



Strategic R&D Planning Process Guide

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7 May 2010

Overview

This document describes one of the techniques that can be used to establish a multi-year strategic R&D product and investment plan for businesses with existing active product lines. Many successful companies have had products in the market for a substantial period of time and find they need to update their business plans to accelerate revenue growth and profitability. These companies must respond by identifying a path to meet these new challenges and take advantage of the resulting opportunities.

To accomplish this, a technique based on “portfolio management” can be applied. Portfolio management in this context is essentially the art of defining a product line roadmap and determining the necessary investments while taking into account both maintaining the current product line profitability and creating the desired next generation products. It involves determining business demands for the current product line, identifying limitations to current products that prevent achieving business goals, and devising plans to correct the critical limitations while implementing parallel plans to deliver a higher value next generation of products and services.

A Typical Scenario

The product line has been in the market for many years and during that time has been updated and modified incrementally to add minor new features, keep production running, reduce costs and improve reliability. The product remains profitable, but the current architecture makes it very difficult to incorporate more cost / performance-effective technologies that could radically enhance product functionality, value and profit. The age of the design is also creating manufacturing issues arising from obsolescence and single-sourcing that are becoming more and more difficult and costly to resolve.

Finally, competitors seem to be catching up, and the cost structure and functionality of the product must be dramatically improved. It becomes impossible to continue to update and modify the current product to meet these demands. Only a completely new product will achieve the desired business goals. Unfortunately, until this new product is available, the existing one must support the company. Customers can not be spooked with fears that the current product is obsolete or revenue could slow down and possibly disappear. Plans are needed to make the current product as stable as possible at an appropriate investment level while the next generation is developed.

How do successful companies respond to these concurrent demands?



The Development Challenge

The key question is how to determine *what investments* to make in *which improvements* to the current product to enable the company to meet their short term goals while in parallel defining and developing a next generation platform that will permit their long term goals to be achieved with maximum profit. A systematic process is required to ensure that the best decisions are made and that the rationale for those decisions is recorded. The process must also be flexible so that it can be adjusted and updated as resulting product development projects move forward in time and new information is uncovered.

The following process is designed to address these needs. The necessary tasks are not sequential in nature, and many can be accomplished in parallel. The process is iterative and will require multiple passes to achieve the desired results. Uncovering requirements and prioritizing them almost always impacts some other item that was already defined. The key is to cycle through the tasks until the rate of change is low enough that the resulting estimates are close to, but not necessarily completely, stable. The goal of this set of activities is to get to an 80% confidence level, not 100%.

Remember the 80/20 rule: 80% of the required effort (and time) for any task will be spent on the last 20% of the task. Use the first 20% of effort to get to 80% confidence and start the projects!

Task 1: Define the Business Assumptions

In order to make the optimal set of investment and resource decisions, first define the business plan. Evaluate the three critical planning horizons defined below. (Note that the time durations will vary depending on the nature of the industry and product being defined.)

- **Launch**
The current product must be made capable of handling all business requirements until the successful launch of the next generation. Time should be added to this date to account for unplanned issues and product manufacturing ramp-up and stabilization. Remember that it is extremely rare for a new product design to work flawlessly for the manufacturer and customer in any volume from day one.
- **Transition.**
After Launch, there will be a transitional period for the old product as the new product ramps to volume production. Existing products will move to a support / maintenance mode as the new product begins capturing the bulk of shipments and revenue.
- **Production**
After the transition phase, most product shipments will be new product and its variants. The old product will transition to end-of-life support. Planning for another set of future generation products can begin.



The information required for each planning horizon consists of product shipments, markets served, product requirements for those markets, and product revenue estimates. From this data, determine how many of each type of product must be built and what their cost goals must be to achieve the desired profitability and revenue goals. In other words, define the product mix based on best estimates of future customer demand. Do not overanalyze this. Remember that this information can and should be refined as more and better information becomes available.

Task 2: Identify and Categorize Current Product Issues

Document the list of issues for the existing product. For each issue, define the required “fixes”, establish duration, document pre/co-requisites, and determine estimated costs. The identified “fixes” are then categorized by the degree of impact to the overall system design and business success. A good starting set of issue categories include:

- Issues preventing building new systems
- Reliability / maintenance issues
- User Interface, human factors and operational issues
- Cost and functionality issues

Task 3: Prioritize existing product issues

Once the issues and costs are documented, the next step is to prioritize them. *Issues that cannot reasonably be resolved before the end of “LAUNCH” should be dropped from consideration at this point.* Remaining issues are prioritized and sequenced such that the most critical are accomplished first. Generally a “triage” would be applied to each item. “*Critical*” items would imply that the product could not be built or supported if the issue is not addressed. “*Important*” items would be the issues that could seriously affect profitability, growth, and/or customer satisfaction until the issue is addressed. “*Desired*” would be everything else, including enhancements and new functionality. *Critical* items are scheduled first and must be implemented. *Important* items are scheduled according to a prioritized cost/benefit/risk calculation (investment/time vs. risk/return). *Desired* items and *Important* items that do not make the cut are dropped and added to the next generation product requirements consideration list. Place the resulting list of changes that will be made on a timeline for implementation.



