



The New Product Development Imperative

I. Product Development Capability as a Sustaining Strategy

Traditional approaches to running and growing a business favor sophisticated strategies, or perhaps marketing prowess, to bring the company to the leading edge of its industry. However, by focusing on effective new product development a compelling solution to the problem of survival and growth, with a different emphasis than the traditional one, becomes apparent. In this prescription, creating and applying the product development skills and capabilities of the firm play a central role. By continually enhancing its development capabilities, the company is able to reinvent existing product lines as well as create new ones, and thereby achieve market leadership: it beats its competitors to the market with the “right” product. The company that continually refines these capabilities creates its future. The company that doesn’t may find itself reacting to competitive and market stimuli using ad hoc fire-fighting skills. Indeed, for the latter company, the time necessary to plan for the future may never be available.

The ability to systematically and quickly reinvent distinctive products and processes may be the optimal way for many companies to compete. Customer expectations, technology and competition are dynamic factors which mean that existing products will have a limited lifetime and either need to be significantly improved upon or replaced altogether. Outstanding new product development can provide a company with just the vehicle needed to meet these challenges. Through product offerings which continually evolve, a company can satisfy a dynamic rapidly changing set of customer needs and stay out in front of its competitors (see **Exhibit 1**). The smaller competitor with outstanding development capabilities (e.g. short development cycle times and effective resource allocation) can win the race against much larger, better-resourced but slower, less productive, opponents.

Research Associate Edward Smith prepared this note under the supervision of Professor Steven C. Wheelwright as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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Exhibit 1

Forces Driving Development Imperatives

Driving Forces		Development Imperative		Implications
1. Intense competition; changing customer expectations; accelerating technological change	⇒	Fast and Responsive	⇔	Shorter development cycles; better targeted products
2. Exploding product variety; sophisticated discerning customers; technical diversity	⇒	High Development Productivity	⇔	Leverage from critical resources; increased number of successful development projects per engineer
3. Demanding customers; crowded markets; intense competition	⇒	Products with Distinction and Integrity	⇔	Creativity combined with total product quality; customers integrated with truly cross-functional development process

While the promise of product development is increasingly viewed by most managers as substantial, the reality is that development efforts most often are frustrating and disappointing both to the individuals involved as well as to senior managers. Underlying this disparity between promise and reality is a set of common misconceptions regarding the planning, direction and execution of development projects. It's not only that firms often lack a set of "correct principles" to guide their development work, but they systematically follow a set of "incorrect principles" which hamper their efforts. Examples of the latter mode of operation, and the likely outcomes, are summarized in Exhibit 2.

In contrast, for the company that recognizes the strategic importance of outstanding product development capabilities, and that adopts a set of efficient, effective principles to guide its development work, the benefits can be huge. To help structure management's thinking about product development, it's useful to consider the challenges as three fold. First, the company has to create the right set of development projects. Second, it has to execute those projects on target, on time and on budget. Third, the company must capture the lessons learned from each project so that capabilities for future projects are developed which enable it to respond to, or even pre-empt, changes in consumer expectations, technology, and competition. Through disciplined application of processes which support these three objectives over time, the company can become systematically better and faster at product development and play an increasingly proactive role in determining its future.

Exhibit 2

Examples of “Incorrect Principles”
(Obstacles to Outstanding Development Capabilities)

Myth	A Probable Outcome if Applied
<ul style="list-style-type: none"> Management should select from proposed projects. 	<p>Development strategy created by a random process – disconnected from company objectives</p>
<ul style="list-style-type: none"> Portfolio of projects should exceed capacity 	<p>Over-commitment of resources means that completed projects are late, over budget and inferior</p>
<ul style="list-style-type: none"> Dynamic environment requires frequent changes in priorities 	<p>Increasingly reactive to the environment (e.g., a competitor’s moves and feigns); the company’s trajectory is chaotic</p>
<ul style="list-style-type: none"> Individuals should work on multiple projects concurrently 	<p>People are over committed and ineffective; disenchantment and inefficiencies grow</p>
<ul style="list-style-type: none"> All projects should follow the same process 	<p>Putting a square peg in a round hole—projects with different needs receive the same prescription.</p>
<ul style="list-style-type: none"> Cannot compare projects—each one is unique 	<p>Experience from one project cannot be applied to another; new development projects “reinvent the wheel”</p>
<ul style="list-style-type: none"> Repeated Go/No-go reviews lead to better project results 	<p>Delays propagate through project phases; deliverables are late</p>

II. A Revolutionary Development Strategy—Creating the Right Set of Projects

Where exactly a company chooses to pursue growth and apply its development capabilities is the starting point for defining a development strategy. Generally, there are three different areas where the company’s attention can be focused: new product development, new customer development (in the existing market), or new market development. For example, when an existing product is no longer competitive, or the market in which it’s sold is saturated, a company may supplant old products with new ones to maintain or increase market penetration. Alternatively, a new product designed to complement an established line can leverage existing products and broaden the company’s offerings while taking advantage of existing technology, channels and customers. Or an existing product, as well as new ones, can be leveraged for entrance into a completely new market. Deciding what combination offers the best solution to the problem of sustainable profits and growth

is the challenge. Increasingly, companies are finding that a set of development principles – operationalized through a series of concepts and tools – can help management address these important issues (see **Exhibit 3**).

