b>	The quality programs objectives pertain to the specific concerns of establishing an overall system to assure continuous improvement of

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<sup>1</sup> The ultimate purpose of Quality Management is to create an environment, and put disciplines in place, which will enhance our ability to continually improve our product offerings. That improvement is measured against customer needs and expectations.

<sup>2</sup> The section on Quality management and planning was prepared with the assistance of Allan D. Strawhacker (PPD/APD)

<sup>25</sup> This function provide both strategic planning and leadership capability necessary for *Quality* management aimed at continuous improvement. As teams develop, the authority may shift to a resource role. As organizational skills become well established, systems must be put in place in support self managing teams in the area of continuous improvement.

<b>Objectives</b>	products and services. Objectives should include external business requirements such as compliance with quality program certifications, i.e. FORD's Q-1, the European ISO 9000 or the US Department of Defense 105D. Internal or Departmental certification may also be necessary. <sup>3</sup>
<b>5.4.2.3 Determinants of Quality</b>	In order to deliver quality, the determinants of quality must be identified and measures developed. These measures must be quantifiable, so that they may be monitored and controlled. These determinants should be based on supplier and customer abilities, needs, and expectations rather than product specifications or manufacturing standards. All aspects of the offering, including manufacturing, marketing, product, and service, uses, need to be examined.
<b>5.4.2.4 The Quality Program</b>	There should be a documented procedure for involving all affected functions when corrective actions or process improvements are contemplated. Effective wide spread communications of results after implementation of such actions should follow in a timely manner.
<i>5.4.2.4.1 Quality Measures</i>	Quantitative measures of quality need to be established and statistical means to monitor and control established.
<i>5.4.2.4.2 Quality Potential Study</i>	The <i>Quality Potential Study</i> is directed at assessing the best possible performance of which the business system, manufacturing, marketing, and distribution, is capable. This study is based on historical performance where possible. The Quality Potential Study is usually conducted as soon as the product is fully specified.  A <i>Quality Process Potential Study</i> is a preliminary evaluation of the potential stability and capability of a process, over a short period of time, before full production begins. It offers an invaluable and timely view of how well the process might perform against expectations, and where improvement opportunities may exist. <sup>4</sup>
<i>5.4.2.4.3 Offering Quality</i>	Offering quality design assessment is intended to review the design of the product, services, and business structure to assure that quality is designed

<sup>3</sup> A state of continual improvement can only exist in an organization when all activities are guided by commonly held principles. The development of commonly held principles is dependent upon a shared "vision" of what should be. An important role of management is to lead in creating an environment which fosters shared thinking around the goals and objectives of the organization. Management must implement systems, such as reflective processes, to continually measure progress in creating this kind of environment.

<sup>4</sup> Areas of attention for the *Process Quality Potential Study* include:

- Material quality parameters
- Material sequencing
- Process control measures
- Changes/adjustments made during the trail run
- Any pertinent environmental factors
- Any concerns, questions, or unusual events

- Design* into the business. This reassessment is usually conducted in conjunction with the *Quality Potential Assessment*.
- 5.4.2.4.4 Statistical Process Control* *Statistical Process and Quality Control* procedures must be established for the business. Particular emphasis is placed on the manufacture of the products.
- 5.4.2.4.5 Quality Capability Assessment* The *Quality Capability Assessment* focuses on expected and deliverable quality in the system. This study is based on historical performance of the system during initial market development production. Sufficient data needs to be collected to allow for full statistical analysis. The assessment is usually undertaken shortly after the establishment of the *Statistical Process Control* procedures.
- 5.4.2.4.6 Quality Program Actions* The Quality Team must be empowered to make changes in the process and product in order to meet quality requirements. The range of this authority should be specified.
- 5.4.2.4.7 Organization* For quality to be functional it must be organized in depth. All levels of management must be involved in the development process and personally committed. The organization for quality must be based on the integral nature of running the business and assuring quality. The section review the lines of responsibility regarding quality and assuring appropriate channels of communication among manufacturing, marketing, distribution, and management regarding customer satisfaction.
- 5.4.2.4.8 Defect Fault Mode Analysis* Defect Fault Mode Analysis addresses the continuing relationship between measured quality and the sources of defect. The goal of this process is a continuing decrease in defects and improvement of overall quality. The Defect Fault Mode Analysis should be designed into the business system to assure continued improvement.
- 5.4.2.4.9 Incentives* An incentive system should be established to encourage continued quality improvement.
- 5.4.2.4.10 Quality Audit Schedule* Quality Audit systems, either external or internally developed, should be applied to the business on a routine basis. The tentative schedule for such audit should be identified.
- 5.4.2.4.11 Supplier Assessment* The quality programs for assessing materials, supplies, and services used by the business should be assessed on a continuous bases.
- Suppliers for the firm should be equally committed to quality. They should undergo periodic quality audits and an incentive program should encourage improvement.
- 5.4.2.5 Resources** Required resources necessary to carry out the quality mission must be identified.
- 5.4.2.6 Milestones** Key milestones such as reports, expected prototype products and product demonstrations should be noted.

#### 5.4.2.6.1 Gantt Chart

Gantt and Critical Path charts graphically show the status of action items on time lines. These charts should be used if appropriate.

### 5.4.3 DISTRIBUTION PLAN

The distribution plan focuses on the means of getting the product to the customers and users.<sup>1</sup> Because the distribution channel involves inventory, it is usually handled as part of the manufacturing function in the firm. However, it is traditionally associated with marketing. The establishment of the distribution plan should involve both functions.

#### 5.4.3.1 Market Demands

The market may impose demands on the distribution channel such as just-in-time delivery. Such demands should be identified.

#### 5.4.3.2 Distribution Function Objectives

Distribution function objectives usually focus on: (1) the quality of delivery, how fast can it arrive, (2) costs of storage, transfer, and delivery, and (3) inventory control. These objectives are often given as combinations of constraints and desires such as maintaining 95% delivery within 24 hours with excess inventories not exceeding 20% and at minimum cost.

#### 5.4.3.3 Channel Management

The distribution channel can be designed, selected, and managed rather than just accepted as a given. Control of the distribution channel will depend on the size of the business, the willingness to commit resources, and the power position in the market. In general, control is limited and the selection of possible distribution routes are constrained.

##### 5.4.3.3.1 Structure

The structure of the distribution channel is a listing of who sells the product to whom. This usually involves a number of "middlemen" who store, breakdown, transfer, sell and even process the product. These "middlemen" may include: warehouses, distributors, agents, dealers, processors, and users.

Several channels may exist for the product serving different markets or the same ones.

##### 5.4.3.3.2 Channel Characteristics

Distribution channels may be independent or sharing common points. For example, distributors may act as dealers for some customers. Users may be also dealers. Multiple channels may serve the same customers.

##### 5.4.3.3.3 Channel Value

Value has to be extracted all along the distribution channel. For the most part this consists of price margins between channel points. Other forms of value may be obtained, including using the product or the financial float.<sup>2</sup>

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<sup>1</sup> Specific terminology is used to refer to the members of the distribution channel: *warehouses* are locations and firms which transfer firm owned products under direction of the firm; *agents* sell and transfer firm owned products to customers; *distributors* sell and transfer products that they own; *Customers* are any firms that take ownership of the products. Distributors are considered customers. The *end-use customer* is the person who uses the product first. The *ultimate customer* is the final user or consumer of the product.

<sup>2</sup> The *financial float* is a quantity of money under the middleman control representing difference between received cash and payables. In some industries interest on the float is a major source of income.

- 5.4.3.3.4 Time Constraints* The nature of the product, its production or its application may impose a constraint on the distribution. Some products have a short shelf life, or are produced in campaigns, or are used for short seasons (such as for agricultural chemicals or the Christmas tree business). These time constraints have to be identified.
- 5.4.3.3.5 Geography* Geographic considerations should be mentioned. The existence of sparsely dispersed customers require a different distribution channel than a condensed situation. International trade is different than those internal to the United States.
- 5.4.3.3.6 Special Conditions* There may be special conditions that have to be considered in handling, storing, and transferring the products. These include temperature and environmental control, safety conditions, theft protection. In addition, special international conditions may exist restricting or facilitating transfers of product. These should be identified.
- 5.4.3.3.7 Mode of Transport* How the product is to be transported within the distribution channel can be vital. Some customers cannot accept certain forms, while in other cases only one may be economically feasible.
- 5.4.3.3.8 Packaging* Product packaging should be considered a promotional element as well as a means of delivering the product. Packaging should be considered a part of the Quality program and quality controlled accordingly throughout the distribution channel.
- 5.4.3.3.9 Labeling* Package labels and inserts must be maintained throughout the distribution channel to the end-use customer. This should be assured by the distribution program.
- 5.4.3.3.10 Safety* Product safety has to be assured throughout the distribution channel. A program should be in-place to assure both personal and environmental safety.
- 5.4.3.4 Organization** The way the distribution channel is organized by the business can determine its effectiveness.
- 5.4.3.4.1 Selling Direct* Selling direct involves moving product from the firm's ownership directly to the user. Alternative organizations may involve using distributors and dealers to hold and move product.–
- 5.4.3.4.2 Agents Warehouses & Plants* Agents, public and private warehouses and plants are used to store and transfer product. The objective is to consolidate materials to reduce inventory, yet have them near enough to the distributor, dealer and customer to facilitate rapid delivery.

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<sup>3</sup> It should be noted that the form of the distribution channel does not necessarily effect the selling or communications approach. A end-use sales organization may sell to users even though the product passes through independent distributors and dealers. Under this condition, the end-use sales force will refer to the local dealer for the actual sale and transfer.

With the advent of jet air transport and same day delivery service there has been a shift toward consolidation of warehousing. Each business and product has its own characteristics, which determine the number and location of warehouses.

#### *5.4.3.4.3 Distributors*

Distributors are customers. Since they take ownership of the product, additional issues such as credit reliability must be considered. For the most part, the firm can be expected to finance the distributor channel through delayed payments. Liberal return policies encourage stocking of inventory. The choices of distributors and their number are critical channel issues.

#### *5.4.3.4.4 Dealer Networks*

Like distributors, dealers take ownership of the product. Unless the dealer is a sole seller of the firm's products, which would be very unusual, the firm would take only a minor role in financing their operations. Usually, this is done by extending payments to the distributor to allow him to extend credit to the dealers. Return policies are also used to encourage stocking of inventory on the dealer level.

#### *5.4.3.4.5 Transfer Agents*

The choice of transfer agents and negotiated transport costs can be critical. Usually the materials or logistics function can provide assistance in this area.

### **5.4.3.5 Performance**

The quality of the distribution channel and its productivity are measured by meeting the objectives set for it. The measures need to be clearly defined.

#### *5.4.3.5.1 Inventory*

Several definitions of inventory may be needed. These may include: the value<sup>4</sup>, average on hand quantity, turn-over<sup>5</sup>, and end of period. The selection of inventory measure depends on its translation to overall cost to the business.

#### *5.4.3.5.2 Delivery*

Average and worst case delivery times are usually used as measure of delivery performance.

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<sup>4</sup> There are several modes of inventory evaluation which are used for accounting purposes, i.e., First-In First-Out, Last-In First-Out, and Market Value. Generally, the mode used by the oversight business or the operating division should be used for all evaluation to reduce confusion.

<sup>5</sup> Turn-over is the number of sales periods it takes to sell off the on-hand inventory.



*5.4.3.5.3 Costs*

Costs include handling, transferring, transportation, and fees. Usually inventory maintenance costs are included, but working capital tied to the inventory or any associated finance charges are not.

**5.4.3.6 Milestones**

Key milestones such as reports, expected prototype products, and product demonstrations should be noted.

*5.4.3.6.1 Gantt Charts*

Gantt and Critical Path charts graphically show the status of action items on time lines. These charts should be used if appropriate.

## **6. OVERALL ENTERPRISE PLAN**

The enterprise plan is a compilation of the operation plans for the venture. It is an overview of the total activity and serves to coordinate the individual programs.

### **6.1 TARGETS AND MILESTONES SUMMARY**

Targets and milestones are used to track the progress of the program. They represent the path forward for development and are the decision points for commercialization or termination.

#### **6.1.1 OVERALL DEVELOPMENT STRATEGY**

The general procedures for development and the logic behind its selection should be reviewed in this section. The focus is on the overall development strategy, merging R&D, marketing, and manufacturing functions.

#### **6.1.2 CRITICAL ISSUES**

Critical business issues and decision points need to be identified. This includes the criteria for the decisions.

#### **6.1.3 SHORT TERM TARGETS**

The selection of short term targets should be the definition of critical issues and decision points. The objective is to obtain information for early viability assessment the development path.

#### **6.1.4 ACTION ITEMS**

All key action items should be listed with a brief discussion of objective, responsibility and timing.

##### **6.1.4.1 Responsibility**

Program and action item responsibility should be outlined. The outline should show lines of reporting and authority.

##### **6.1.4.2 Milestones**

Key milestones such as reports, business tests, prototype products and product demonstrations should be noted.

##### *6.1.4.2.1 Gantt Charts*

Gantt and Critical Path charts graphically show the status of key action items on time lines.

#### **6.1.5 DECISION DATES**

All key decision dates should be assembled in either a list or calender.

## 6.2 RESOURCES & BUDGET

Resources include manpower, funds, capital, facilities, and investments. Five year forecasts should be prepared assuming "expected case" growth of the venture.

### 6.2.1 MANPOWER

All internal manpower resources are to be considered. External resources are covered by contracts and other out-of-pocket expenses. The focus of the manpower section is the type of individual and the numbers necessary to development and maintain this business concept.

#### 6.2.1.1 Internal

Internal manpower consist of employees of the firm assigned to the program and within the empowering organization. It consists of the core business group. The section should address the projection of internal manpower requirements in man-years.

