COMPETING BY DESIGN

Creating Value and Market Advantage in New Product Development

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Introduction

During the writing of this book, we contacted an "expert" to ask for some examples to help illustrate key points. His background was in engineering and engineering management and we knew he had done significant work in areas that we were writing about. We discussed the content of *Competing by Design* and its intended audience with him. After some initial explanation, he commented, "but other people have written excellent books on reducing product development time using concurrent engineering and other techniques, aren't you just doing the same thing over again?" We explained that our approach was different, that *Competing by Design* is not a technical book and that we were not focusing solely on technology or techniques. Our focus was to be on management of the product development process in terms of the strategy of the firm and the emerging competitive environment of the 1990s. He replied, "but the other books include excellent chapters on management's perspective. Is yours a strategy book?" We replied that our intention was not to concentrate just on strategy, and that while there are some excellent books on the market that include advice for management, most have been unsuccessful in reaching the executive audience because they are perceived as technical in nature. The conversation continued for a little longer, with our friend attempting to fit us into any number of single-focus categories ranging from computer-aided engineering to strategy and techniques.

We think of our "expert" friend as a little like a blind man trying to describe an elephant. He "sees" potential product development improvements from his personal perspective, which is based on the parts he has touched (his experience and particular abilities). His engineering background predisposes him to think in terms of technology and

techniques, not an integrated approach which combines strategy, techniques, and technology to gain market advantage. Technically oriented people such as our "expert" are certainly improving aspects of product development in industry through application of techniques and technology. But in most cases, their work has not been developed as part of the overall mission and strategy of their company, and it is therefore missing the major potential for breakthrough change that will be essential in the coming years.

As we will illustrate, technical improvements in product development are not always translated into significant competitive advantages. Techniques and technologies are being implemented in ways that do not add any improvement to the overall process and do not support the mission and strategy of the firm. Often, new techniques and technologies are merely implemented as a result of the engineer's tendency to experiment with them. Sometimes they buy new technologies or implement techniques because they have heard that their competitors are using them. This is like putting together pieces of a complex jigsaw puzzle without knowing what the completed picture is supposed to look like. More often than not, the puzzle doesn't get completed.

Meanwhile, competitive strategies continue to evolve. Executive management is trying to deal with global competitors who are continually driving down the time it takes to develop new products and get them to market. The quality of these products is excellent, and manufacturing costs are relatively low. Techniques and technology are only used as supports for strategy in these companies, not as the basis for competitive product development. Solutions which rely solely on technology, such as General Motors' attempt to completely automate an assembly plant, have been dismal failures. Similar applications which rely solely on technology in the engineering and R&D departments have not made any serious dent in catching up to the leading competitors.

To be fair to the engineers, the reality is that no single function in the company can provide the leadership and broad outlook necessary to meet the competitive challenges facing companies in the 1990s and beyond. Those who intend to survive and prosper will recognize that the leadership and vision must come from an active, informed, and involved executive management team which understands that the bases of competition are shifting. Quality is no longer a differentiating

factor, it is the price of admission to the game. Time-to-market is increasing in importance, as are accurate assessment and satisfaction of customer needs. Product development and introduction capabilities are becoming more critical competitive factors with major impact on long-term success. World-class manufacturing is no longer sufficient to remain competitive. World-class product development is emerging as the next major competitive frontier.

A few companies we know are already engaged in world-class product development. Some of their stories are in *Competing by Design*. Unfortunately, in the vast majority of companies we visit, the departments responsible for new product development are not performing well. In fact, we think most of them are out of control. They continually spend sums that are difficult to justify based on the results they achieve, they are overstaffed for the amount of real development activity that is required, they regularly fail to take full advantage of technical advances, implementing islands of automation that ignore the potential for integration, and they do a dismal job of project management—missing deadlines with predictability. Senior management is often unhappy with their performance, but is at a loss as to how to correct the situation.