Exhibit 3 Concepts and Tools for Creating the Development Portfolio
(8 steps towards building outstanding development capabilities)

Concepts & Tools	Description
<i>Pre-Project</i>	
<ul style="list-style-type: none"> • Characterizing project types 	A common language is established by defining types of development projects; each project's contribution to the larger strategic framework becomes evident
<ul style="list-style-type: none"> • Strategic choice of project mix 	Creating by design a development portfolio that is aligned with the company's objectives
<ul style="list-style-type: none"> • Creation of road maps 	Linking and sequencing the individual projects in the project mix; mapping out the evolution of future product generations
<ul style="list-style-type: none"> • Aggregate Project Planning 	The big picture: managing the strategic project portfolio
<i>Project Execution</i>	
<ul style="list-style-type: none"> • Type of project team 	Building a development team that is matched to the project type; nurturing the teams that will be executing tomorrow's development projects
<ul style="list-style-type: none"> • Prototyping 	Monitoring project performance and status relative to established targets; testing market realities and consumer acceptance
<i>Learning from Projects</i>	
<ul style="list-style-type: none"> • Project audits 	Post project analysis of performance to capture know-how; creating effective processes for future development projects
<ul style="list-style-type: none"> • Learning across projects 	Building process capabilities as a means for competitive renewal; building confidence and enabling repeated success

Platform A platform project establishes the next generation of a product line and usually represents a systems solution to a product challenge. For example, anticipating that its laptop computer would cannibalize sales of its lowest performance desktop model, a computer manufacturer thoroughly redesigned the desktop line to make its features and performance more distinctive. The new platform would use the latest microprocessor architecture to achieve the performance boost, which in turn would require significant changes in the computer's motherboard and substantial re-engineering. Furthermore, recent technological advances in multi-media hardware and in communications protocols would be incorporated, and aesthetics would be changed to ensure product distinction from the previous desktop generation. Though technological features of the new generation platform would have much in common with the previous one (facilitating a seamless transition for customers), it represented an integration of new product functions and features, as well as the development of new manufacturing processes. As a result of the project's broad scope, a multi-functional effort would be needed to carry out the necessary development activities and would require about one and a half years to complete. Though these types of projects represent a significant investment, especially for a small company, a well-designed platform can be the foundation for derivatives for many years to come and thus should have a major impact on the company's future.

Derivative Derivative projects are undertaken when an incremental change to an existing platform, or an existing product's manufacturing process, is required. The result may be an added feature or even reduced cost. This is a less demanding type of project since changes involved are limited in scope and require fewer resources to affect (the platform version of the product has already defined many of the development choices). An example of a derivative project would be the introduction of a "faster" laptop computer by replacing its microprocessor with a faster version of the same chip. Another derivative based on the same platform, but "slower", could address the lower end of the market. In this example, the derivatives are classified by the speed of the laptop's microprocessor chip (e.g. 200 megahertz versus 300 megahertz). Other simple modifications could be used to create even more derivatives however: the 350 megahertz model might come with a standard 8 gigabyte disk drive, a smaller lower cost 4 gigabyte drive, or a larger more expensive 10 gigabyte drive. The key factor is that new features can be added easily to the existing platform to specifically target the needs of smaller and smaller markets. The limited scope of derivative projects means that the development team can pursue its activities with limited supervision, relying instead on existing procedures for guidance. These types of projects can typically be completed by small functional teams in just a few months.

Maintenance This is the simplest type of project and encompasses improvements in, or maintenance of, existing products and processes. Often this includes projects which result in increased manufacturing efficiencies, reduction of chronic low-level problems and reduction of manufacturing costs. These projects are performed by small functional teams.

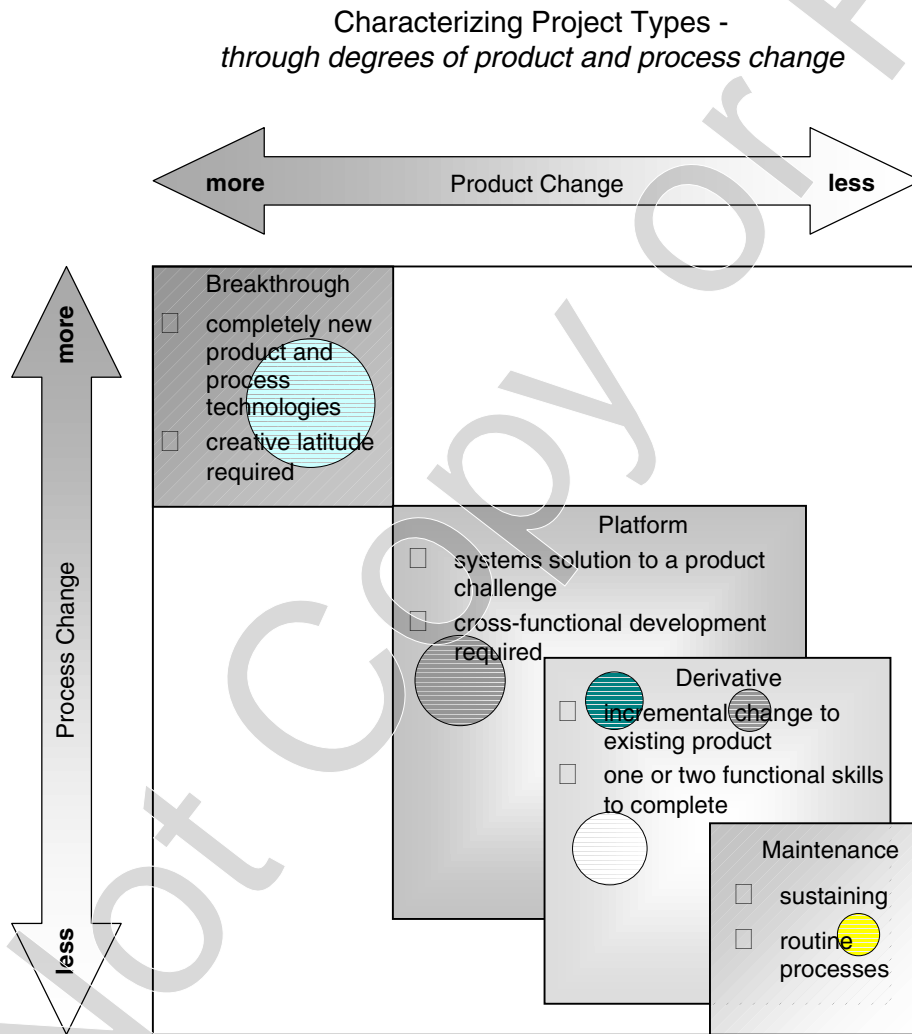
While "the degree of product change" embodied in each individual development project is a primary dimension for distinguishing project types, adding one or more secondary dimensions can often provide additional insight and guidance. Possible candidates for this second dimension would include: degree of manufacturing process change, degree of delivery channel change, and degree of change required by the customer's processes. Which of these continuums will be the most helpful complement to the primary continuum – degrees of product change – depends on the product, the market and the company's strategy.