##### 6.2.1.1.1 Team Size

The size of the business team should be estimated. Specific individuals may belong to several business teams. Team size refers to the number of individuals. This may be larger than the total man-years allocated. The specific skill should be identified, if relevant.

##### 6.2.1.1.2 Members

Key team members should be included. It is understood that they may change during the course of the program.

#### 6.2.1.2 The Firm

Other non-organizational, company personnel on the program should be identified. These are staff man-power, from Departmental and Corporate Staff groups. Engineering, R&D, marketing research, and information systems people should be included. Traditionally, these individuals are not covered by the "head count", but, they do indicate the size of the firm's commitment.

##### 6.2.1.2.1 By Organization

The manpower requests by organization should be listed.

##### 6.2.1.2.2 Estimate Costs

Since this man-power will be charged against the program, cost estimates for those charges should be included.

### 6.2.2 OUT-OF-POCKET COSTS

Out-of-pocket costs consist of all expenses that are not covered by direct support of the firm's personnel. Direct travel and expenses are also covered in the out-of-pocket costs.

#### 6.2.2.1 Manufacturing

Manufacturing cost items not directly associated with production and production administration should be identified by general group.

##### 6.2.2.1.1 Development

Manufacturing development items should be separated from administration. This is especially important if contract development is being done or if development is being done under a joint venture agreement.

##### 6.2.2.1.2 Tests

Costs of production tests and market tests and development materials should be listed separately.

#### 6.2.2.2 Market Development

Market development activities should be separated from on-going business maintenance activities.

**6.2.2.2.1 Market Tests**

The conduct of market tests including advertising and promotional expenses should be itemized. Costs of product for the tests, however, are covered under manufacturing.

**6.2.2.2.2 Market Research**

Costs for market research programs for concept, marketing testing, and exploration of market conditions should be itemized by program.

**6.2.2.3 Consultants**

The expenses for external consultants should be listed separately under specific programs.

**6.2.3 OPERATIONS  
COSTS & REVENUES**

Costs and revenue from operations should be listed separately. The order that the development versus operations costs are given depends on their relative size. Development expenses should dominate early business concept programs, while operations should become important later in the growth of the business.

Costs and revenues for the business are reviewed in detail in other sections of the business plan. This section only concentrates on the need to support the business during development or where revenues may off-set some development costs.

**6.2.3.1 Manufacturing Costs**

Manufacturing costs include all costs associated with the manufacture of the product, including direct and indirect labor, materials, and power.

**6.2.3.2 Cost of Sales**

Cost of sales includes marketing and distribution costs. Burden, depreciation, and some administration costs are excluded.

**6.2.3.3 Revenues**

Revenues consist of all funds realized from the sell of product or fees for licenses using the technology covered by the business.

**6.2.3.4 Net Costs or  
Contribution**

The difference between revenue and the cost of sales is the net out-of-pocket costs for continuing the business, if negative; or the net contribution to be business, if positive. These represent net cash flow to the firm. Contributions can off-set other costs.

**6.2.3.5 TOTAL  
RESOURCES  
REQUESTED**

The total operating resources requested covers both internal and net out-of-pocket expenses. Not included are investments or charges for investments. A five-year projection should be provide sufficient information.

**6.2.4 EXPECTED  
INVESTMENTS**

Investments include all physical assets, working capital, acquisition/joint venture costs, and certain other expenses.

**6.2.4.1 Physical Assets**

The expected costs for all physical assets including plants, equipment and installation should be included. Inventories should not be included. Inventories are handled as part of the working capital unless the business wishes to put them into separate categories.

**6.2.4.2 Working Capital**

Working capital consists of: (1) inventories, (2) cash, and (3) accounts receivable.<sup>1</sup> Inventories include: raw materials, in-process, and finished products.<sup>2</sup>

**6.2.4.3 Acquisition/ Joint Ventures**

Estimates of acquisition and joint venture expenses are usually unreliable unless the terms of the agreements are secure. Generally only the order of magnitude can be estimated until agreements become secure.<sup>3</sup>

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<sup>1</sup> Credit for accounts payable is sometimes applied to reduce the working capital. For conservative estimates this is usually not done.

<sup>2</sup> The working capital is usually estimated as a fraction of the total annual revenue. For start-up businesses, the charge may be significantly higher since revenues are delayed and costs for priming the manufacturing and the market channels are included.

<sup>3</sup> Acquisitions are handled by the Department and Corporately.

## 6.3 RISKS AND ASSUMPTIONS

The purpose of risk analysis is to identify issues of concern to help the business plan address them.

### 6.3.1 VENTURE RISKS

Venture risks consist of all events that could adversely or positively effect the business beyond those conditions within the venture assumptions.

Risks should be divided between those events that are controllable to some extent and those that are not. Program elements must to be assigned to those items that are controllable and monitoring elements to those items that are not.

#### 6.3.1.1 Market Acceptance

Market acceptance includes lost expected sales or the gain in unexpected customers. Both events can greatly effect the revenue situation and the stress production capacity.

##### 6.3.1.1.1 Customer Benefits

Missing customer benefits or disappointing customers expectations can effect future sales.

##### 6.3.1.1.2 Resistance

Unexpected customer resistance due to known or unknown factors could impact the business.

##### 6.3.1.1.3 Replacement Technology

Functional replacement of the basic customer need is a critical problem, often overlooked. Such events can total destroy new business opportunities.

##### 6.3.1.1.4 Promotional Programs

Promotional programs that do not work or can not be properly implemented will impact the business.

### 6.3.1.2 Capabilities

Capabilities include all abilities to develop and run the business. These include manufacture and product development.

#### 6.3.1.2.1 Technologies

Technologies relied upon for the product itself or for making the product, which are either ineffective or better than expected, may drive program and venture timing changes.

#### 6.3.1.2.2 Capacity

Reduced or expanded manufacturing capacity impacts need for market capability and the development time table.

#### 6.3.1.2.3 Distribution Channel Resistance

Distribution channel resistance can curtail stocking channel inventory and adversely effect the availability of product.

#### 6.3.1.2.4 New Market Opportunities

Unexpected, though possible, new market opportunities can both expand the business and strain its resources. Existing programs can be adversely effected.

### 6.3.1.3 Competitive Reaction

Reaction of competition may limit the marketing capabilities of the venture. Only unexpected reactions, those not covered by the standard business plan should be considered.

- 6.3.1.3.1 Entry* The entry of additional direct and indirect competitors can be critical. Such entries can effect both price and share.
- 6.3.1.3.2 Price* Unexpected, though possible, competitive reaction to pricing can be critical.
- 6.3.1.3.3 Programs* Unexpected, though possible, promotional programs by a competitor could put the business on the defensive, greatly changing business needs.
- 6.3.1.4 External** External factors are those not within the direct scope of the business and unexpected.
- 6.3.1.4.1 Environmental Issues* Unexpected, though possible, environmental issues such as materials that thought to be harmless, but reclassified as harmful, can greatly effect the forward direction of the business.
- 6.3.1.4.2 Safety Issues* Unexpected, though possible, safety issues should be noted.
- 6.3.1.4.3 Legal Restrictions* Possible legal and regulatory restraint should be noted.
- 6.3.1.4.4 Labor Problems* Any potential for labor unrest should noted as a potential problem.
- 6.3.1.4.5 Public Affairs* Public affairs problems are notoriously difficult to predict, but if any are foreseeable, they should be noted.
- 6.3.2 IMPACT ANALYSIS** The impact analysis attempts to determine the effect on sales, costs, price, investment, and timing of the various risks on the expected performance of the business.
- 6.3.2.1 Exposure** Along with the direct impacts on the business, additional problems that might occur with the adverse events should be noted.
- 6.3.2.1.1 Financial* Financial responsibilities beyond the direct funds and resources expended constitutes risk. These could include any damage costs or contract termination expenses.
- 6.3.2.1.2 Working Relations* Working relations with customers, distributors, independent agents and internal and external partners may be affect by risk events. The potential impacts should be noted.
- 6.3.2.1.3 Spillovers* Failure or success in one business can effect other businesses. Impacts of specific risk on other internal businesses' events should be identified.
- 6.3.3 RISK ASSESSMENT** Risk assessment centers on the estimation of the likelihood of the events and their importance.

- 6.3.3.1 Likelihood** A probability estimate for the likelihood of the event taking place is usually given.<sup>1</sup> Rougher estimates of very low, low, medium, high, and very high can be used also.
- 6.3.3.2 Prioritization** The risk elements or events should be prioritized in terms of their potential impact on the business and likelihood of occurrence.
- 6.3.3.3 Addressing Concerns** For important risk events that are controllable, program elements should be assigned. This assignment involves associating program action items with the uncertain risk to assure that the issues are being covered.
- 6.3.3.4 Monitoring Events** Monitoring is part of any development plan. The key uncontrollable events have to be monitored. These should be identified.
- 6.3.4 SCENARIOS** Several scenarios are usually necessary to capture the range of possible futures for the venture. These scenarios usually reflect the key sources of external uncertainty but assume that the present development strategy is followed. If there is question regarding the implementation of the plan alternative scenarios may be generated. Each scenario is a list of assumptions about the future.
- 6.3.5 CONTINGENCY PLANS** Contingency plans should be constructed to handle each of the scenarios. The contingency plans need not be lengthy or tightly detailed, but should be in place.
- 6.3.5.1 Indicators** The method by which the scenario is identified as taking place should be noted. Both the criteria and the monitoring procedures should be explained. For example, a criterion may be obtaining or losing a specific contract.
- 6.3.5.2 Approval** Both the person responsible for triggering the action and the person authorized to approve the change in program should be identified.
- 6.3.5.3 Actions** The plans should indicate changes in direction, actions, or termination. These actions should be specific and implementable. For scenarios that are very likely, a full business plan may need to be constructed. For most situations, only an outline is sufficient.

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<sup>1</sup> The subjective probability estimate is usually a good qualitative measure of confidence. These estimates are used for simulating an overall estimate of the distribution of possible returns (Monte Carlo). However, there are questions regarding the reliability of those procedures given the imprecision of the probability estimate.



## 6.4 FINANCIAL ANALYSIS

This section consists of the detailed financial analysis for the enterprise. A summary of the analysis is located early in the business plan. Only a small number of scenarios were included in that section. Because of its size, the detailed financial analysis is often separated from the business plan and presented as a separate document or in an appendix.

### 6.4.1 SCENARIO PROJECTIONS

A few of the scenarios developed during the risk analysis are usually used as a basis for the financial analysis. These are analyzed using the traditional techniques of forecasting and venture analysis.

#### 6.4.1.1 Sales

Sales projections are made for each scenario. Two general methods may be used: (1) Field Sales Forecasts, and (2) Trend Extrapolation. The choice usually depends on the availability of data and the ability to factor uncertainty into the estimates.

##### 6.4.1.1.1 Field Sales Forecast

Field sales forecasts are based on the opinion of the sales organization on the probability of making specific sales. If access to the assessors is available, a number of projections can be obtained based on the various scenario assumptions.<sup>1</sup>

##### 6.4.1.1.2 Trend Extrapolation

An alternative to field sales forecasts is trend extrapolation or curve fitting. Uncertain events can change the market potential and effect the projected sales.

#### 6.4.1.2 Cost

Cost of sales should be reassessed based on the assumptions for each scenario. The expected reduction of costs, due either to a learning mechanism or economies of scale, may be different depending on external effects and venture organization.

#### 6.4.1.3 Price (Revenues)

Projections of price and revenues, in combination with sales volume and revenue are critical. Competitive risks generally effect both share and allowable price.

#### 6.4.1.4 Financial Analysis

The purpose of the financial analysis is to obtain overall measures of the quality of the business to the firm. Several procedures are traditionally done:

##### 6.4.1.4.1 Proforma

The "Proforma" analysis is a table in an accounting format indicating the revenues, costs, investments, depreciation, before tax income, and after tax income. It is the traditional manner of viewing the financial business. Usually a five or ten year projection is made.

##### 6.4.1.4.2 Cash Flow

The cash flow analysis focuses on the various measure of the income flow. Usually both current dollar estimates, similar to the "Proforma", and discount cash flow are calculated. Graphic presentations are usually given

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<sup>1</sup> Like risk analysis, this assessment is usually done during group meeting of the sales force and management.

along with tables.<sup>2</sup>

#### 6.4.1.4.3 Breakeven

Cash breakeven is defined as the sales volume required to cover total costs. The venture breakeven is the total volume required to both cover costs and to replace investment on a discounted cash flow basis. The venture breakeven is usually given as a number of years to a total breakeven.

#### 6.4.1.4.4 Value (IRR)

There are several traditional measures of financial value, in addition to breakeven. These are the net present value and return ratios, such as return on investment and internal rate of return<sup>3</sup>. The net present value is the sum of the discounted cash flow over the time horizon. The return on investment is the ratio of after tax income to investment. The internal rate of return is the computed discount rate for which the present value is zero.<sup>4</sup>

#### 6.4.1.4.5 Financial Ratios

There are several financial ratios that are often useful to examine a venture. These include sales margin and inventory turnover. If data for their calculation are available, they should be determined.

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<sup>2</sup> The discount rates for equalizing the value of money are usually agreed upon throughout the firm. The Economists Office should be able to provide the agreed upon discount rate or cost of capital.

<sup>3</sup> There are several other ratios such as return on equity and return on fixed capital. These are based on alternative funding methods which are beyond the control of the business management and, therefore, are usually not included in the analysis.

<sup>4</sup> It should be noted that the present value and the internal rate of return measures depend on the time horizon. If this is critical, a ten year time frame is usually set. In some cases as much as twenty years may be necessary to get consistent results.

If multiple investments are planned at different times, there may be multiple values of the internal rate of return. Traditionally, the lowest, non-zero or non-negative, value is selected.

**6.4.2 EXPECTED CASE  
ANALYSIS**

Selected expected scenarios are analyzed in detail as cases. These cases should span the range of possibilities.