Just as there was a clear movement to world-class manufacturing in the 1980s, there is a clear direction toward world-class product development in the 1990s. World-class product development will require a basic level of technical understanding and active leadership on the part of management, much the same as world-class manufacturing initiatives such as Total Quality Management (TQM) and Just-in-Time (JIT) did. What is needed is a resource for executive management that provides the information necessary to understand how to bring the product development process under control and to use it to compete effectively. This requires an understanding of how to apply the techniques and technologies that are available, as well as a familiarity with the philosophical, organizational, and strategic changes necessary to achieve success. We hope to help establish and enhance this complex level of understanding in the following pages.

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CHAPTER 1

Don't Worry: You're Not So Different

SETTING THE SCENE

One advantage of being a consultant is having the opportunity to work with a wide range of companies of different sizes and in different industries—some good, some not-so-good. Based on our experiences, we have concluded that "all good companies are similar but all not-so-good companies are different." This book looks at the characteristics of the best companies to help you make your company, good or not-so-good, into a better one.

In this chapter we will examine the similarities and differences among companies by looking at four different companies—a medium-sized electronics manufacturer, a large company with broad interests in mechanical and process engineering, a major automotive manufacturer, and a company in the aerospace sector.

Managers often feel that their company is unique. Because the product it makes is different from other companies' products, they feel that they cannot take advantage of improvements made in other companies. Of course the products are different, but many of the processes, systems, and techniques are the same in most companies, and perhaps most important, employees are human beings. In today's world cultural and organizational issues are as important as technological and product-specific issues.

As you read about the four companies highlighted in this chapter, you'll notice that although their products are different, they share many similarities. All four companies are under pressure to adapt to a fast-changing environment, all have been trying to respond to change, and all are less than happy with their results thus far. Their lack of success is provoking internal tensions, and executives are asking themselves, "What should we do next?"

These companies, like most others, are already trying to make major improvements. Many companies have a long shopping list of initiatives they wish to be implemented. These initiatives will be described in detail later in the book. They include activity-based costing (ABC), benchmarking, business-process reengineering (BPR), concurrent engineering, companywide quality control (CWQC), continuous improvement, teamwork, and Total Quality Management (TQM). There are information system (IS) initiatives such as client/server computing, computer-aided design (CAD), computer-aided design/computer-aided manufacture (CAD/CAM), computer-aided engineering (CAE), computer-aided manufacturing (CAM), computer-aided process planning (CAPP), computer-aided software engineering (CASE), computer-aided test (CAT), computer-integrated manufacturing (CIM), electronic data interchange (EDI), electronic mail, engineering data management (EDM), frameworks, object-oriented technology, simulation, and virtual reality (VR).

Some initiatives address engineering practices. They include Design for Assembly/Design for Manufacture (DFA/DFM), Early Manufacturing Involvement (EMI), Failure Modes and Effects Analysis (FMEA), Fault-Tree Analysis, Just-in-Time (JIT), Life-Cycle Design, Plan-Do-Check-Act (PDCA), Quality Function Deployment (QFD), Value Analysis (VA), and Value Engineering (VE). Some of the activities address standards and standardization. They include computer-aided acquisition and logistic support (CALS), Group Technology (GT), ISO 9001, and Standard Generalized Markup Language (SGML).

Before looking at these improvement initiatives in detail, let's look at some typical companies that are trying to implement them.

TYPICAL COMPANY SITUATIONS

Company A: A Medium-Sized Electronics Manufacturer

Company A, a medium-sized electronics manufacturer, is facing issues such as the globalization of its markets, global competition, and rapidly advancing technology. One of its major problems is how to keep its many multinational customers happy. It has had problems recently with multinational companies because it produces different-quality products in different countries. It also has had problems ensuring that the various companies and their divisions are given the correct discounts even when they order across national boundaries. The multinationals want the same product and service from Company A wherever they are operating. They also expect Company A to respond to local market conditions, which implies that Company A may have to engineer special products anywhere in the world—quite a challenge when its engineers are located on only three sites.

In the electronics sector the pace of change is rapid. Leading companies that offered five new versions of a product each year in the mid-1980s were producing ten new versions of a product each year by the end of the 1980s. Some were able to reduce the cost of a product by 30 to 50 percent over a three-year lifespan.