Many manufacturing firms have found "the degree of manufacturing process change" to be a particularly useful second dimension. The result is a two-dimensional graphic as shown in **Exhibit 5**. Although an "on diagonal" project mix is not essential, it is the most prevalent. Projects in the upper right seldom are attractive, because to capture the full benefit of manufacturing process change usually requires significant product change (i.e. getting enough bang for the buck). Projects in the lower left are infrequent, because dramatic product change generally requires significant process change in order to deliver the full power and feature benefits of the new product.

A two-dimensional display of project types can be used not only to guide the definition and discussion of future projects, but also to assess the current portfolio of projects. For example, each project might be represented by a circle and positioned on **Exhibit 5**, with the location indicating the degree of product and process change and the size of the circle indicating the amount of resources

required for each project. Some companies have then found colors a useful way to show which projects are early, on time or late, or to show which projects are under, on, or over budget. Such analyses can help identify biases and trends, and focus management attention on needed improvements.

Exhibit 5 The four primary types of projects differ in the degree of change they require in product and process technology. Circles are used to indicate the location and size of individual projects within the product/process change framework.



Continual Improvement of the Definitions of Project Types

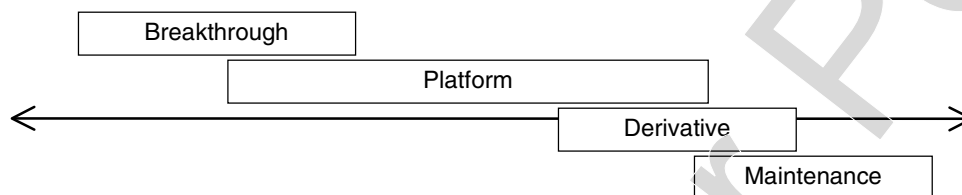
For firms which have developed a process for classifying projects, many have learned over time that the definitions of project categories become even more useful as they are narrowed. Conversely, the greater the overlap between project definitions, the greater the confusion that is likely to result. When definitions are narrowed, a precise language is established that provides for efficient, effective communication with everybody “on the same page” when they plan and discuss projects.

Exhibit 6 characterizes the evolution in definitions that has occurred in many firms over time and over several generations of product.

Refining Project Definitions over Time

Exhibit 6

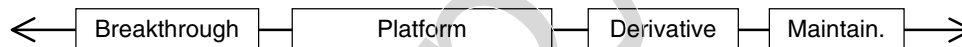
Phase 1: Overlapping



Phase 2: Mutually Exclusive



Phase 3: Focused



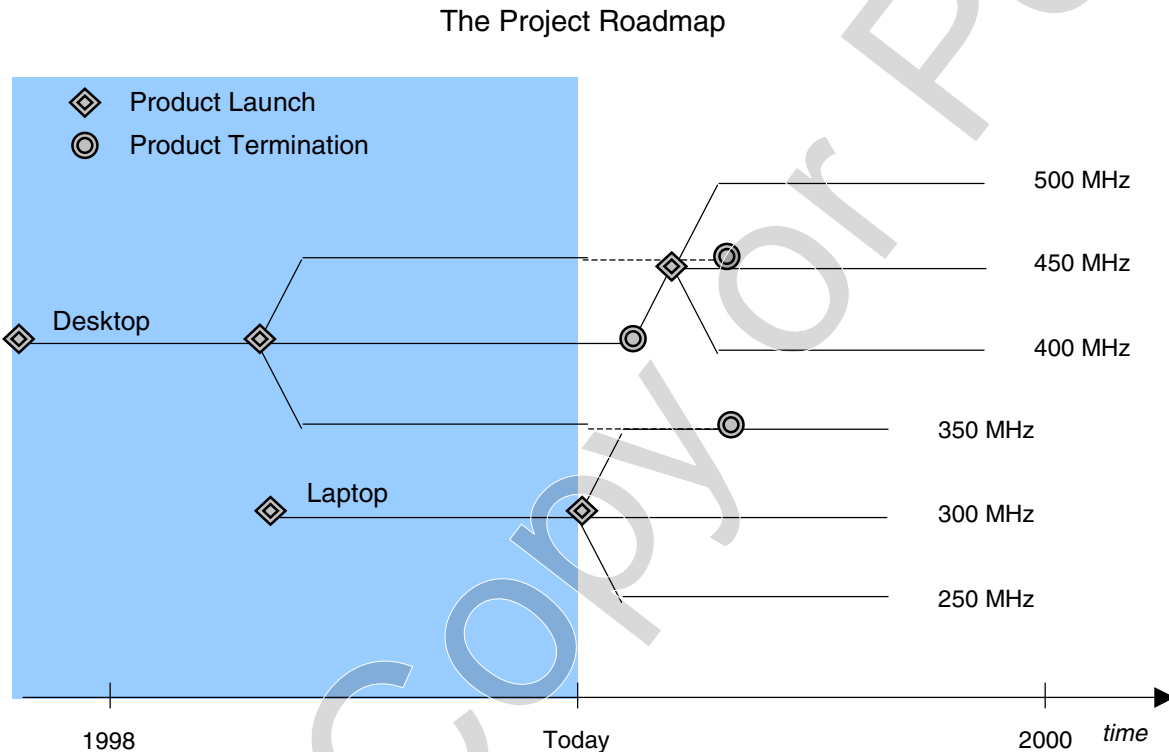
Planning the Firm's Future as its Product Line Grows

The number of development projects and the mix of those projects that a given firm can pursue simultaneously depend on several factors. These include the resources available, the firm's strategy and even the age of the firm. For most startups, development efforts are focused initially on one major project – one that will lead to a product around which the company can build its business. Hopefully, this core product will be the basis for the firm's product line. If this core product is well designed, successful derivatives will allow the company to grow and expand the market space it can address, ultimately resulting in a stronger market position as well as a greater market share.