PROFORMA

Case 1: Price = Target Price (Learning Curve Estimate)

YEAR	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Sales (Units)	0.57	3.99	8.34	12.38	15.90	26.92	37.48	49.24	61.82	74.99	88.56	102.45	116.67	131.25	146.28	161.85
Price	4.48	4.24	4.02	3.39	2.77	2.99	3.08	3.04	3.03	3.04	3.06	3.10	3.15	3.21	3.27	3.35
-----																
Revenue	2.57	16.90	33.56	41.90	44.02	80.37	115.39	149.67	187.17	227.62	270.94	317.30	367.06	420.69	478.81	542.15
COST																
Variable Costs	0.45	2.61	4.71	6.61	8.49	10.30	20.10	26.37	33.76	41.32	49.74	58.67	67.42	77.31	87.84	99.07
Fixed Costs	2.30	11.16	18.83	25.55	32.18	38.70	74.12	96.12	122.24	149.31	179.99	213.17	246.62	285.27	327.43	373.63
Depreciation	2.00	2.00	2.00	2.00	5.00	5.00	5.00	10.00	10.00	10.00	10.00	20.00	20.00	20.00	20.00	20.00
-----																
Cost of Sales	4.75	15.76	25.54	34.16	45.67	54.00	99.23	132.50	166.00	200.62	239.73	291.84	334.03	382.59	435.27	492.70
-----																
Earnings	(2.17)	1.13	8.02	7.74	(1.65)	26.36	16.16	17.17	21.17	26.99	31.20	25.47	33.03	38.10	43.54	49.44
INVESTMENTS																
Working Capital	1.19	3.94	6.39	8.54	11.42	13.50	24.81	33.12	41.50	50.16	59.93	72.96	83.51	95.65	108.82	123.18
Fixed Investment	20.00	20.00	20.00	20.00	50.00	50.00	50.00	100.00	100.00	100.00	100.00	200.00	200.00	200.00	200.00	200.00
-----																
Total Investment	21.19	23.94	26.39	28.54	61.42	63.50	74.81	133.12	141.50	150.16	159.93	272.96	283.51	295.65	308.82	323.18
-----																
New Investment	20.00				30.00			50.00				100.00				
FINANCIAL ANALYSIS																
Earnings +																
Depreciation	(0.17)	3.13	10.02	9.74	3.35	31.36	21.16	27.17	31.17	36.99	41.20	45.47	53.03	58.10	63.54	69.44
Cash Flow	(20.17)	3.13	10.02	9.74	(26.65)	31.36	21.16	(22.83)	31.17	36.99	41.20	(54.53)	53.03	58.10	63.54	69.44
Cumulative																
Cash flow	(20.17)	(17.04)	(7.02)	2.72	(23.93)	7.43	28.60	5.77	36.94	73.93	115.13	60.60	113.63	171.73	235.27	304.72
Deflation Factor	1.28	1.22	1.16	1.10	1.05	1.00	0.95	0.91	0.86	0.82	0.78	0.75	0.71	0.68	0.64	0.61
Discounted																
Cash Flow	(25.75)	3.81	11.60	10.74	(27.98)	31.36	20.15	(20.71)	26.93	30.43	32.28	(40.69)	37.68	39.33	40.96	42.63
Discounted																
Cumulative																
Cash Flow	(25.75)	(21.94)	(10.34)	0.40	(27.58)	3.78	23.93	3.23	30.16	60.59	92.87	52.18	89.86	129.19	170.15	212.78
ROI	-0.8%	13.1%	38.0%	34.1%	5.5%	49.4%	28.3%	20.4%	22.0%	24.6%	25.8%	16.7%	18.7%	19.7%	20.6%	21.5%
IRR		36%														
10th Yr. NPV		93														
15th Yr. NPV		213														

Case 2: Price = Cost + 20% Return on Investment

YEAR	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Sales (Units)	0.57	3.99	8.34	12.38	15.90	26.92	37.48	49.24	61.82	74.99	88.56	102.45	116.67	131.25	146.28	161.85
Price	5.16	5.16	3.70	3.22	3.64	2.48	3.05	3.23	3.14	3.08	3.07	3.38	3.35	3.37	3.40	3.44
-----																
Revenue	2.96	20.55	30.82	39.87	57.95	66.70	114.19	159.12	194.30	230.66	271.72	346.43	390.73	441.72	497.03	557.34
COST																
Variable Costs	0.45	2.61	4.71	6.61	8.49	10.30	20.10	26.37	33.76	41.32	49.74	58.67	67.42	77.31	87.84	99.07
Fixed Costs	2.30	11.16	18.83	25.55	32.18	38.70	74.12	96.12	122.24	149.31	179.99	213.17	246.62	285.27	327.43	373.63
Depreciation	2.00	2.00	2.00	2.00	5.00	5.00	5.00	10.00	10.00	10.00	10.00	20.00	20.00	20.00	20.00	20.00
-----																
Cost of Sales	4.75	15.76	25.54	34.16	45.67	54.00	99.23	132.50	166.00	200.62	239.73	291.84	334.03	382.59	435.27	492.70
Earnings	(1.79)	4.79	5.28	5.71	12.28	12.70	14.96	26.62	28.30	30.03	31.99	54.59	56.70	59.13	61.76	64.64
INVESTMENTS																
Working Capital	1.19	3.94	6.39	8.54	11.42	13.50	24.81	33.12	41.50	50.16	59.93	72.96	83.51	95.65	108.82	123.18
Fixed Investment	20.00	20.00	20.00	20.00	50.00	50.00	50.00	100.00	100.00	100.00	100.00	200.00	200.00	200.00	200.00	200.00
-----																
Total Investment	21.19	23.94	26.39	28.54	61.42	63.50	74.81	133.12	141.50	150.16	159.93	272.96	283.51	295.65	308.82	323.18
New Investment	20.00				30.00			50.00				100.00				
FINANCIAL ANALYSIS																
Earnings +																
Depreciation	0.21	6.79	7.28	7.71	17.28	17.70	19.96	36.62	38.30	40.03	41.99	74.59	76.70	79.13	81.76	84.64
Cash Flow	(19.79)	6.79	7.28	7.71	(12.72)	17.70	19.96	(13.38)	38.30	40.03	41.99	(25.41)	76.70	79.13	81.76	84.64
Cumulative																
Cash flow	(19.79)	(13.00)	(5.72)	1.98	(10.73)	6.97	26.93	13.55	51.85	91.89	133.87	108.46	185.17	264.29	346.06	430.69
Deflation Factor	1.28	1.22	1.16	1.10	1.05	1.00	0.95	0.91	0.86	0.82	0.78	0.75	0.71	0.68	0.64	0.61
Discounted																
Cash Flow	(25.26)	8.25	8.42	8.50	(13.35)	17.70	19.01	(12.13)	33.09	32.93	32.90	(18.96)	54.51	53.56	52.71	51.96
Discounted																
Cumulative																
Cash Flow	(25.26)	(17.01)	(8.58)	(0.08)	(13.44)	4.26	23.28	11.14	44.23	77.16	110.06	91.10	145.61	199.17	251.87	303.83
ROI	1.0%	28.4%	27.6%	27.0%	28.1%	27.9%	26.7%	27.5%	27.1%	26.7%	26.3%	27.3%	27.1%	26.8%	26.5%	26.2%
IRR	42%															
10th Yr. NPV	110															
15th Yr. NPV	304															

Figure 6, Example of Earnings Chart

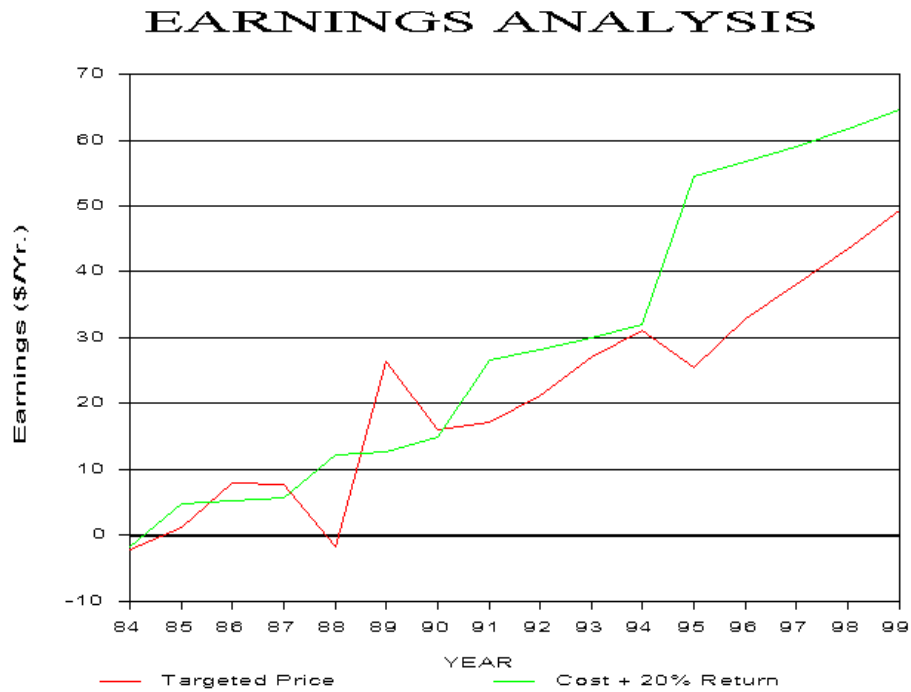
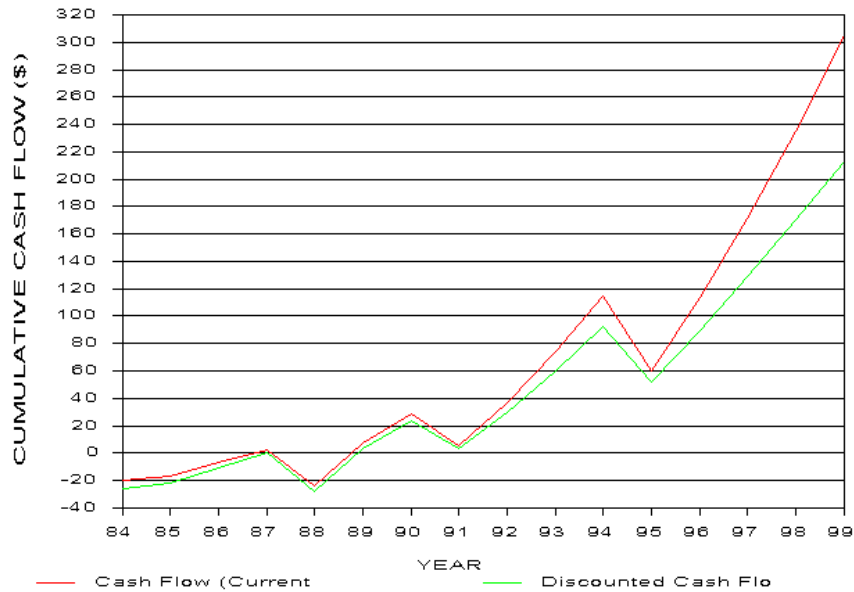


Figure 7, Example of the Cash Flow Chart

### CUMULATIVE CASH FLOW ANALYSIS



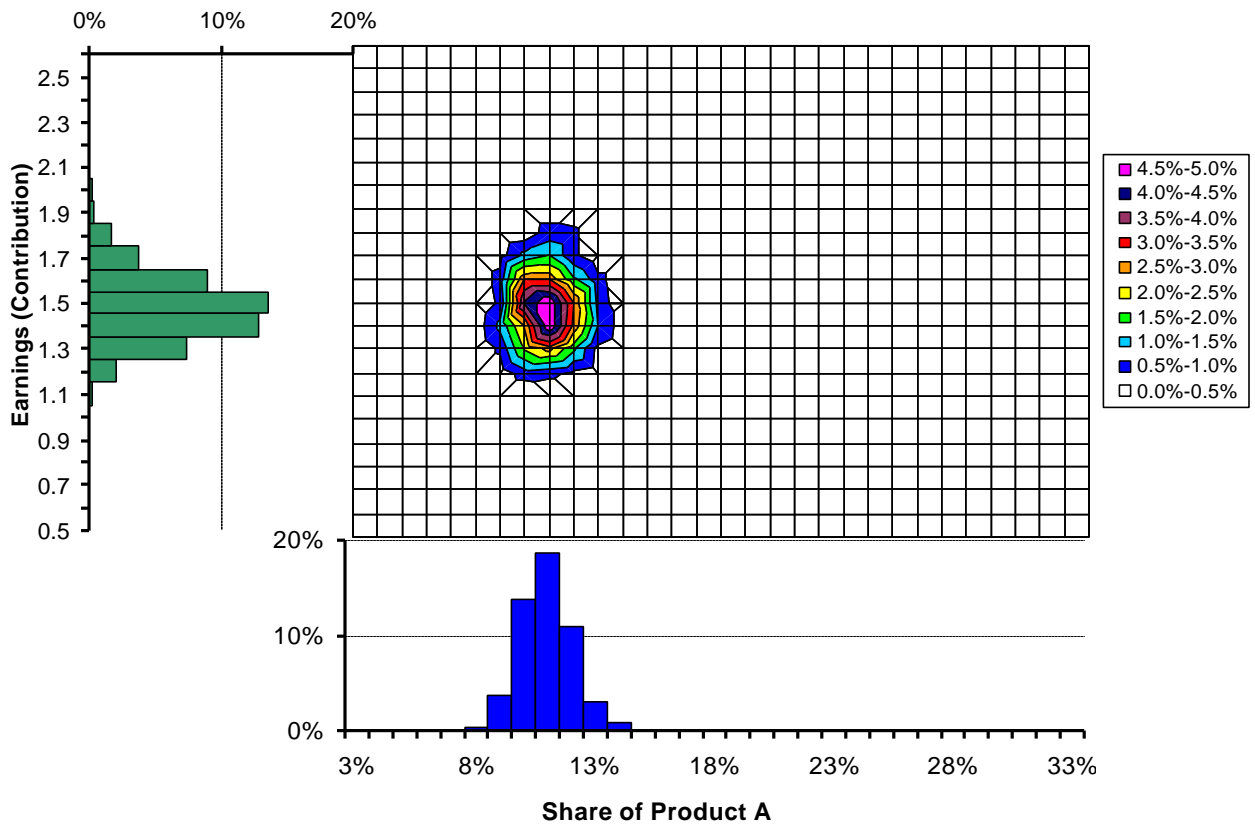
**6.4.3 SIMULATION**

An alternative approach is to model the financial analysis to allow the introduction of random variation. The technique requires estimation of the probability distribution of possible events. The results of the analysis are sets of plots showing the likelihood of returns.