Motorola reduced order-to-manufactured-product time for one basic consumer electronics product from four weeks to two hours. Apple Computer reduced product development cycles from eighteen to twenty-four months in 1990 to nine months in 1993. Intel's 586, for which volume shipments began in 1993, had a four-year product-development cycle, whereas it took five years to get the 486 to market in 1990. The 586 has 3 million transistors compared to the 486's 1.2 million. Many electronics companies, such as Hewlett-Packard, now derive more than half of their revenues from products less than three years old.

In this environment, Company A's prime objectives are to increase its ability to develop new products and services and to find new ways to make and deliver them to the customer faster than competitors. Time,

not cost, is becoming the key parameter. High quality is no longer optional.

The life cycle of some new electronic products, from conception to obsolescence, is already down to less than two years. As product lives continue to fall, being three months late with a product, even a product that is cheaper than the competition's, becomes disastrous. Most customers will already have bought the competitor's product, and those who have not will be waiting for the next generation of product. Similarly, producing a product that does not meet customer requirements will lead to disaster for Company A. There will be no time for trial and error; the product will have to be right the first time.

Company A has made tremendous efforts to adapt to this new environment. It has the latest computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided testing (CAT) systems and has invested in new manufacturing facilities. Performance has improved, but nowhere near as much as it must if Company A is to remain competitive.

In analyzing some of its recent initiatives, the company noticed that in the 1980s and early 1990s attempts to make changes tended to be uncoordinated, project-oriented, noninterrelated, and nonsustaining. For example, one vice president would push the idea of strategic IS, while another tried to do TQM, and someone else did fuzzy logic.

These initiatives were not integrated, and in practice the resulting activities sometimes conflicted. By the time these initiatives filtered down the hierarchy to practicing engineers, they often had already been diluted, the next initiative was known to be on its way, and no one could be motivated to change their behavior.

A great deal of effort and money has been invested in the attempt to change, but the result has met no one's expectations and has left some people very unhappy. Top management has concluded that the engineering department is an unmanageable black box, a black hole that sucks up dollars that are never seen again. It now believes that engineering doesn't understand the business environment—that it lives in an ivory tower. Not only is engineering habitually late with new products, but the software that it develops to go in the products is 90 percent of the time more than three months late and always full of errors. Forty percent of engineering's efforts go into fixing the bugs.

Top management has been devastated by engineering's refusal to come out of its ivory tower and talk to people in other departments in the company. The engineering department has refused to talk to the corporate management information system (MIS) department and mocked the performance of the research department and the shop floor. The only good thing the engineers ever said about the sales people was to compliment them on the speed with which they got coffee served in customer meetings. They have had little respect for marketing since the marketing VP was seen polishing his shoes on the backs of his trouser legs when an important customer turned up unexpectedly.

At times engineering has admitted it isn't perfect. Engineering management admitted it sometimes wasted a lot of time putting too much effort into the wrong project and then not receiving the expected payback for their investment. However, engineering management believe the real problem lies with top management. Top management responsibilities change frequently. Because managers are moved around before initiatives and projects are finished, they try for easy short-term success and leave the long-term problems to the next guy. After starting something with a bang, a few months later it would disappear without even a whimper.

Engineering feels that top management is dominated by bean counters—namely, the financial controller who runs the business and puts together plans and budgets. Although he does this very well, he lives far from reality in a world of figures on paper. Engineering claims he doesn't understand the customers or the products and thinks they don't really matter: to him everything's just another financial management problem to be resolved by a spreadsheet. Top managers are generally so busy looking at these figures that they don't have time for the customers and products. Engineers claim that top managers use the wrong measurement systems to judge performance. The main indicator for engineering performance is engineering headcount and not productivity or customer satisfaction. Engineers complain they rarely are involved in decision making and, moreover, that top managers have a macho style—that they want to make all the decisions, even when they clearly are not competent to do so. They feel there's no attempt to get a consensus—that the big cheeses just lay down the rules and everyone is expected to obey.