No matter how well designed the firm's core product is, however, it has a finite useful life span. To remain competitive, and to address a greater part of the market, the original core platform will have to be improved and possibly additional platforms with their accompanying product families will need to be added. Before long, the successful firm finds itself having to decide when (and how often) to design the next generation of an existing platform, how extensively to leverage each platform, and when (and how many) new platforms to add. These are critical development decisions because they will determine the resulting product lines offered by the company.

Paradoxically, given the need for evolving and growing product lines, most firms find themselves with far more project possibilities than their development resources will allow. Management must think carefully about the portfolio of projects that will utilize its resources effectively and provide the results called for by the firm's business strategy. One of the tools that can assist management in this effort is the creation of a project roadmap that outlines the platforms and derivatives over time and graphically illustrates their interrelationship. An example of a scenario for a desktop/laptop computer manufacturer is shown in Exhibit 7.

Exhibit 7 This exhibit shows what the development roadmap might look like for a planned line of desktop and laptop computer derivatives based on microprocessor speed. The expected market launch and termination dates of the desktop and laptop lines are shown through the actual development projects would begin well in advance. Note that shortly after the introduction of the 350 megahertz (MHz) laptop derivative, a redesigned desktop platform would be introduced.



Linking Strategy to the Project Mix

The project roadmap can assist management in capturing and learning from its past development experiences, and help it in applying those lessons to future projects. Indeed, the real power of the roadmap is a prescriptive one: through a strategic choice of development projects the company can proactively determine its future sequence of projects rather than simply responding to individual project proposals. If those working on product development know the business strategy and how it translates into a project roadmap, they're much more likely to identify, define and propose projects that fit the roadmap and thus complement the strategy.

Once project types or categories are defined and narrowed within a firm, the mix of projects can be specified that will support the business strategy, and put into action the project roadmap. The project mix provides an additional tool to help management insure that the best set of projects get proposed, approved and executed. How this might work is illustrated in **Exhibit 8**. Each of the three columns – A, B, and C – represent a mix of project efforts (i.e. business strategies) tailored to a particular business. For example, in Business A, 60% of the development resources are allocated to breakthrough projects, 25% to platforms and 15% to derivatives. In contrast, Business C allocates 60% of its development resources to derivatives, 35% to platforms and 5% to breakthroughs. Business A's allocation is consistent with a high tech start-up wanting to compete on the "leading edge", whereas Company C's allocation is consistent with a strategy for a mature, broad-line business. Company B clearly is focused on platforms with some derivatives, but limited breakthroughs.

Exhibit 8 Three different business strategies.

**Achieving Business Strategy through the New Product
Development Project Mix**

Types of Projects	Business A Strategy	Business B Strategy	Business C Strategy
• Breakthrough	60	10	5
• Platform	25	60	35
• Derivatives & Maintenance	15	30	60
	100%	100%	100%

For each individual firm, each type of project will have a representative scope, size and duration if the firm has clearly defined each project type. Knowing those definitions, the total development budget and the desired project mix for the business, management can determine how many projects of each type it can undertake in a given period of time. For example, for a firm like Company B in **Exhibit 8**, they might find they can do 0.5 breakthroughs per year, 3.5 platforms per year, and 7.0 derivatives per year (since each derivative project is much smaller than a platform or breakthrough project). Creating the project mix, and identifying the needs by project type, will force management to address its limited resources. With a formal position established, management has a point from which an analysis of its development strategy can begin.