**6.4.4 CONCLUSIONS**

The conclusions section should summarize of the results of the analysis, giving the range of results and identifying the key issues.

**Figure 8, Monte Carlo Analysis Results**





## 6.5 MANAGEMENT FRAMEWORK

The management framework reflects issues regarding the organization and peripheral issues affecting the financial conduct of the business. These issues can be determinant of success and must be addressed. The management framework focuses on three areas: (1) the organization of the venture, (2) internal control, and (3) environmental issues.

### 6.5.1 ORGANIZATION

How the venture is to be organized for success should be explained. This is especially important if the characteristics of the business are unique to the firm and the corresponding organization has characteristics uncommon among most corporate businesses. These characteristics may include reporting agreements and individual authority.

#### 6.5.1.1 Sponsorship

Management and organizational support of the business is critical for securing resources. The organizations that support the development of the venture should be identified.

#### 6.5.1.2 Personnel

The management of human resources is a key factor for success. The policies and programs for managing this resource should be identified.

##### 6.5.1.2.1 *The Firm vs Contractors*

The general guidelines for the fraction and type of work to be done by the firm and by contractors should be outlined. The strategic reasoning for the general breakdown should be discussed.

##### 6.5.1.2.2 *Staff vs Assigned*

The organization of business dictates the fraction of the effort that will be given to the company's staff groups and what fraction will be undertaken by this assigned business group. The strategic reasoning for the general breakdown should be discussed.

##### 6.5.1.2.3 *Professional Performance*

Each business requires special skills among its professional personnel. If these skills are unique in any way to this business they should be identified.

##### 6.5.1.2.4 *Reward Systems*

A system should be established to reward conduct and behavior which is particularly advantageous to the business. This may include quality, safety support, innovation, implementation, and any other special conduct or skill necessary to this business. It is the intent of the reward system to positively and publicly reinforce advantageous behavior.

##### 6.5.1.2.5 *Career Progression*

Career progression programs should be reviewed. Availability of promotional positions and the need for turn-over discussed.

### 6.5.1.3 Organized Labor Issues

Labor union concerns including wages and work rules should be identified. If the potential for labor discomfort exists it should be discussed.

#### 6.5.1.3.1 *Work Rules*

Any potential work rule problems should be noted. This is particularly critical if such work rules could delay the installation of equipment or production prove-out.

#### 6.5.1.3.2 *Unionization*

Any potentially disruptive unionization or reorganization of labor should be mentioned. This includes potential changes in representation from local to national unions.

*6.5.1.3.3 Pending and Potential Legal Action*

Any pending labor legal problem that could be disruptive should be mentioned. These include active discrimination suits.<sup>1</sup>

**6.5.2 INFORMATION PLAN**

The Information Plan is designed to outline the needs for information and computer systems and resources for this business. Because of the scope of the plan, a longer planning time horizon is used, typically five or six years.

The Information Plan usually focuses on electronic information systems including "Electronic Data Processing" as well as general computer needs. With the development of personal computers, this now includes office systems as well as large scale systems. Generally, manufacturing automation systems are excluded from this plan except for information transfer. Manufacturing and technical research systems are generally covered in their own plans.

**6.5.2.1 General Information**

General needs for information should be noted if requiring allocation of resources. Both the nature, source, and use of the information should be noted.

*6.5.2.1.1 Library Requirements*

Library or business information center resources should be noted if major programs are envisioned, particularly, if internal studies using library resources are anticipated.

*6.5.2.1.2 Special Studies*

Special studies, not including those in research and development and marketing should be included here, if significant costs are anticipated.

*6.5.2.1.3 Data Services*

On-line proprietary data services include Internet resources like DIALOG. These services can be expensive to use. If the costs are anticipated to be significant, they should be included. All electronic resources should be included.

*6.5.2.1.4 Records Destruction*

Records destruction programs are required by the Corporation. Any special considerations for this business should be noted.

**6.5.2.2 System Selection**

Standards are used to assure effective and efficient use of resources in securing computer systems and software. Each business contains its own special requirements and the standards should be set by the business. In most cases, standards exist for the larger organization, Division, Department, or the Corporation. It is generally advisable to follow existing standards, if they are correct for the business.

The specific systems recommended or secured by the business should be specified if they differ from the larger organization. The criteria for selection should be noted if they differ from guidelines.

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<sup>1</sup> Only active issues should be noted in this section. No speculative issues should be documented.

#### 6.5.2.2.1 Guidelines

Operating Divisions and the Information Systems Division have set guidelines for computer equipment and software. These guidelines represent suggestions for system selection. The guide-lined components, in general, are widely used; they are supported to some extent by the guide-lining organization; and they have been reviewed and determined to be effective (though not necessary determined to be the best)

The guidelines are usually limited to widely used applications, personal computers, spreadsheets, word processing, and graphic packages. Special applications, including simulation and scientific programming are not included. Support of guide-lined components is generally constrained to a limited set of applications and computers (platforms). Because of the time required the guide-lined components can be out-of-date. Better systems are often available which have not yet been guide-lined.

It is generally recommended that guide-lined components be used where there are no other constraints or conditions that would exclude them. The guide-lining organizations do not assure that the guide-lined systems are either the best for the business or even that they satisfactory. It is the obligation of the organization to determine what is best for itself..

#### 6.5.2.2.2 Performance

Performance is usually the key criteria for selecting a system or software. Performance should be noted in terms of what the system is to do. Technical performance is usually not of interest. Only those components that have direct value such as ability to do "desk top publication" or perform data base operations quickly should be selected.

#### 6.5.2.2.3 Consistency

It is important that the systems and software being used are the same throughout the business. This is to provide a means to share data, information, programs, and expertise.

#### 6.5.2.2.4 Compatibility

An alternative to complete consistency, is to assure that the systems can communicate with each other. It is most desirable that the systems are compatible in the sense that programs and data can be exchanged.

There has been significant effort in the last few years to make, previously incompatible systems, work together. Programs exist that run on mainframe, PC's and minicomputers<sup>2</sup>. The choice of systems in the future may be less sensitive to the compatibility problem. The less incompatible the system the better.

#### 6.5.2.2.5 Documentation

All software programs written for the business should be documented. Technical documentation, users' guides, and manuals should be prepared. Guidelines for preparation should be noted or at least referenced.

#### 6.5.2.2.6 Copyright

All proprietary software should be copyrighted. If such is not the case, it should be explained.

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<sup>2</sup> FOCUS for example will run on all three environments.

- 6.5.2.2.7 Licenses* Licenses or purchase agreements for all non-public, non-proprietary software should be secured. The status of all critical non-commercially available programs should be noted.
- 6.5.2.2.8 Records Destruction* A program for compliance with records destruction of electronically stored data and software should be prepared and reviewed.
- 6.5.2.3 System Requirements** Detailed system proposals should be prepared for the development of all non-personal computer programs. The requirements for all systems should be summarized in the information plan.
- 6.5.2.3.1 Objectives* The objectives for each system should be noted. These objectives should reflect the use of the systems and any special requirements.
- 6.5.2.3.2 Functional Specifications* The functional specifications include the types of equipment that the program will use and the data required as input. If available, the computer languages, systems, and programs that will be used in its development should be noted.<sup>3</sup>
- 6.5.2.3.3 Life Span* The expected life span of the system is critical in determining the extent of support provisions, flexibility in design, and extent of documentation. The life span of all programs developed within this business should be estimated.
- 6.5.2.3.4 Life Cycle Costing* The life cycle costs cover all expenses connected with using the system over its life span. These costs include, development, implementation, maintenance, support, and expected enhancement.
- 6.5.2.4 Business Systems** Business systems include most of the support, accounting and office functions for the business. These systems, more than most, have to interact with each other, sharing data and programs.
- 6.5.2.4.1 Information Needs* Because of the expected interaction among functions, it is critical to review the information needs of the business. These usually include document routing and control, accounting data, sales and cost information, and expenses.<sup>4</sup>
- 6.5.2.4.2 Data Flow Diagrams* The data flow diagram shows the sources and uses of information. The planning purpose for this chart is to eliminate unnecessary redundancies in data storage and information reporting.<sup>5</sup>

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<sup>3</sup> These included the procedural languages such as *Basic*, "C++", "Java, or even, *COBOL*, etc.; data base managers such as *DBase III+* or Oracle, DB2, SAP; and any CASE (Computer Aided Software Engineering) including Microsoft's Visual Suite tools.

<sup>4</sup> Procedures to develop an information needs statement have been developed by *DEC* and *IBM*. If the problem is complex, we recommend reviewing those procedures.

<sup>5</sup> Some redundancy is necessary to assure integrity and validation of the data and auditability of the system.

- 6.5.2.4.3 Accounting Systems* All business operations require accounting systems in place. If a standard system being used for this business, it should be identified. If a new system is being developed, the reason for its development and its specification should be noted. Details of its development should be documented and reviewed by the internal auditing function.
- 6.5.2.4.4 Manufacturing Systems* Quality, shipment, and inventory control should be logged and coded to allow for generation of a total product history to be generated. If a standard system is being used, it should be identified. If a new system is being developed its specifications should be noted. Details of its development should be documented.<sup>6</sup>
- 6.5.2.4.5 Audit Critical Systems* Systems that are likely to be critical in the financial reporting of the firm, are referred to as Audit Critical. The development of these systems should be reviewed with the internal auditing function.
- 6.5.2.4.6 Integrated Systems* An overall plan for system integration should be considered. This tends to require the development of subsystems that use the same or compatible languages or packages.
- 6.5.2.4.7 Timing and Costs* It is important that the information systems be in place as the business develops. Timing and costs can be critical.
- 6.5.2.5 Office Automation** Office automation has become a major component of business information systems. If the needs of the business require unique facilities, these should be noted along with the objectives and specifications. Consistency in office automation is extremely important. The extent of backup of the unique components should be described.
- 6.5.2.6 Product Systems** Products can include software as a component. Security and control of these products should be discussed in the information plan. The development and maintenance of these systems should be covered in the product development section of the business plan. The resources for development and maintenance should be covered separately from the general business and marketing information support systems.
- 6.5.2.7 Marketing Systems** Systems are used to assist in the marketing and distribution functions of the business. These systems should be described in detail. Funding for their development is usually covered under the marketing budget. If so, they should be described in both sections of the business plan.
- 6.5.2.7.1 Sales Aids* Sales aids consist of all demonstration or "customer assistance" tools using computer programs. Included in this group are "expert systems" used by the sales force or for use directly by the customer.
- Identify: (1) the objectives, (2) support, and (3) control elements for each system.

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<sup>6</sup> Such systems should comply with quality management requirements.

- 6.5.2.7.2 Sales Force Communications* Remote communication systems are becoming a dominant component in marketing support systems. Outline the components of the systems in place and the standardization of software. Note the particular communication network being used.
- 6.5.2.7.3 Complaint System* A key element of the quality assurance program is rapid response to complaints. The system to record and track complaints should be efficient, effective, and in place as early in the venture as possible.
- 6.5.2.7.4 Customer Computing* Customer computing includes distributor/agent communications as well as on-line sales aids. In this section any networked structure involving customers should be described along with the means of support.
- 6.5.2.7.5 Data Control* Since proprietary data might be distributed in the marketing systems, controls need to be imposed. The nature of these control should be described.
- 6.5.2.7.6 Timing and Cost* The marketing systems are part of the promotional and sales activities of the business. Their timing relates to the on-going marketing process. Their timing and costs should be identified.
- 6.5.2.8 Technical Systems** Technical systems include all design, scientific, and analysis activities. Usually these activities are confined to the technical staff for personal use and are not considered to be Audit Critical. Some of the activities can give critical competitive advantage and are vital to the venture.
- 6.5.2.8.1 Design* Design data, including CAD/CAM (Computer Aided Design/Computer Aided Manufacturing) are considered proprietary. Consistency of systems are a great advantage. Both the choice of CAD/CAM systems and the protection procedures for information should be reviewed.
- 6.5.2.8.2 Forecasting* Sales and price forecasting programs and information should be protected.
- 6.5.2.8.3 Simulation* Simulation programs and scientific computing usually involve systems that are not easily interpreted by business personal. They do not require the same degree of protection from theft. To prevent possible loss of such complex and unique systems, care must be taken to ensure full documentation.
- 6.5.2.8.4 Research Data Support* Research data are usually stored as hardcopy and as magnetic materials. Since these data may be called upon in legal actions (patents) they need to be protected.
- 6.5.2.9 Security** Security of systems are covered in the the firm's electronic information security guidelines.
- 6.5.2.10 Communications** Communications systems are generally set by the Department or by ISD. Information covering these systems and updates should be clearly distributed to business participants. Those responsible for the systems should be identified.

**6.5.2.11 Support**

System support are usually classified in terms of the qualifications of the support staff: (1) trained support and (2) expert support. Trained support focuses on the helping the novice use the system. It usually the least expensive approach. The personnel are trained on the software in a specific environment.