Task 4: Define the Basic Requirements for the Next Generation Product

Defining the requirements for the next generation product can be a lengthy process, but it is critical that some estimate be established quickly so that R&D planning can proceed in the short term to allow for informed investment decisions. This requires that product requirements be a living document that is refined over time, rather than a one-time-only activity. The benefit to this approach is that quick estimates can be made and tested. It can then be easily updated over time as new information becomes available. The drawback is that there could be significant errors in estimates as requirements shift with the addition of new knowledge.

The living document approach is the most effective strategy for the simple reason that no matter how much research and planning is performed, a completely accurate final set of requirements and development plans is rarely ever possible no matter how much time is allotted. Waiting for perfection only delays the process and drives up the ultimate development costs without a better result. Furthermore, not using the living document approach can lead to making product requirements static which results in ignoring new information and decreasing future business success.

The basic requirements for your new product should include a high level set of assertions about:

- Requirements relative to the current product specifications. Set challenging goals such as reducing BOM cost by ½, increasing reliability by 10x, increasing capacity by 50%, etc. These are the types of aspirational goals that should be used to drive thinking. You can assume that your competition is already doing this
- Estimate total annual volume shipments over the new product's lifetime.
- Understand your financial capabilities, breakeven and time to revenue needs.
- Define the target markets for the new product, paying particular attention to differences in capacity requirements, future / new regulatory requirements, what users will operate the products, and its operating environment.
- Deficiencies in the current product as well as customer feedback that might exist. Speak to service techs, users, and others who interact with the existing products.
- New or emerging technologies that could be useful in a next-generation product. Evaluate the current product's existing technologies and look for more effective replacements and enhancements.
- Long-term manufacturing / support plans.
- Risks and potential Intellectual Property issues
- The sales model and how revenue is obtained
- Sales ramp-up and training. Allow for demo units, sales tools, customer training, etc.



The output from this activity should be a 1-2 page list of high-level requirements used to develop a Rough Order of Magnitude (ROM) schedule and development cost estimate. The ROM will be used for capital / funding requests and as the starting point for the future detailed plan.

Task 5: Identify Dependencies and Leverage

When managing multiple development efforts in parallel, it is critical to plan for dependencies and leverage. *Dependencies* are those efforts that assume another effort must be accomplished first or in parallel. This is sometimes called a co-requisite task. *Leverages* are those efforts that will be used across product versions and product lines.

In the case of existing products, it is important to understand any limitations in backwards-compatibility and have a strategy for retrofits (dependency) if appropriate. User interface software may be used on both the existing and new products (leverage). A list of those items that will, and perhaps more importantly, *will not*, be common or retrofittable must be created to avoid future confusion.

Task 6: Create the Product Roadmap

Once the current product issues are prioritized / estimated and the new product ROM estimate is ready, the next step is to put this information in a graphical Product Roadmap representation of the combined plans. The roadmap shows the overall product portfolio on a single page with each product release defined in time with its list of functionality. This gives decision makers a visual, easy to comprehend, view of the strategy. It is also a powerful tool to use when requesting funding and making investment decisions.

Task 7: Update the Plans

Perhaps the most critical part of this process is to keep it alive and make it a regular part of the product development process. The portfolio roadmap should be updated and reviewed on a regular basis to insure that changes in assumptions and estimates are reviewed and approved and that the plan adapts to any new information as it becomes available. When planning for years of product shipments, it is critical to remember that visions of the future are probably going to change every 3-12 months. The plan must be updated to accommodate changing reality, or business success will certainly suffer.



Output

The outputs of this process include the following documentation, which is used to obtain the necessary R&D funding for the product lines and forms the baseline for the strategic product R&D plan.

- A prioritized list of current product issues that will be addressed
- A schedule and cost matrix to implement the product issues
- A list of issues that will not be implemented
- A rough requirements document for the new product and a ROM cost / schedule estimate
- A product Roadmap

Conclusion

Managing multiple product development activities is difficult. Keeping current customers well served while creating the next great thing is a challenging art under the best of conditions. One mistake and your customers will either go to your competition or stop buying current products while they wait for your next one. Either is devastating to the bottom line.

Applying a structured and flexible Portfolio Management approach can help. Being clear about what your true needs are, planning quickly and maintaining flexibility can help ensure that you provide the right products on the right path to your customers and yield maximum profitability to your business.