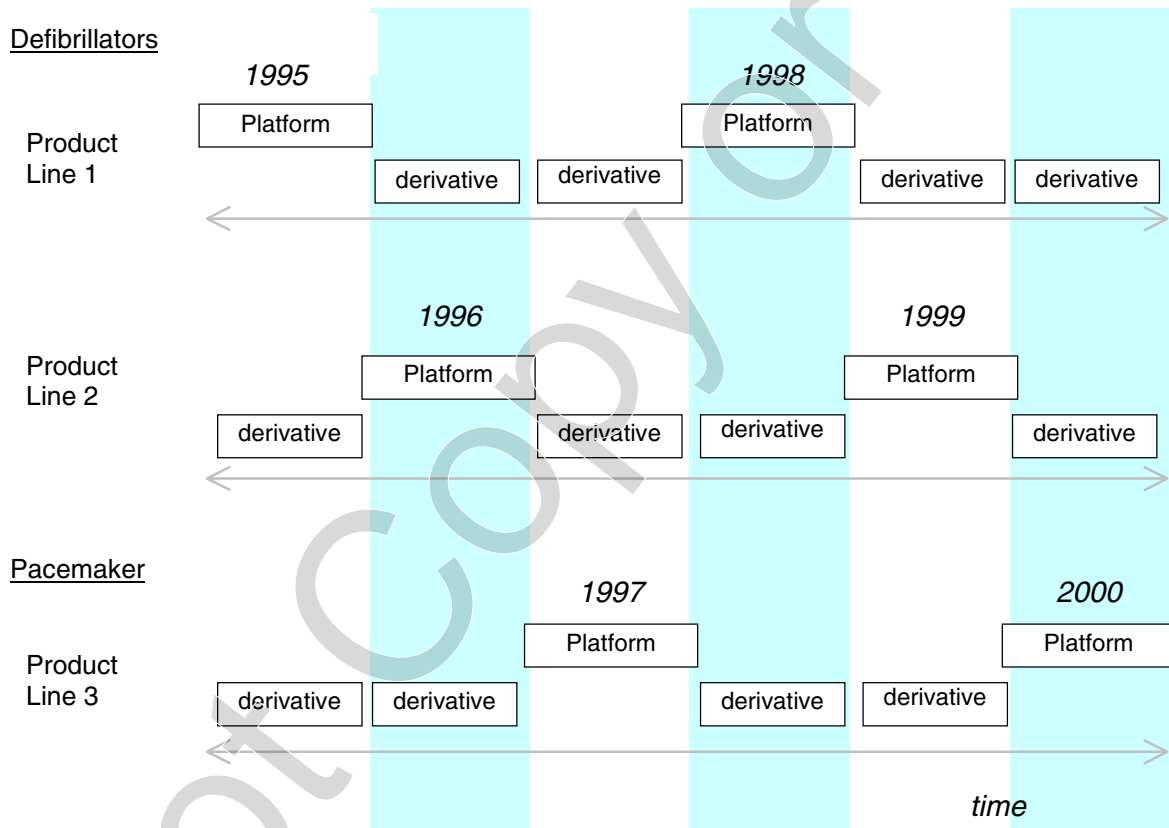
The Aggregate Project Plan

The purpose of the Aggregate Project Plan (APP) is to bring together the definition of project type, the overall project mix and the project roadmap. In combination, this set of tools enables management to:

- Link the set of development projects directly to the business strategy
- Fit the development efforts to the available resources
- Relate the development projects to the product lines and the markets served
- Guide decision making regarding the creation, chartering and resourcing of new projects.

Once these tools become established in a firm, management can use them to set up a schedule of anticipated new product launches. Some firms refer to this as the “development train schedule” since it establishes the timing, mix and number of “trains” (development projects) leaving the “station” (being launched by the company). **Exhibit 9** illustrates such a project schedule for CPI, a firm in the heart rhythm management business. This exhibit is specific to the CPI product lines and markets, and it accommodates the realities of the FDA approval process to which the company’s products are subject. However, for CPI, it represents a major step forward in making development planning a proactive effort geared toward the firm’s business strategy.

Exhibit 9 Sequencing Projects*:
Creating projects plans with rhythm and discipline



Defining the Contents of Individual Projects

Having developed a road map and aggregate project plan for the portfolio of development activities that the company desires to complete, it still remains to decide the scope and objectives of each individual project that will be pursued. This entails gathering data regarding customers, markets, competitors, and company capabilities to determine what should be the focus of each individual project. However, it also requires considerable judgment and intuition because seldom is all the information available that would be desirable.

* From *Cardiac Pacemakers, Inc. (A)* (see endnote)

Most firms find that a variety of approaches are needed in order to gather as much useful data as possible. Included would be customer and distributor focus groups, targeted market research studies, industry reports, advice from experts and systematic discussion among those in the firm who best know the customers. In addition, getting input from the board of directors, picking a lead customer to partner with, testing new ideas early and often with potential customers, and working with user groups can be important.

The challenge is to identify those product and system characteristics that will best meet the customer's needs and distinguish the firm's products from those offered by its competitors. However, this must be done within the bounds of a given project type as well as the firm's specific development experience. For example, most firms with a history of breakthrough products have learned that no more than one or two major new ideas should be incorporated in a single project. Furthermore, it's imperative that "proof of feasibility" be demonstrated before those new ideas are included in the project. For platform projects most firms have found that three to five major new features are the limit and that such projects most often should be thought of as next generation "systems solutions" to the customer's problems, not simply as a set of better features. Finally, derivatives need to be limited to only a few relatively modest modifications so that they can be done quickly and expeditiously in order to meet the needs of a specific large customer or a special sub-segment of the market. These principles or rules can help focus data gathering tasks in the smaller firm and reduce the likelihood of "wheel spinning" and endless "analysis/paralysis" that often occurs in larger firms.

The output of this set of activities (e.g. assembling focus groups, market research studies and vigorous dialog) should be a "charter" which guides each individual development project. While many firms choose to include selected dimensions on the desired product specifications in such charter statements, an increasing number of companies have concluded that what is most important is ensuring that the criteria for project success are clearly identified in this "determination of content phase", but that it may be undesirable to establish the specifications in too much detail. These firms have learned that detailed project specs can become too constraining in the case of breakthrough and platform projects, and may limit unnecessarily the creativity and innovativeness of the development team. For example, a platform project charter might be as specific as "success in this product will be its adoption by ten of the top twenty customers within the targeted market segment during the first twelve months following product launch, with gross margins in excess of 40%". It would then be left up to the platform development team to determine what features and content of the product would be most likely to achieve that targeted performance.

In contrast, for a derivative project the charter might be "this project will be deemed a success if it includes the highly desired feature, A, B and C, and if customers, X, Y and Z select us as their primary source of supply for this product within six months of the new product launch".

Finally, in considering the challenge of being market and customer driven in product development, it is important to recognize that the market is a moving target and the longer the project takes, the more the market will have moved. Thus building into the project execution, the need for periodic customer input and reaction to ideas and prototypes is imperative. The rule should be "get input early and often". Even when useful customer responses have been obtained and prototyping performed, however, management's judgment and intuition is also required since most customers have exhaustive wish lists, and priorities and objectives which are different from the company's. Consequently, while continual market input should be sought, it must be filtered, tested and evaluated, not simply accepted as "truth".

III. Outstanding Project Execution – Two Imperatives

Having created and approved an appropriate set of projects, project execution becomes the focus of management's attention. If pre-project activities have been done right the scope, purpose and duration of each development project will have been established. Next, the resources needed to effectively complete each project will need to be provided according to type and priority. While there are numerous tools and techniques available to assist in effective project execution, two of the most

important for development projects are building a project team matched to the project type, and adopting an effective prototyping philosophy.