*6.5.2.11.1 Application Suite*

Trained support of system are targeted to the "application suite". This is the intersection of supported equipment, supported software, and supported applications. Not all equipment that can use the software is supported; nor are all applications of the software on the supported hardware supported. This limitation of hardware, software, and application allows for effective training of the support staff in a short period of time.

If trained support is planned for this business, the application suite for that support needs to be identified. This includes both the areas that will be covered and what is likely not to be covered.

*6.5.2.11.2 Expert Support*

Expert support usually consists of a small group of highly knowledgeable consultants. This type of support system tends to be expensive to maintain on a formal basis. Expert support is usually handled informally and in conjunction with trained support. The trained support handles the novices and the experts handle the more experienced users.

The existence of experts for the systems that are being developed or being implemented should be identified.

*6.5.2.11.3 Source*

The sources of support and resources should be identified.

**6.5.3 INTERNAL CONTROLS**

Internal controls are designed to protect Company assets against loss from unauthorized use or disposition. They also help ensure reliable financial data and records for preparing financial statements, maintaining accountability, and making informed business decisions.

Internal controls are audited by the internal auditing function. This function is to verify that such controls are in operation and are being used.

**6.5.3.1 Established Programs**

Where feasible, established accounting and control systems should be used. This should reduce the setup and management costs as well as help assure compliance. If the nature of the business or functional organization is vastly different than the host organization, the established systems may not be appropriate. The standards of the system need to be documented.

**6.5.3.2 Standards**

Implementation of internal controls should be based on the Company's Internal Control Standards Manual, related Company policies, and administration procedures, such as the Electronic Information Security Standards and Security of Company Assets Policy.

**6.5.3.3 Responsibility**

Operating and financial management have a shared responsibility for the implementation and execution of operating, accounting, and financial controls. The financial function should be requested to take a key role in developing and implementing controls. Similarly, the Information Systems department is a resource in the case of computer systems and electronically stored data.

**6.5.3.4 System Integrity**

Control integrity refers to procedures established to maintain the system in force.

*6.5.3.4.1 System Compliance*

Not only must a system be potentially effective, but it must be used. The auditing process focuses on both the effectiveness of the system and compliance with the system. Procedures to assure compliance should be established and identified.

*6.5.3.4.2 Documentation*

Control and compliance procedures should be documented in terms of their structure for auditing and for use as a guide for the organization. Such guides should be widely distributed to all individuals using the system. The existence of such documentation should be identified.

**6.5.3.5 Accounting Systems**

The accounting systems are the heart of most financial control. These systems track the cash flow through the business. The structure of the accounting system should comply with internal standards and be compatible as possible with other systems.

*6.5.3.5.1 Audit Critical Systems*

Some of the accounting systems are critical for tracking the state of the business or those portions that may allow for fraud or theft. These systems are designated *Audit Critical Systems*. These require special care in development to assure quality and effectiveness. Check with the *Auditing Division* for the identifications of these accounts. Where feasible, established accounting procedures and programs should be used for *Audit Critical Systems*.

*6.5.3.5.2 Internal Systems*

There may be programs to consolidate accounting systems. This is particularly important in highly critical areas such as invoicing. Where feasible, use the most commonly applied systems available.

*6.5.3.5.3 Divisional Systems*

Where feasible use those systems employed by the operating division.

**6.5.3.6 Protection**

Beyond the accounting system, procedures need to be in place to protect the firm's property. The intent is to protect property, but not interfere with proper use of resources or incur excessive costs. The extent of the protection procedures should reflect the real danger of loss.

*6.5.3.6.1 Physical Assets*

All physical property should be protected from damage or loss. Standard procedures should be established for protection from fire and theft. Some property is more susceptible to theft than others. Examples are precious metals such as gold, and attractive, consumer usable items like desk top computers. Special precautions should be taken for these properties.

*6.5.3.6.2 Expense Control*

Procedures to monitor and control expenses and cash outlays should be established.



- 6.5.3.6.3 Intellectual Property* Programs to Protect Intellectual Property should be established and a schedule of communications programs to reinforce their compliance identified.
- 6.5.3.6.4 Information Systems* Programs for the protection of computer programs and data should be established. These include assuring the integrity of the software and data beyond the physical safety and limiting access if necessary. Procedures to assure compliance should be identified and documented.
- 6.5.3.6.5 Records Destruction* Programs for compliance with records destruction should implemented and documented. This includes a schedule for the destruction of the business plan or parts of it.
- 6.5.3.7 Review/Audit Procedures** Care should be taken to assure that the control systems can be easily audited. Generally this requires: (1) access to documentation, (2) availability of data and logic flow diagrams, and (3) if feasible, the availability of system testing facilities. These requirements should apply for either manual (paper and ink) or computer automated systems.
- 6.5.3.7.1 Internal Auditing* Internal Auditing is responsible for monitoring the adequacy of the Company's internal controls to achieve their stated objectives. Besides performing periodic audits, Auditing renders control environment assessments for businesses and systems development reviews to ensure inclusion of controls.
- The audit process requires: (1) availability and access to data and documentation, (2) systems/process flow diagrams that document controls, and (3) ideally, the availability of system testing facilities. These requirements apply for either manual or computer automated systems.
- 6.5.3.7.2 External Auditing* Independent audits are conducted by outside auditing firms for the Board of Directors on an annual basis. The audits tend to focus on the integrity of published financial data with some testing of internal controls. External auditors and internal auditors coordinate activities to optimize audit coverage and minimize redundancy.
- 6.5.4 ENVIRONMENTAL AND SAFETY PROGRAMS** Safety and concern on the environment is doctrine in many firms. Procedures of the assurance of maintaining a safe and environmentally solid business should be identified.
- 6.5.4.1 Safety** Business safety covers: (1) plant, laboratory and facility safety, (2) safety of personnel on business, but off site, (3) customer safety involving the firm's products, and (4) off the job safety.
- 6.5.4.1.1 Plant Safety Concerns/ Solutions* All key safety issues and concerns beyond those standard for this type of operation should be identified. These include the use of solvents and chemical agents. Any bad actors, such as suspected carcinogens should be identified. Potentially dangerous processes should be noted.
- Procedures to reduce or eliminate these concerns should be identified and stated.

*6.5.4.1.2 Plant Evacuation Procedures*

Emergency procedures to evacuate facilities for which this business is responsible should be developed and noted. If site management is separate, only a citation to the site safety procedure document is necessary.

*6.5.4.1.3 Product Use Concerns/ Solutions*

Any product use concerns should be identified and the particular potential problems described. Procedures and programs to eliminate these concerns should be identified and stated.

*6.5.4.1.4 Product Labeling*

Appropriate labeling conventions should be followed. Those procedures must be cleared with the Legal Department to determine if they comply with necessary regulations.

*6.5.4.1.5 Safety Objectives*

Overall safety objectives should be set for on-the-job and off-the-job safety. These objectives should follow standard quality procedures in terms of historical and goal number of incidences.

*6.5.4.1.6 Safety Programs*

A safety program should be established with scheduled safety meeting and goals. For efficiency, such programs could be merged with the activities of other organizations.

*6.5.4.1.7 Safety Audits & Inspections*

Periodic safety audits and inspections should be planned and identified.

**6.5.4.2 Environmental Concerns**

It is normally the firm's policy to comply with all regulations regarding the environment and to be a good neighbor within the community that the firm functions.

*6.5.4.2.1 Materials Disposal*

The environmental issues regarding the disposal of all materials under the authority of the business should be noted. Any special provisions for hazardous materials and the route of disposition of those material must be noted.<sup>7</sup> Any legal constraints in disposal for such materials should be noted and explained.

The existence of acceptable procedures for disposing of the product should be noted.

*6.5.4.2.2 Public Resource Requirements*

Exceptional expected use of public resource, i. e. water and power, should be noted.

*6.5.4.2.3 Environmental Impact Statements*

Any requirement for Environmental Impact Statements should be noted. The source of the preparation should be identified.

**6.5.4.3 Public Affairs**

The public affairs organization is usually responsibility of both the business and the external issues. The Public Affairs plan addresses specific programs undertaken by the business or for which the business has

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<sup>7</sup> If disposal of materials is handled by site management, the existence of the procedures should be noted.

accountability.

*6.5.4.3.1 Public Affairs Programs*

Any specific public affairs or business image programs beyond product advertising should be described in terms of: objectives, elements, resources requirements, means to verify results, and responsible organization. In most cases, the program will be an adjunct to an existing corporate advertising programs, making coordination critical.

*6.5.4.3.2 Public Announcement Procedures*

Occasionally there need to be public announcements, either regarding business changes or emergencies. Procedures and lines of responsibility should be clearly designated. Individuals with the authority to make such announcements and those whose have authority to approve such announcements should be identified.

Procedures should be identified to facilitate rapid communications of emergency.

*6.5.4.3.3 Public Service Programs*

Other public service programs, which will command significant resources should be identified.

*6.5.4.3.4 Community Relations Programs*

Programs that are under the control of the business should be mentioned.<sup>8</sup>

**6.5.4.4 Legal Considerations**

Major legal considerations should be identified, including potential liabilities.<sup>9</sup> Issues that do not apply to the business directly, such as Corporate or preexisting personnel issues, should be excluded.

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<sup>8</sup> *Community relations programs* are usually associated with plants. Site management, therefore, usually assumes responsibility. If the business supervises operations and these programs, they should be considered within the business plan.

<sup>9</sup> These should also be listed under risks and in the appropriate operational plan.

**TOTAL QUALITY MANAGEMENT  
QUALITY SYSTEM ANALYSIS  
SCORING GUIDELINES**

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**A. MANAGEMENT FOCUS, COMMITMENT, AND INVOLVEMENT**

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**1. DOES THE ORGANIZATION HAVE A CLEARLY DEFINED AND WELL UNDERSTOOD FOCUS OR VISION? IS THERE EVIDENCE THAT THE VISION IS BEING ACTIVELY PURSUED? IS EVERY INDIVIDUAL IN THE ORGANIZATION INVOLVED IN THE ACTIVITY?**

- 0 - There may be a "written" Vision in existence, but there is no evidence that it has been communicated to the organization, or is being used to drive organizational activities.
- 1 - 2 - A "Vision Statement" has been developed for the organization, but knowledge of it, beyond its' developers, is very sporadic or nonexistent. There is no evidence that activities are being driven by, or tested against the "Vision". There apparently is no activity underway or planned to bring knowledge and understanding of the "Vision" to the organization.
- 3 - 4 - A "Vision Statement" has been developed and knowledge of its' existence has been communicated throughout the organization. Understanding of the meaning of the "Vision" and/or activities which will move the organization toward the "Vision" seem nonexistent or extremely limited. There is no evidence of activity to drive organizational goal setting against the "Vision".
- 5 - 6 - A "Vision Statement" exists, and a formal program is in place to communicate both knowledge and understanding of its' purpose to the organization. Activities are underway to involve people across the organization in developing procedures, methods, and disciplines which will move the organization toward its' "Vision".
- 7 - 8 - A well thought out "Vision Statement" exists, which is sensitive to total Business and marketplace needs and objectives. There is strong evidence that the "vision" is well understood by the organization, individuals have taken stewardship for it in their daily activities, and are obviously convinced that it is attainable. Strategic planning, goals, and objectives are driven by and routinely tested against the "Vision Statement". A process has been developed to change and/or upgrade the "Vision statement", as appropriate. An effort is complete, or underway to make the "Vision" a fundamental driver in all types of planning activities.
- 9 - 10 - There is an extremely well thought out "Vision statement" which is in full accord with Business, Corporate, and marketplace goals and expectations. The "Vision" is an integral driver of culture change in the organization. The "Vision" is viewed as the appropriate test criteria in evaluating any and all organizational priorities and planning activities, strategic, leadership, and operational. Evidence shows total involvement at all levels in activities yielding continuous improvement in the functional capabilities of the organization.

**SCORE**

**0 to 10 Points** \_\_\_\_\_

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**2. HOW IS MANAGEMENT CREATING AN ENVIRONMENT TO DRIVE CONTINUOUS IMPROVEMENT? IS THERE AN ORGANIZATION IN PLACE TO PROVIDE EFFECTIVE LEADERSHIP? IS MANAGEMENT PARTICIPATING IN THE PROCESS IN A VIABLE WAY? DOES THE PROGRAM EXTEND TO ALL LEVELS OF THE ORGANIZATION?**

- 0 - There is no evidence (as opposed to discussion) of a commitment to continuous improvement in quality and productivity. There is no formal quality authority, or quality organization. The organization is working against static standards.
- 1 - 2 - A document exists which identifies continuous improvement as an organizational goal, but there is little or no evidence of strategic leadership to achieve implementation. Continuous improvement efforts are centered in a relatively few individuals who hold positions making them accountable. A quality resource, manager, or committee may have been named, but knowledge and understanding of its existence and/or purpose is not widespread in the organization. There is no evidence that a quality authority is providing leadership in establishing quality philosophy, principles, or activities. The official quality function appears to exist in name only.
- 3 - 4 - A statement of "vision" and/or "principles" exists, and includes some stated expectations of achieving some state of continuous improvement. There is little or no evidence of its use to drive organizational activities. A quality authority exists, but is viewed by the organization as being singularly responsible for quality management. The quality function is engaged in some planning activities, and is attempting to implement some improvement type projects in some isolated areas. While the quality organization may recognize the need to provide education and training in the disciplines of quality management, there is little or no support for such activities. The function is viewed by the organization as "just another job, or standing committee" with little or no visible impact. There appears to be minimal Management involvement and little chance of the function providing viable leadership or resourcing of quality management. Some quality management disciplines are in place in some areas due in large part to external pressure, but are not universally accepted or very effective.
- 5 - 6 - A plan to implement a continuous improvement policy is well defined on paper, however management involvement and leadership is limited or inadequate. A quality resource or manager, and some type quality committee is in place and its existence and purpose are well understood throughout the organization. Evidence exists that continuous improvement is a high priority in all levels of the organization. The quality function is actively engaged in quality planning activities, and is involved in implementing processes and procedures aimed at continuous improvement. Training in some quality awareness and specific quality tools is beginning to draw attention to the need to work on striving for continuous improvement. Quality management activities are fairly well developed but appear mostly task oriented as opposed to being an integral part of the management process. Management involvement in quality management is becoming very visible to the entire organization. Permanent teams have been formed and are allowed to make improvements within limited boundaries. On-going team development is somewhat limited.
- 7 - 8 - A very highly effective well functioning quality authority is in place. All levels of Management are heavily involved in its' activities. Effective lines of communication are open with all levels and disciplines within the organization. There is evidence that the quality management function is relinquishing some control and goal setting to other disciplines within the organization, and take a more strategic role in quality management direction. Management relies heavily on the quality function as a resource in all strategic planning activities. There is evidence of much interaction with customers and suppliers on quality management related issues. Total Business and marketplace needs and objectives are reflected in ongoing quality management activities. Quality management to gain continuous improvement is obviously a part of the culture. Continuous improvement is recognized as a "process" vs.

a "task". A good system is in place to recognize team and individual contributions in support of the organization's quality goals and objectives.

- 9 - 10 - A well established organization for continuous improvement is functioning and is involved in all appropriate decision making processes. Operating principles of continuous improvement are in evidence in virtually all levels and disciplines of the organization. The function and role of the quality authority is diminishing. Many quality related responsibilities are being absorbed into all segments of the organization. The quality function provides minimal leadership and is viewed as a resource and strategic planning function. The entire organization is well attuned to in-house, customer, and supplier quality needs, expectations, and goals. Quality considerations are a "second nature" integral part of all planning and functional activities. Self managing, cross functional teams are in place and are working to continually improve all aspects of organizational functions. Reflective processes routinely lead to change for improvement. On-going team development is the norm. Viable systems are in place to monitor accountability.

**SCORE****0 to 10 Points**


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**3. IS THERE EVIDENCE OF TRAINING IN THE USE OF TOOLS FOR THE MEASUREMENT AND RANKING OF OPPORTUNITIES FOR IMPROVEMENT? HOW IS ACCOUNTABILITY ESTABLISHED? IS THERE EVIDENCE THAT THE ORGANIZATION IS RESPONDING?**

- 0 - There is no program for training in the use of recognized techniques to identify improvement opportunities, nor is there evidence of procedures to establish accountability for identifying improvement opportunities.
- 1 - 2 - There is some documentation of plans to train appropriate personnel to identify and rank opportunities for improvement, but little or no evidence of significant progress. Evidence does not exist that accountability has been established or that the organization has much value for such activities.
- 3 - 4 - An Economics of Quality or similar program is in the early stages of implementation, effectiveness remains to be seen. Quality costs are not being identified and/or analyzed in a concerted organized way across the organization. Task team activity appears to be limited to pre-identified improvement projects, after which the team usually disbands. Accountability rests with an external team leader.
- 5 - 6 - Some quality measurement tools, such as an E.O.Q. program are in evidence and are beginning to have direct impact on the organization's ability to identify and prioritize quality improvement opportunities. In some cases these activities lead to direct involvement and work with customers and/or suppliers in improvement activities. Permanent teams have been formed and are allowed to identify, prioritize, and work on improvement opportunities within limited boundaries. Accountability appears to be limited to responsible individuals along functional lines.
- 7 - 8 - A good system is in place to recognize team and individual contributions in support of the organization's quality goals and objectives. A well designed program is in place to identify quality improvement opportunities and facilitate the merited assignment of resources for quality and/or cost improvement. Accountability for quality improvement activities is routinely accepted by individuals through out the organization and is well monitored.
- 9 - 10 - There is evidence that a focus on continuous improvement is an integral part of any activity or task within the organization. Every individual has taken stewardship for activities which yield continuous improvement. Viable systems are in place to monitor accountability. There is an extremely well thought

out system in place to measure quality costs, drive project identification, and achieve measurable positive results.

**SCORE**

**0 to 10 Points** \_\_\_\_\_

**4. IS THERE A QUALITY PLAN IN PLACE? IS IT WELL COMMUNICATED AND UNDERSTOOD? DOES IT APPEAR TO SET FORTH ACHIEVABLE GOALS? DOES IT PROVIDE FOR A WELL COMMUNICATED PROGRAM TO BRING ABOUT CONTINUOUS IMPROVEMENT IN QUALITY AND PRODUCTIVITY?**

- 0 - There is no "Quality Improvement Plan" or documented continuous improvement policy in existence.
- 1 - 2 - There is a Quality Improvement Plan or document which identifies continuous improvement as a goal of the organization, however, there is little or no evidence of strategic or leadership activities to drive implementation.
- 3 - 4 - A "Quality Improvement Plan" has been developed and knowledge of it's existence has been communicated throughout the organization. Value for and Understanding of the meaning of the Plan and/or how it can be utilized to drive improvement seems illusory or extremely limited, especially at operational levels. There is little or no evidence of organizational strategies and/or activities being driven by the beliefs and principles in the Quality Improvement Plan. Quality costs are not being identified and/or analyzed in a concerted organized way. There is little or no evidence that strategic planning activities are being driven by or tested against the Quality Improvement Plan.
- 5 - 6 - A "Quality Plan" exists, and a formal program is in place to communicate knowledge and understanding of it's purpose. Activities are underway across the organization to develop work procedures, disciplines and systems which will drive toward the goals and objectives of Quality Plan. Implementation appears "fairly consistent", however, the actual improvement to date is "very spotty" and possible long term results questionable. An economics of Quality or similar program is being developed to drive quality improvement activities but has not been widely communicated nor has training been completed and/or effective.
- 7 - 8 - A well thought out "Quality Improvement Plan" exists, which addresses total Business and marketplace needs and objectives. There is strong evidence that individuals throughout the organization have a good understanding of the "Plan", and have taken stewardship for it in their daily activities. Implementation of training, procedures, and systems to drive continuous improvement is well underway. The implementation plan appears to be working well and initial positive results are apparent. A well designed program is in place to identify Quality costs and facilitate the merited assignment of resources for cost improvements. Strategic planning, goals, and objectives are driven by and routinely tested against the Quality Improvement Plan. A process has been developed to periodically review and keep the Quality Plan aligned with Business objectives. A mechanism is in place to assure integration of Quality Plan Goals and Objectives into all types of planning activities.
- 9 - 10 - There is an extremely well thought out "Quality Improvement Plan" which is well aligned with Business, Corporate, and marketplace goals and expectations. The operating principles set forth in the plan are obviously part of the organizational culture. There is evidence that the "Plan" is an integral driver of organizational planning and activities. The "Vision" is viewed as an essential test criteria in evaluating organizational planning activities and priorities at strategic, leadership, and operational levels. Evidence shows involvement at all levels in activities yielding continuous improvement in the functional

capabilities of the organization. There is a well established system in place to measure Quality costs, drive improvement projects, and achieve measurable positive results.

**SCORE**

**0 to 10 Points** \_\_\_\_\_

**5. ARE THERE METHODOLOGIES AND PROCEDURES IN PLACE FOR INTERNAL AUDITING FUNCTIONS? WHAT IS THE PHILOSOPHICAL RATIONALE FOR THE AUDIT FUNCTION?**

- 0 - There is no evidence of an Audit process.
- 1 - 2 - Audits are done, but there is little or no documentation for the process. Audits are generally used to highlight defects and feedback loops are weak or nonexistent. There appears to be little or no value for the Quality auditing function in the organization.
- 3 - 4 - The importance of the auditing process seems to be recognized, but a formal support system is seriously lacking. There is no evidence of a generally accepted audit philosophy. Documentation of the system and of past audits is seriously deficient. Audit frequency, location, and viability are haphazard. Followup on deficiencies and concerns is at best ineffective, and at times disruptive.
- 5 - 6 - There is documentation for an audit process and there are some audit forms in existence. While the documented philosophy and the process seem to be generally accepted by management, there is little evidence of understanding in other levels of the organization. Audits are done in certain areas with some regularity. Audit focus appears to be primarily on discrete defects and/or deficiencies as opposed to system viability. When corrective action is taken it is often done in a unilateral and disjointed manner. Viewing the overall audit process, there are one or more serious shortcomings and some major area or areas are not being audited.
- 7 - 8 - There is a well documented system in support of a well managed audit process. Well designed audit forms are available for each appropriate area and audits are performed on an established regular frequency. Audit results are properly reported to affect corrective action, and the central Quality authority is an integral part of the communication loop. Audit results are available to and acted upon through team activities at all appropriate levels in the organization. Audits are well focused on system performance and improvement opportunities. Corrective actions often yield measurable significant system improvement.
- 9 - 10 - In addition to above, extremely thorough procedures are available for all audit activities. Procedures are continually being evaluated and improved. Teams interact regularly with appropriate resources to better understand process and product performance.

**SCORE**

**0 to 10 Points**

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**A. MANAGEMENT FOCUS, COMMITMENT, AND INVOLVEMENT (Possible 50 pts.)**

**Total Score**\_\_\_\_\_

**B. ADVANCE QUALITY PLANNING**



**6. IS THE RESPONSIBILITY FOR QUALITY PLANNING ON NEW PRODUCTS CLEARLY DEFINED AND DOCUMENTED? ARE FORMALIZED SYSTEMS IN PLACE WHICH CLEARLY DEFINE ALL ASPECTS OF MATERIAL, PROCESS, AND/OR PRODUCT QUALITY CONTROL? ARE PROCESS FAILURE MODE AND EFFECTS ANALYSIS, OR A SIMILAR METHODOLOGY USED AS A BASIS FOR ESTABLISHING QUALITY PROGRAMS FOR NEW PRODUCTS AND/OR CONTROL OF PROCESSES?**

- 0 - There is no formal program or system to guide the introduction of new products.
- 1 - 2 - There is a written procedure to guide new products through introduction to commercialization. The procedure has serious shortcomings and is treated as a "check-list" to be put on file early in the introductory process. Documentation is very inadequate and of little or no value in understanding and/or resolving concerns/problems. There is no evidence of any type failure mode and effects analysis.
- 3 - 4 - There is a good written procedure for new product introduction. The need for quality planning is recognized but evidence shows it is not done in an effective manner. Quality planning activities are "person dependent" vs. being an integral part of the introductory process. All or most improvement/problem solving is driven by motivated individuals, not team activities.
- 5 - 6 - There is a well written very detailed procedure on quality planning for new product introduction. New product introduction is a well organized team activity. Evidence indicates quality planning takes place but is not often a high priority on the teams agenda. The quality aspects of the overall plan are generally viewed as a "Quality Manager/Office" responsibility. There is generally little or no customer involvement in the process. Failure mode and effects analysis type activities do take place before and during introduction, and team responses to concerns/problems are usually effective.
- 7 - 8 - The organization has a well documented extremely thorough new product introduction program. There is evidence of a close and very effective working relationship with customers on quality planning. Evidence shows quality planning efforts include team participation by suppliers, engineering, marketing, R&D, production, Customer, and in some cases other affected disciplines. The effort is tracked by team generated Process Flow Diagrams, Floor Plans, Control Plans, or similar planning documents. There is also evidence of vigorous team follow-up on any identified concern or problem.
- 9 - 10 - In addition to 7 - 8, a number of statistical tools such as designed experiments and process potential studies are integral parts of the new product introduction process. The formalized procedure drives the team to continually improve on the process and the written procedure. A strong organizational involvement in continuous improvement activities helps assure the availability of any needed expertise and/or resources. Supplier and Customer involvement in the process can be defined as a "partnership".

**SCORE**

**0 to 10 Points \_\_\_\_\_**

**7. ARE PROCESS POTENTIAL STUDIES CONDUCTED OF NEW PRODUCT CHARACTERISTICS AND PROCESS PARAMETERS? ARE CONTROL PLANS, FMEA'S AND/OR FLOW CHARTS USED TO UNDERSTAND AND CONTROL THE PROCESS?**

- 0 - There is no documented evidence of process potential studies or FMEA's being used.

- 1 - 2 - Process potential, process capability studies, and/ or FMEA'S are not conducted with any regularity. The viability of analysis and documentation is questionable in those which have been completed. Team management of the process and response to results in ineffective.
- 3 - 4 - Process potential, process capability studies, and/ or FMEA'S are conducted with some regularity, but there are serious deficiencies in methodologies, and/or the effectiveness of study team activities. Follow-up documentation is not readily available. Knowledge of results are not widely communicated. There is no indication of wide spread value for these type activities in the organization.
- 5 - 6 - Fairly reliable process potential studies, process capability studies, and/or FMEA's are used, but there are some deficiencies in methods used or in team response to results. Results were well communicated within the organization. There is evidence of activity to better understand and utilize these types of tools.
- 7 - 8 - Records show that process potential studies, process capability studies, and FMEA's are conducted for all appropriate situations. All activities are managed by a well organized effective team. Results are well documented and widely distributed. Evidence indicates numerous improvements from such activities and they are becoming institutionalized.
- 9 - 10 - In addition to above, these activities are integral drivers of improvements in process and product quality management, and there is much activity to continually upgrade their value and use.