Creating the Right Team for the Project Type

In today's world, teams are "in". However, teams come in a variety of different forms and vary in size, expertise and often exist only as long as the individual project lasts. One way to characterize a team is by how it deals with three principle dimensions of decision making:

- The extent to which the team decides what is to be done (i.e., how tasks are carried out)
- The extent to which the team controls the resources needed to complete the project
- The nature of performance measures used to evaluate the teams and its project results

The types of teams considered for development projects can be arrayed along a continuum from functional (where those working on a project remain in their function and have only a functional role on the project) to autonomous (where the team has its own location and is its own stand-alone organizational entity). Between these two extremes are the types often referred to as "lightweight" and "heavyweight" teams. These designations reflect the extent of their authority and responsibility regarding the three dimensions highlighted above (see **Exhibit 10**).

Functional This represents a "traditional" team structure, with individual team members answerable to their respective function heads. Indeed, their placement on the team is temporary. When the project is complete, the team is disbanded. This type of team can be very effective for projects which can be subdivided into functional subprojects or on projects requiring deep technical knowledge. The team's overall performance often is not judged directly – instead each individual team member is judged by his or her functional manager based on conformance to established processes and procedures and overall "functional excellence."

Lightweight In its most common form, one functional project manager has oversight over the entire lightweight team. This adds a degree of coordination to the team's effort not often found in the functional team. However, like the functional team, individuals continue to be focused primarily on their function, not on overall project results. Individual members of a lightweight team are still answerable to their primary functions, and the project manager has little control over the resources used, the major decisions, or in establishment of targets, deadlines and performance measures.

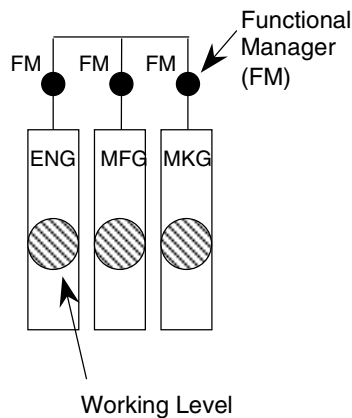
Heavyweight Team members are still "identified" with their various functions, but their primary responsibility for the duration of the project is to the development team with each member reporting directly to the heavyweight team leader. The team leader is a "heavyweight" in the company, typically with as much authority as senior function managers. As a consequence, the team has more control over the resources used, the decisions made, and the targets established. The team is evaluated on its delivery of the project objectives.

Autonomous The autonomous team has a truly integrated cross-functional structure, and is designed to handle the most challenging development projects whose parameters are difficult to define. These teams have the most entrepreneurial spirit of the bunch — they are chartered to do what it takes to deliver the desired results. The team is given control over the resources necessary to complete the project, and usually is free to determine the team's operating procedures. It is evaluated based on results, not on adherence to processes like the functional or lightweight teams would be. The team is free to solve problems in real time and has the authority to make strategic as well as tactical decisions without bureaucracy and unnecessary overhead.

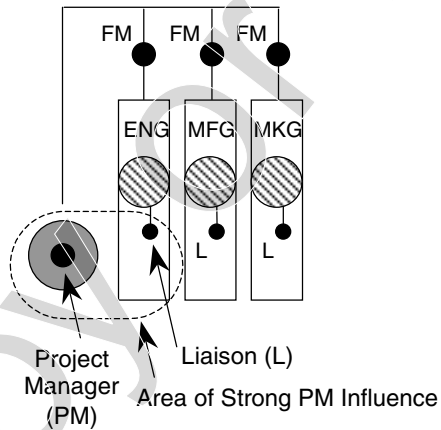
Exhibit 10 Four levels of teams are depicted here: functional, where the work is completed in the function and coordinated by functional managers (FM); lightweight, where a coordinator works through liaison representatives (L) but has little influence over the work; heavyweight, where a strong leader exerts direct, integrating influence across all functions; and autonomous, where a heavyweight team is removed from the function, dedicated to a single project, and co-located.

Types of Development Teams

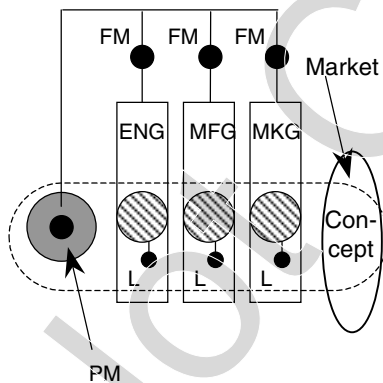
1. Functional Team Structure



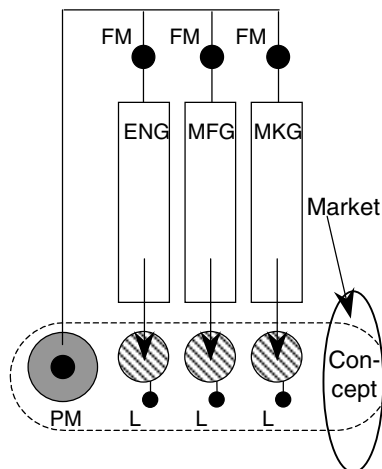
2. Lightweight Team Structure



3. Heavyweight Team Structure



4. Autonomous Team Structure



Each of these team structures has its strengths and weaknesses (see **Exhibit 11**). Based on the business strategy pursued, each company usually will have a dominant development focus with an associated dominant project type and team structure. For example, the small company betting on the commercialization of a cutting edge technology, might adapt business strategy A in **Exhibit 8**, and choose to have 60% of its resources committed to a breakthrough project: with the dominant team structure being autonomous. In such circumstances, the development team is likely to be a primary driver of much of the company's activities. Thus the team has great latitude and influence on decision making, with other parts of the company organized to support its efforts.