**SCORE** **0 to 10 Points** \_\_\_\_\_

**B. ADVANCE QUALITY PLANNING** **(Possible 20 pts.) Total Score**\_\_\_\_\_

**C. PROCEDURES**

**8. ARE WRITTEN PROCEDURES DEFINING QUALITY-RELATED FUNCTIONS AVAILABLE (i.e. a Quality Manual)? ARE THESE PROCEDURES APPROPRIATE TO AND ADEQUATE FOR THE OPERATION? ARE THE PROCEDURES EFFEC-TIVELY IMPLEMENTED?**

- 0 - Procedures are either non-existent or completely ineffective. Investigation indicates that those procedures that do exist are rarely if ever followed.
- 1 - 2 - Some procedures may be available, but seem to be passed from operator to operator verbally. Implementation of procedures cannot be verified and appears to be very haphazard. Maintenance is performed only when equipment fails. There are no history files on maintenance available.
- 3 - 4 - Some written procedures exist which cover most tasks but do not appear to be widely followed. There are some serious deficiencies in the procedures as written. There are numerous examples were procedures are obviously not followed. Maintenance history records are inadequate.
- 5 - 6 - Good written procedures exist and cover most if not all organizational tasts. There is a well documented system in place to keep procedures current with the needs of the organization. Evidence exists that procedures are generally well understood and followed. There is a fairly well- planned equipment maintenance program. Evidence shows effective implementation, but certain aspects of the program need improvement. Maintenance records exist but require some improvement to be statistical viable.

- 7 - 8 - Good written procedures are available for all significant functions. Evidence is available that procedures are almost always followed and any exceptions are well-documented. The smooth flow of production through the operation reflects that good time tested procedures are well established. There is a well planned and effectively-implemented Maintenance program. Records are complete and well organized. Some reliability and capability studies have been performed.
- 9 - 10 - Extremely thorough procedures are available for all tasks and functions in the operation. Investigation reveals that procedures are clearly understood, always followed, and are treated as "living documents" which are continually being evaluated and improved. Maintenance records are very detailed and contain very complete maintenance histories.

**SCORE****0 to 10 Points** \_\_\_\_\_

**9. DO PROCEDURES EXIST DEFINING METHODS FOR MONITORING AND MAINTAINING PROCESS/PRODUCT PARAMETERS. ARE CONTROL FUNCTIONS AND RESPONSIBILITIES CLEARLY DEFINED? ARE THE DEFINED CONTROLS ADEQUATE FOR THE OPERATION? ARE THE APPROPRIATE DISCIPLINES INVOLVED AND ACCOUNTABLE? ARE QUALITY CONTROL ACTIVITIES "PEOPLE" OR "SYSTEM" DEPENDENT?**

- 0 - There is no evidence of any process control program, or methods for identifying material/product status, (ie; unapproved for use, O.k. to use, suspect, N.G., etc.)
- 1 - 2 - There are process controls but responsibility and accountability are seriously lacking. Sampling methods are inadequate, and there is no statistical analysis of data. Identification status of product/material is ineffective.
- 3 - 4 - There is a detailed control program which is focused on detection of defects and/or non-conformance. Detection is viewed mainly as a quality inspector or control laboratory function. Operator decisions on product/material quality are often overruled by supervision. Accountability for control is very weak and not uniformly applied.
- 5 - 6 - The control program is based on 100% inspection, or meeting measurement or test result specifications. There is no evidence of a statistically validated batch or lot release system. There is evidence of some root cause corrective actions, driven by problems detected by the control system, but these type activities are very sporadic. Product/material identification procedures and procedures assigning responsibility and accountability for control have some major deficiencies.
- 7 - 8 - Most control is achieved through the utilization of statistical methods. Where appropriate, validated sampling plans, test methods, and test procedures are well documented and implemented. In some instances, improvement activities have allowed removal or simplification of some system controls. Operators routinely make accepted "go / no-go" decisions on material/product quality. Detected defects are driven to root cause corrective action steps on a routine basis. Very adequate product/ material identification is in evidence.
- 9 - 10 - In addition to above, improvement teams are actively engaged in moving appropriate controls "upstream" in the operation, with heavy emphasis on prevention of non-conforming production. There is evidence that procedures are viewed as necessary and part of every individual's responsibility.

**SCORE****0 to 10 Points** \_\_\_\_\_

**C. PROCEDURES****(Possible 20 pts.) Total Score \_\_\_\_\_****D. MATERIAL CONTROL****10. ARE THERE ADEQUATE SYSTEMS IN PLACE FOR THE MANAGEMENT AND CONTROL OF INVENTORIES? DO PROCEDURES PROMOTE AND FOSTER ACCURATE INVENTORY RECORDS?**

- 0 - Procedures are either non-existent or completely ineffective. No formal system is in place to control inventory investment. Any procedures which do exist are rarely if ever followed. Material shortages are routine.
- 1 - 2 - Only verbal procedures are used. Inventory investment and material movement are loosely controlled at best. Often inventory accuracy is not reliable and/or cannot be verified. Procedure implementation appears to be very haphazard. Material shortages occur with some frequency.
- 3 - 4 - Some written procedures exist and cover most significant functions, but need clarification. Universal Stewardship for inventory investment and material management is not apparent. These activities are viewed as the responsibility of specific functions within the organization. While there is some evidence of the implementation of procedures, there are numerous examples where procedures are obviously not followed. Spot shortages of material occur occasionally. Physical inventories almost always reveal inconsistencies.
- 5 - 6 - Good written procedures exist and cover all but one or two significant functions. Appropriate investment controls are in place and appear well matched to the type business engaged in. Inventory cycle checks or similar tools are being utilized. Evidence exists that procedures are generally well understood and followed. Material shortages are very rare, however physical inventories sometimes require some reconciliation.
- 7 - 8 - Good written procedures are available for all aspects of inventory investment control. Evidence is available that procedures are almost always followed and any exceptions are well-documented. Understanding and responsibility for the management of these functions is diffuse in the organization. Extremely good records exist, and physical inventories seldom reveal any problems.
- 9 - 10 - All of above plus, extremely thorough procedures are available for all related functions. Investigation reveals that procedures are clearly understood, always followed, and are "living documents" which are continually being evaluated and improved.

**SCORE****0 to 10 Points \_\_\_\_\_****11. ARE ADEQUATE PROCEDURES IN PLACE TO ASSURE SUB-STANDARD MATERIAL WILL NOT BE INTRODUCED INTO THE PRODUCT FLOW? DO APPROPRIATE PROCEDURES EXIST TO ASSURE PROPER IDENTIFICATION, HANDLING, AND STORAGE OF MATERIAL? DO THE PROCEDURES PROVIDE FOR THE PROPER SEGREGATION OF SUB-STANDARD AND/OR UNRE-LEASED MATERIALS? ARE THE PROCEDURES PROPERLY FOLLOWED?**

- 0 - Procedures are either non-existent or completely ineffective. It appears that any procedures which do exist are rarely if ever followed.
- 1 - 2 - Verbal procedures are used, or existing procedures are seriously inadequate. Implementation of any procedures which do exist cannot be verified and appears to be very haphazard. There is little or no evidence that identification methods are viable.
- 3 - 4 - Written procedures exist and cover most significant functions, but need clarification or are inadequate. Implementation of procedures appears haphazard and there are examples of procedures not being followed. Evidence indicates that attention to material identification, handling, and storage are not a high priority. There is little or no evidence of auditing/enforcement of existing procedures.
- 5 - 6 - Good written procedures exist which cover all significant functions. Evidence indicates that material handling and storage is adequately controlled. A good identification system and proper quarantine areas exist. Procedures appear to be generally well understood and followed. Authority for release/quarantine is well established.
- 7 - 8 - Very complete written procedures exist for control of unreleased and quarantined material. Evidence indicates that procedures are almost always followed and any exceptions are properly resolved. A good well monitored quarantine system is in place. A very good identification system exists which includes named individuals responsible for material disposition. Procedures include provision for periodic review and appropriate upgrade.
- 9 - 10 - In addition to #7-8, extremely thorough procedures exist for all aspects of material identification, handling, and storage. Procedures and systems are subject to continuous review and improvement. Procedures are well understood and always followed through out the organization.

**SCORE****0 to 10 Points \_\_\_\_\_**

**12. ARE PRODUCTION OPERATIONS THAT PRODUCE NON-CONFORMING OR OUT-OF-CONTROL PRODUCTS PROMPTLY CORRECTED? IS RESPONSE PERSON/FUNCTION DEPENDENT, OR A TEAM ACTIVITY? ARE APPROPRIATE STATISTICAL/QUALITY TOOLS USED AS A BASIS FOR ESTABLISHING AND MAINTAINING QUALITY CONTROL? ARE FORMALIZED PROBLEM SOLVING DISCIPLINES IN PLACE?**

- 0 - Evidence indicates that management does not get involved in correcting out-of-control or non-capable operations. There is no evidence of FMEA's being performed, or formal problem solving disciplines being utilized.
- 1 - 2 - Evidence indicates that any correction of deficient operations is usually a "person" dependent "trial and error" type activity. Response to process problems is very haphazard and viewed by the organization as "fire fighting". Reports to management are inadequate, non-existent, or disregarded. There is little or no value for FMEA's or formal problem solving disciplines.
- 3 - 4 - Deficient operations are corrected rapidly in those cases where a particular problem recurs often and some experience has been gained as to responses that work at least temporarily. Management seldom takes an interest in these conditions. Most problem solving energy is expended in the form of "fire fighting". There is never time for FMEA's or implementation of problem solving disciplines. Most, if not all problem identification, analysis, and corrective actions on the manufacturing floor are by individual

initiative, or a discrete discipline along functional lines (i.e. a process engineer, or the maintenance organization). "Turf" issues seem to be the catalyst for most if not all problem solving activities.

- 5 - 6 - Deficient operations are corrected fairly rapidly, and indications are that management is usually well informed of problem conditions. Management's role however seems to be that of driving the organization to resolution of problems through exhortation while remaining isolated from the problem solving process. Much energy is classified as "fire fighting". While there is some awareness of the value of FMEA's and formal problem solving disciplines, they are very seldom if ever used. There is evidence of some team activities, but direction, purpose, and a viable team building environment are lacking. "Turf" issues hinder effective problem solving activities. Most if not all successful problem solving is accomplished by motivated individuals within the organization.
- 7 - 8 - The existence of deficient operations is effectively communicated to management and such operations are quickly corrected. Appropriate levels of management are often directly involved as resources in the problem solving process. FMEA's and formal problem solving disciplines are used routinely to identify and correct problems. Team activities are well established and considered necessary to the organization's functioning capability. It is obvious that Management is actively working to provide a focus on continual improvement.
- 9 - 10 - The organization exhibits a very high level of concern for and awareness of keeping all processes stable and capable. On aim process performance is viewed across the operation as an appropriate measure of acceptable organizational performance. Response to any problem is assumed a self-managing team activity, with resourcing available from management and/or any other discipline as appropriate. FMEA's are complete on all processes, and proper documentation is available in the work areas. Formalized problem solving disciplines are standard operating procedure.

**SCORE**

**0 to 10 Points** \_\_\_\_\_

**13. IS PRODUCT RETURNED BY CUSTOMERS ANALYZED TO DETERMINE WHY THE PRODUCT WAS DEEMED UNACCEPTABLE? IF PRODUCT IS FOUND TO BE NON-CONFORMING IS THE FAILURE MODE DETERMINED, AND APPROPRIATE CORRECTIVE ACTION TAKEN? IS RESPONSE TO CUSTOMER CONCERNS A PERSON/FUNCTION DEPENDENT, OR A TEAM ACTIVITY?**

- 0 - The supplier has no formalized provisions for returned product analysis.
- 1 - 2 - Returned product analysis is seriously handicapped by deficiencies in equipment, facilities, trained personnel, procedures, and/or record keeping. Information from the customer is usually non-existent or completely unreliable.
- 3 - 4 - Returned product analysis is performed, but is not a high priority activity. Reporting is almost always late, and analysis is perfunctory, with little or no corrective action initiatives. While there is some first hand knowledge of the problem from the customer, information is "sketchy", and cannot be relied upon. The returned product system is entirely person/function dependent.
- 5 - 6 - Returned product analysis is performed on a routine basis with consistent positive results. Analysis and report back timing are monitored by management, and reporting is usually done in a timely manner. While most of the activity is performed by discrete functions within the organization, other resources are made available if needed. Some direct customer contact is usually involved. Records of analysis and/or any corrective action are often inadequate to create an effective audit trail.

- 7 - 8 - In depth analysis is performed on all returned product with a high degree of involvement across functional lines in the organization. Corrective actions of root causes of product failure are routine investigative culminations. Records indicate heavy involvement with the customer from notification of the dissatisfaction through corrective action steps, with customer input to the process being solicited. Documentation of the analysis and corrective action steps are detailed and provide a clear understanding of the entire process. All appropriate information is recorded in the operating area's procedures, (i.e. control plans, process flow charts, etc.).
- 9 - 10 - Same as above, plus extremely well thought-out procedures are in place. Very thorough root cause analysis is done, and appropriate corrective action is promptly initiated. Thorough computerized records and analysis results are consistently available ahead of expected timing. Personnel throughout the organization are well informed of such activities, and readily relate the effect of "corrective actions" to their own work activities.

**SCORE****0 to 10 Points** \_\_\_\_\_**D. MATERIAL CONTROL****(Possible 40 pts.) Total Score** \_\_\_\_\_**E. TEST EQUIPMENT/METHODS**

**14. ARE WRITTEN INSPECTION, AND LABORATORY TEST INSTRUCTIONS AVAILABLE FOR INCOMING, IN-PROCESS, AND OUTGOING AUDITING? IS PROPER DOCUMENTATION AVAILABLE ON TEST METHOD VALIDATION AND UPDATING? ARE INSPECTIONS AND TESTS PERFORMED ACCORDING TO THE WRITTEN PROCEDURES? ARE THERE ADEQUATE RECORDS OF INSPECTIONS AND TESTS?**

- 0 - Written inspection/laboratory test instructions do not exist. Indications are that inspections/tests are not being adequately performed.
- 1 - 2 - Written instructions exist but are inadequate and/or are incomplete. Most of the inspection/testing activities are seriously deficient.
- 3 - 4 - Written instructions exist but have significant shortcomings. There is little evidence that test methods and procedures are being uniformly followed. Recorded results of tests inadequate or considered unreliable.
- 5 - 6 - Written instructions are generally complete and well communicated for all disciplines of the operation. There are however some questions as to how consistently procedures are followed, and how complete and reliable recorded test results are. Evidence indicates that an audit trail through the test results for problem solving activities, etc., would be difficult. There may be good record keeping disciplines in place, but the data is hard to retrieve and manipulate; or data is computerized, but there is no discipline in place to facilitate routine analysis. There is no documentation available on the validation of test confidence levels, or tracability to universally recognized standards.
- 7 - 8 - Written instructions are complete and appear very adequate for the type operation. Evidence indicates that inspections/test methods are being properly followed. Test records appear complete and detailed. Documentation exists on the statistical validation of test method confidence levels, and/or test methods can be traced to acceptable standards. All test data is easily retrieved for analysis, (extremely good record keeping, computerized system, etc.) Analysis is routinely performed on data showing deviations.