Exhibit 11

Project Team Types
(Their strengths and weaknesses)

Team Structure and Associated Characteristics	Strengths	Weaknesses
<p><u>Functional</u> (traditional): Team members work under different functional managers; projects evolve in a serial fashion as tasks pass from one function to the next.</p>	<ul style="list-style-type: none"> • Brings functional expertise to problem solving • Function managers control resources for the tasks they own 	<ul style="list-style-type: none"> • Judged based on adherence to function processes rather than overall project results • Lack of coherence between functional tasks on complex projects; serial processing • Cookie cutter approach to solving varied problems
<p><u>Lightweight</u>: Heightened degree of coordination due to “administrative” oversight; similar to a functional team</p>	<ul style="list-style-type: none"> • Same as functional • Oversight of collective functional responsibilities helps ensure timely project completion 	<ul style="list-style-type: none"> • Same as functional • The lightweight manager has little organizational clout and little power to affect critical decisions
<p><u>Heavyweight</u>: Core team members are representatives of their functions on an integrated development team; heavyweight manager is a heavyweight in the organization</p>	<ul style="list-style-type: none"> • Heavyweight manager has broad control over the decision-making processes, resources used and targets established 	<ul style="list-style-type: none"> • Team members still report to functional head; rewards and responsibilities are disconnected from project deliverables • Political tightrope - project manager has about the same stature as functional heads
<p><u>Autonomous</u>: Team members are co-located and answer only to the heavyweight project manager; the team has extreme latitude to devise solutions to the problems it has responsibility for.</p>	<ul style="list-style-type: none"> • Focus: no conflicting forces pulling at team members • Speed and ability in solving challenging, novel problems • Complete functional integration- the broadly skilled team is independent 	<ul style="list-style-type: none"> • Less corporate control; team tends to expand on original project description • Little use of existing process solutions • Unique product and process solutions may be difficult to integrate into existing business

Conversely, a larger company with more than one established product line might following business strategy B. Their focus is on a series of platform projects with each being staffed with a strong heavyweight team. Strong project management, as well as collaboration with the functions, ensures that the new platform being developed will be aligned with the company strategy, yet make effective use of existing processes and technologies. The heavyweight, as well as the autonomous, teams have market responsibilities within their scope of accountability (see Exhibit 10), which is essential if they are to be judged on market results.

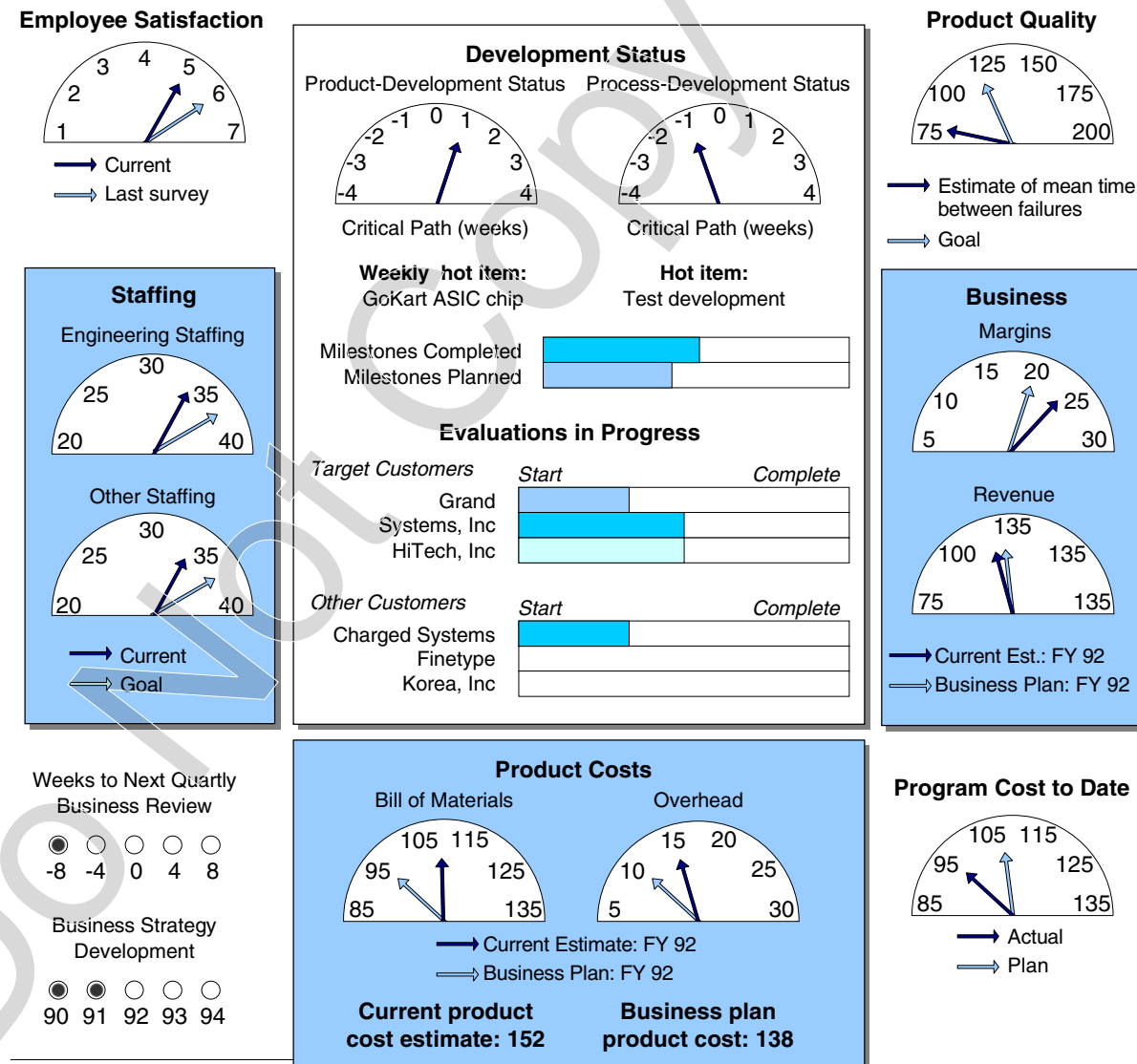
Finally, a firm pursuing business strategy C (typically a large firm with multiple existing platform-based product lines) would likely do many derivative projects with only an occasional

breakthrough or platform effort. Their primary organization structure is likely to be functional, making it natural for them to use mainly functional and lightweight development teams. Such a company would have the option of using an autonomous team when pressed to do a breakthrough or platform project.