- 9 - 10 - In addition to above, evidence shows that the organization is very innovative in assuring the validity and reliability of the measurement program. Records are computerized, and easily retrievable for analytical studies, etc. Retain samples are easily indexed to points of end use, ie; raw material test data, batch number, production date/time, etc. Test instrument and methods reliability are maintained through such activities as repetitive reliability studies. Continual improvement is in evidence throughout the testing discipline.

**SCORE****0 to 10 Points \_\_\_\_\_**

**15. ARE APPROPRIATE TEST METHODS, TEST EQUIPMENT AND GAGES AVAILABLE TO FACILITATE PROCESS CONTROL? IS THERE AN EFFECTIVE TEST METHOD/TEST EQUIPMENT/GAGE MAINTENANCE SYSTEM IN PLACE? ARE MAINTENANCE AND CALIBRATION RECORDS AVAILABLE FOR TEST EQUIPMENT/GAGES? ARE THERE RECORDS AVAILABLE SHOWING RESULTS OF ROUTINE RELIABILITY AND REPEATABILITY STUDIES ON TEST EQUIPMENT/GAGES?**

- 0 - Appropriate test equipment and/or gages are not available.
- 1 - 2 - Some test equipment/gages are available, but not at all process control points. The use and type of some equipment needs reevaluation. Proper training in the use of some test equipment is in question. Maintenance is done only when equipment fails. There are no records on calibration and/or maintenance and/or R & R studies available.
- 3 - 4 - Test equipment/gages are available for most process control points, but does not exist in a few important areas. Most tests are performed on a go/no-go basis, with little or no data being collected on results. Some control points would be improved with a different type equipment/gage. Scheduling and history records of maintenance, calibration, and/or R & R studies are inadequate.
- 5 - 6 - Complete variable data type gaging and testing is available for all significant characteristics. There is a fairly well-planned gage/test equipment maintenance program. Evidence shows effective implementation, but certain aspects of the program need improvement. Maintenance and calibration records exist but require some improvement to be statistically viable. Some R & R studies have been done, but not on all necessary equipment/gages, and study records are incomplete and/or inadequate.
- 7 - 8 - Same as above, plus gages/test equipment for all significant characteristics provide input directly to analytical equipment for statistical analysis. There is a well planned and effectively-implemented Maintenance and calibration program. Records are complete and well organized. Evidence shows an R & R program is in place for most equipment/gages. Records reflect effective corrective action as necessary in response to R & R study results.
- 9 - 10 - All of above, plus test equipment/gage capability studies have been performed for all significant characteristics. There is an unusually well-planned and implemented gage and/or test equipment program. Maintenance, calibration, and R &

R study records are very detailed and contain very complete maintenance/calibration histories.

**SCORE****0 to 10 Points \_\_\_\_\_**



**E. TEST EQUIPMENT/METHODS****(Possible 20 pts.) Total Score \_\_\_\_\_****F. STATISTICAL METHODS****16. ARE APPROPRIATE STATISTICAL METHODS USED TO MONITOR PRODUCT CHARACTERISTICS AND PROCESS PARAMETERS? IS THERE EVIDENCE OF THE UNDERSTANDING AND USE OF CAUSE AND EFFECT ANALYSIS TO FACILITATE PROCESS CONTROL/ON AIM PERFORMANCE?**

- 0 - Statistical methods are not used. Any relationship between process parameters and product quality cannot be identified.
- 1 - 2 - Statistical methods are not in use, but some limited training has begun in some isolated areas and/or around some discrete functions. Statistical expertise resides with external resources. There are no formal problem solving disciplines in place.
- 3 - 4 - There is some limited use of statistical methods by a few individuals. Evidence shows statistics to be viewed as a "technical" tool in some discrete locations only. Training is limited to operations level technicians and operators. Reaction to out-of-control conditions is usually limited to corrections by "trial and error". Problem solving and improvement activities are very limited and unorganized.
- 5 - 6 - Statistical methods are being used at a number of control points in the process. Some use is also beginning in such area as process potential, designed experiments, etc. A formal training program for the entire organization is underway. Formal teams, with statistical training, are being implemented for project improvement activities. Out-of-control conditions are responded to by problem solving teams, with generally good management supported resourcing. team implemented corrective actions are generally effective and well documented.
- 7 - 8 - Control charting techniques (including CUSUM), as appropriate are used extensively throughout the production operation. Priorities for controlling process and product characteristics are routinely checked and agreed upon with appropriate customer personnel. On aim performance of processes is the norm on the operating floor. Established smoothly functioning teams effectively manage out-of-control conditions, to include good documentation of team activities. Cause and effect analysis is regularly used by standing project improvement teams and problem solving teams.
- 9 - 10 - As above, plus statistical methods are used extensively throughout the entire organization, ie; process potential, process capability, test equipment reliability, and designed experiments. Statistical methods are the tool of choice for identifying and reducing variability everywhere in the operation.

**SCORE****0 to 10 Points \_\_\_\_\_****17. IS THERE DOCUMENTATION INDICATING THAT PROCESSES ARE IN STATISTICAL CONTROL? HAS PROCESS CAPABILITY BEEN DEMONSTRATED?**

- 0 - Statistical methods which would support conclusions regarding statistical control or the capability of processes are not in use.

- 1 - 2 - Some statistical methods are in use, but data collected to date is insufficient for use in ascertaining statistical control or process capability. There appears to be little or no understanding of what process "stability" or process "capability" means.
- 3 - 4 - Most key characteristics are control charted by a few individuals. Control charting is obviously a "person dependent" exercise. Evidence shows statistics to be viewed as a "technical" tool to be used by some discrete functions. Control charts are not generally accepted as a tool to control a process. While some of the charts show evidence of statistical control, most do not show capability. Management does not seem to have adequate understanding of or take any interest in the need to bring processes into statistical control. Some progress is being made to bring processes to a state of stability, but activities are being driven by individuals, not the organization.
- 5 - 6 - Statistical methods are being used at most or all control points in the process. Statistical control is evidenced in all or most cases. Some processes are not yet showing capability. Management is showing interest in getting processes into a state of capability. A formal training program for the organization is underway. Teams are being developed to work on process capability. Most process improvement activity is still being accomplished by motivated individuals within the organization.
- 7 - 8 - Control charting techniques (including CUSUM), as appropriate are used extensively throughout the production operation. All process are shown to be both in statistical control, and capable. Process aim within the capability envelop and product specifications are well aligned. Cases of assigned/special cause variation are routinely handled by effective teamwork. Management is actively working to provide a strong focus on continuous improvement.
- 9 - 10 - As above, plus statistical methods are used extensively throughout the entire organization. Appropriate statistical methods are the tool of choice for identifying and reducing variability everywhere in the operation. Continuous improvement of process capability is an organizational goal with broad based support and involvement.

**SCORE****0 to 10 Points \_\_\_\_\_****18. IS THERE A PROGRAM TO MONITOR AND ASSURE THAT SUPPLIERS HAVE THEIR PROCESSES AND PRODUCTS IN STATISTICAL CONTROL?**

- 0 - There is no evidence of activity to encourage suppliers to statistically control their production.
- 1 - 2 - Contacts have been made with some major suppliers requesting verification of statistical control of their process(es).
- 3 - 4 - One or more major suppliers have responded to inquiries, indicating intent to implement statistical methods. Planning is underway for meetings to share expectations with suppliers.
- 5 - 6 - At least one major supplier has delivered evidence of statistical methods implementation. Documentation indicates a lack of control and capability in the supplier's operation. An offer of assistance to suppliers, to help develop appropriate quality control plans has been made. activities are underway to press other suppliers evidence of statistical control.
- 7 - 8 - Most key suppliers are routinely supplying evidence of statistical control. Some suppliers are able to demonstrate capable processes. Routine interaction is taking place with suppliers at appropriate levels in order to share resourcing on issues of mutual concern regarding control and capability of process(es).

- 9 - 10 - Evidence of statistical control and process capability is available from all key suppliers. Resource sharing is routine to work on such things as quality planning, and training programs which impact process control optimization.

**SCORE****0 to 10 Points** \_\_\_\_\_**F. STATISTICAL METHODS****(Possible 30 pts.) Total Score** \_\_\_\_\_**G. SUPPLIER RELATIONS**

**19. WHAT SYSTEMS ARE IN PLACE TO CONTROL THE QUALITY OF INCOMING MATERIALS, PRODUCTS, AND SERVICES. ARE THERE APPRO-PRATE SYSTEMS IN PLACE TO EFFECTIVELY DRIVE CAUSE AND EFFECT RELATIONSHIPS BETWEEN PROCESS/PRODUCT PROBLEMS AND INCOMING MATERIALS TO A WARRANTED SOLUTION?**

- 0 - There is no ongoing improvement effort involving vendors. Interactions take place only when there is a problem.
- 1 - 2 - There is a document such as a policy or a procedure stating that supplier focused improvement and improved quality of out-sourced materials are organizational objectives. Evidence shows that activities to meet such objectives are nonexistent or haphazard and unorganized. Most problem solving activities in this area are completely driven by reaction to perceived problems with little or no cause and effect analysis.
- 3 - 4 - There are documented procedures in place, aimed at continuous improvement, outlining how interactions with vendors will be handled. The procedures are not widely understood or followed. Most interaction takes place only when there are problems somewhere in the material supply chain. Most corrective action centers on problem resolution as opposed to problem prevention. Cause and effect analysis is seldom used with positive results.
- 5 - 6 - Implementation of procedures to control incoming materials and products is "fairly consistent", however, the actual improvement to date is "very spotty" and possible long term results questionable. Attempts are underway to form teams with appropriate vendor personnel to address concerns and problems and to drive continuous improvement. Some cause and effect analysis is being used to drive problems to root cause for corrective action. Mutual quality concerns are being addressed with at least one major supplier through utilization of appropriate quality measurement tools (ie, a quality audit process, incoming material acceptance system, etc.), and routine meetings of appropriate personnel.
- 7 - 8 - Incoming material control procedures are well established and uniformly followed. Implementation of improvement actions has occurred for most major receiving systems. Statistical methods, including cause and effect analysis are an integral part of material related problem solving activities. Interactions with vendors are routine with problems being viewed as a "mutual" concern. Response to concerns and problems usually leads to appropriate corrective action at the root cause level wherever it occurs in the supply chain.
- 9 - 10 - In addition to above, comprehensive and detailed procedures are in place which reflect vendor input. A team spirit is evidenced by the type interactions taking place with vendors. Evidence also shows major improvements have been realized on most to "virtually all" incoming material control systems.

**SCORE**

**0 to 10 Points** \_\_\_\_\_

**20. ARE THERE METHODOLOGIES AND PROCEDURES IN PLACE FOR AUDITING SUPPLIERS? WHAT IS THE PHILOSOPHICAL RATIONALE FOR THE SUPPLIER AUDIT FUNCTION?**

- 0 - There is no Supplier Audit process.
- 1 - 2 - There is a perception that a supplier audit program is needed, but there is little or no documentation. There appears to be little or no activity to implement such a program. There is little or no evidence that an agreed upon audit philosophy exists.
- 3 - 4 - While the importance of an auditing process seems to be recognized, there is no evidence of an effective formal support system. There is no evidence of a generally accepted audit philosophy or of accountability for implementation and management. Documentation of a supplier audit system is seriously deficient. While one or more audits of suppliers may have been completed, follow-up on deficiencies and concerns is at best ineffective. Any supplier improvement as a result of an audit function is very questionable.
- 5 - 6 - There is documentation for a supplier audit system which includes a well thought-out philosophy and process, but implementation appears somewhat unorganized and haphazard. Audit focus appears to be on defects and/or deficiencies as opposed to system viability and improvement opportunities. There is little evidence that corrective actions taken by suppliers in response to audit results will be effective in the long term. There are ongoing contacts, and/or reciprocal visits with vendors relative to Quality, but no formal agreed upon improvement process is in place. At least one major vendor has been audited but there is little or no evidence of any activities to assist the vendor in establishing a continuous improvement process. Viewing the overall audit process, there are some serious shortcomings which must be addressed.
- 7 - 8 - There is a well documented system in support of a well managed audit process. Suppliers understand the process and procedures, and are audited on an established regular frequency. Audits are well focused on system performance and improvement opportunities. Audit results are effectively acted upon through team activities within the suppliers' organization and often yield measurable significant system improvement. When needed, appropriate resourcing is made available to suppliers to assist in planning and implementing continuous improvement activities.
- 9 - 10 - In addition to above, extremely thorough procedures are available for all audit activities. Procedures are continually being evaluated and improved. All vendors are being interactively engaged in continuous improvement activities. Teams regularly interact with appropriate vendor representatives to better understand material performance throughout all processing steps. The audit process is used throughout the processing chain (both supplier and in-house), as a primary tool in identifying improvement opportunities.

**SCORE**

**0 to 10 Points** \_\_\_\_\_

**G. SUPPLIER RELATIONS**

**(Possible 20 pts.) Total Score** \_\_\_\_\_

**TOTAL RAW SCORE**

**(Possible 200 pts.)** \_\_\_\_\_