Effective Communication: Schedules and Timing

Once a project is underway, both the team and senior management need a way to track and respond to project progress. While a defined process that breaks the development effort into phases and milestones is very useful, equally important for breakthrough and platform projects is providing timely information on the status of key aspects of the project. Chris Meyer has proposed the concept of a dashboard as one way to do this (see Exhibit 12). This comprehensive indicator, much like the dashboard in a car or plane, displays for both project members and company management alike the status of key activities in the project. Many companies have found this a particularly useful tool for development project management.

Exhibit 12 The Project Team Dashboard*
(A comprehensive performance indicator at one company)



* From Chris Meyer, *How the Right Measures Help Teams Excel* (see endnote)

Linking Development Project Phases to Prototype Cycles

One other tool that has exceptional leverage in executing development projects, but which is often underutilized, is prototyping. A prototype cycle consists of three steps – design, build and test (DBT). Early in a project, prototypes may be simple mockups, simulations or breadboards, whereas later on they may involve pilot production builds.

The DBT cycle embedded in prototyping is a critical tool for helping determine what design will best meet customer needs and how the company can best produce and deliver that product. It does this by providing a representative model for testing not only the product's physical and functional attributes, but enables customers to provide specific feedback, facilitating the company's own development of its operating processes and procedures. It also is a communications tool, between various functions and between the development team and management. When prototyping occurs in conjunction with each phase of the project, it provides an excellent reality check on the status of the project, what is and isn't resolved, and how well the project is progressing towards targeted objectives.

For most firms, prototyping is a grossly underutilized tool for managing development projects. By better planning and execution of more frequent prototype cycles, a team can quicken the pace at which it moves to a final design, and increase the likelihood of success by using it as a vehicle to gather ongoing customer input (by letting them review and evaluate prototype units) and to test the rest of the organization's readiness to support and deliver this new product.

Project Staffing and Career Development

Human resources selection, training, and development policies need to complement the future development strategy of the company (e.g. provide the right mix and quality of skills for the company to meet its development objectives). For many companies, when it comes time to staff a development project they find they have a major shortage of people with the breadth and experience called for.

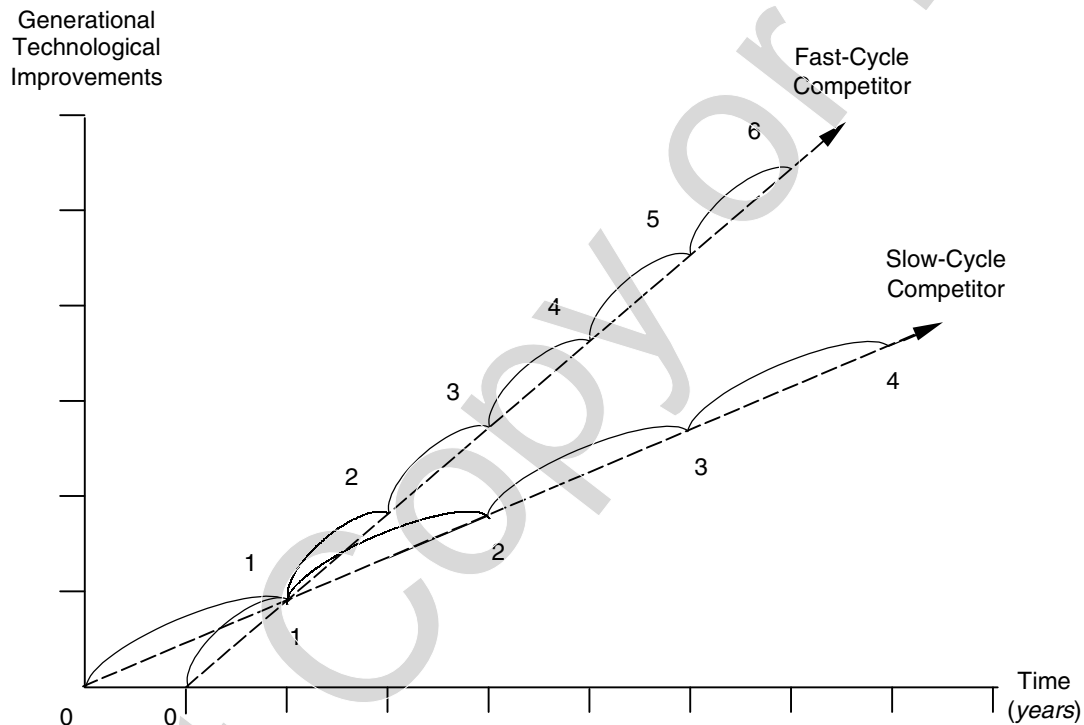
Development projects can be used not only to create new products, but to train people and build the breadth and depth of their skills in important managerial and functional areas. Less experienced employees, or newly hired ones, often start on derivative projects where job functions tend to be narrower and less complex. Next, they might move onto platform projects as a core team member where they represent both their function and the team. Then they might be assigned to lead a development team on a derivative project. Finally, they might be asked to lead a major project. On-the-job training and associated career development paths are an essential tool for a company wishing to create a significant capability in new product development.

Critical in staffing development projects is having a qualified cadre of project leaders. This is especially critical for the execution of platform projects where several functions and a comprehensive set of tasks must be integrated and managed. In recent years, many firms have adopted heavyweight team structures for such projects. However, far too often they've failed to select a heavyweight project leader with the requisite experience, skills and credibility. Shown in **Exhibit 13** are several of the characteristics that distinguish heavyweight project managers, and when present, do much to assure the success of a project.

Exhibit 14. While customers buy the products and services created by these firms, what makes their advantage sustainable is the fact that every project significantly improves the development capabilities of the firms.

Exhibit 14 This example compares two competitors who incorporate similar amounts of technological change in each generation of product, but the slow competitor lets twice as much time elapse between product generation introductions as does the faster one. Note the fast cycle competitor starts one year after the slow cycle competitor .

Getting on the Right Development Trajectory



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