Product Development in a Small Company

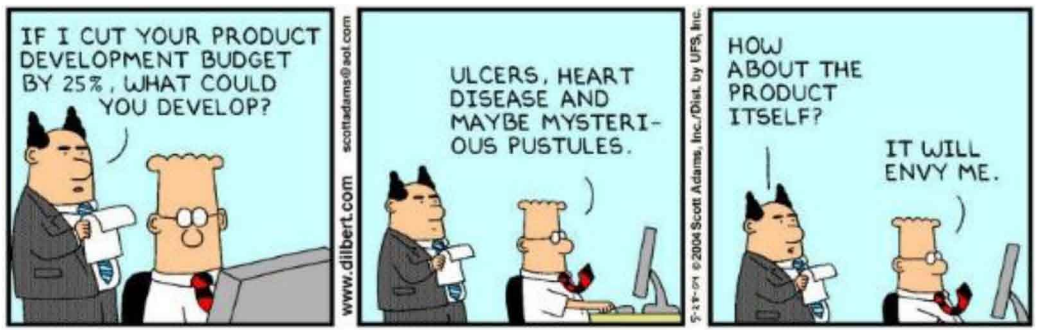
Introduction

The technology explosion of the early 80s created a plethora of niche market technology businesses. These businesses grew up in a world where a couple of engineers could create a new product category by applying enabling technologies that were rapidly decreasing in cost, size and power. Many of these new products created niche markets that, although quite profitable, never achieved significant scale. These businesses typically have very long product cycles as investments in product improvements must be calibrated against a ROI of the development cost. This paper examines the unique challenges that small companies face in developing technology products and outlines some strategies that can be deployed to remediate these issues.

Unique Issues

When compared to larger companies, small technology businesses in niche markets have unique challenges when it comes to developing products. When compared to larger mainstream businesses, small companies have:

- Longer product life cycles
- Limited budgets for developing products
- Small development teams (or none at all)
- Large amounts of tribal knowledge
- Limited understanding of the product development processes
- Few reference designs to leverage new developments
- Limited knowledge of available technologies
- Difficulty attracting top talent for product development activities



Long Product Life Cycles: Because the cost of product development is a significant contributor to the cost of providing the product/service, a large threshold of value must be crossed to justify the cost of developing product enhancements. Large companies can spread the product development cost over a large volume of unit's sales and remain profitable with relatively small margins. Small companies have low volume of unit's sales and must reserve a significant amount of gross margin to pay back the development investment. In a niche market, you can double the value of the product/service with an investment in product development, but even this double may not be sufficient to maintain the same profit margins given how few unit sales are available to distribute the development cost over. On other hand, if a competitor makes an investment in development, and new cheaper/better product comes to market, the consequences of not making the investment can be fatal.

Limited Budget: As a percentage of total revenue, large company's product development budgets are small compared to small companies - even though they are large in absolute terms. Large companies can go "over budget" on a product development project and still maintain reasonable margins. Going over budget in a small company can mean the difference between profit and nonprofit as the extra cost of development cannot be made up with gross margin. Further, small companies have higher cost of capital and limits on the amount of capital available. In a small company, any newly deployed capital must be offset with increases in profits in a short period of time. This can lead to the classic "half-pregnant" syndrome where the project is 50% completed and the development budget has been exhausted. Since there is no additional profit available from the now depleted development budget, no additional capital is available. Since no additional capital is available, the project cannot be finished.

Small Development Teams: Large companies have entire departments dedicated to individual functional activities (drawing control, testing, compliance, etc.) and technology expertise (software, electrical, mechanical, etc.). Although small companies require these areas of specialization as well, they cannot afford to have large cross functional development teams adding to the fixed cost overhead year after year. This leads small companies to be inefficient in many of the development task they perform as generalist try to complete specialist task.

Tribal Knowledge: Documentation cost money - especially in terms of fixed cost overhead necessary to maintain good drawing control. In small companies, with pressure to control product development budget, the short term cost reduction is traded off for long term risk by only documenting the absolute minimum necessary. All knowledge not on paper is inside a person's head. If this person is no longer available production can suffer and the replacement cost can be large as new people try to recreate the tribal knowledge.

Management: Like many other functions, product development can be significantly improved through leadership and management processes. Large companies attract the best leaders and can afford to spend countless resources on process improvements. Small companies rarely have any dedicated product development resources and often have limited management processes. This lack of leadership and process leads to very ineffective development as a group of strong individual contributors fails to develop into a strong team.

Technology Knowledge: Because smaller companies have fewer employees and do less development, their technology knowledge base is limited when compared to larger companies.

This lack of knowledge will limit the number of choices available during the conceptual design phase. This limitation could lead to increased development cost and time, and a decrease in competitiveness as the majority of a products performance, unit cost and development budget is determined by the conceptual design.

Limited Reference Designs: When large companies start a development project, a large percentage of the design is already complete in the form of reference designs from other projects. Smaller companies have very limited reference designs and often start a new development project from scratch. This leads to longer development cycles, longer de-bug periods and higher development costs.

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When to Pull the Trigger:
Because product development cycles are generally measured in years for small companies, deciding exactly when to fund a development activity is important to keeping development cost in check while at the same time maintaining competitiveness. Starting too early can lead to competing with yourself, and waiting until market share starts eroding can lead to the inability to fund needed development with ever decreasing profit margins.

OCCAM DESIGN

Every quarter, these factors should be considered:

Competition: What is the likelihood that a competitor will come out with a lower cost/better features offering based on newer technology? Keep in mind the new offering can come from two sources: direct competitors, and adjacent competitors. Adjacent competitors are competitors that are not currently competing in the vertical, but who possess technology that could meet, or disrupt your niche. Features can be added or removed from products to produce new offerings for a fraction of the cost of new development. Disruption can occur when new technology replaces older established technology - for example, the typewriter was replaced by the computer even though computers were not direct competitors for decades.

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Cost: How much cost reduction, or pricing power, can be had with a new development? With the increase in gross margin, how long would the payback be? In doing this analysis, be certain you are getting realistic budget numbers from the development team. It is common for development teams to give you the number you want to hear, and not the number you need to hear. Challenge the development team to find similar developments with the same cost.

Market Timing: Most markets have ups and downs. Since the demand for products/services is generally greatest when the market is going from the bottom and on the way to the top, new products are best introduced midway between the bottom and the top. All other things being equal, the best time to start a product development project is just before the bottom hits, so that it can be introduced at the correct time. However, knowing when you are at a bottom is a lot easier said than done. Often, the bottom is only apparent well after the fact. One common strategy to overcoming this timing issue is to fund parts of the development project that are low cost, but consume large amounts of time. This way you can shorten the development time once it is clear that the bottom has passed.

Adjacent Markets: A related topic to when to start a product development project is adjacent markets. Adjacent markets are markets that you can enter for a lower cost than other companies because of some unique quality you possess. Generally this quality is either ability to get products to market, or technology that can be used in a different context. The same rules above apply to when to enter these markets. These market opportunities should be examined yearly at a minimum.

Staffing Small Development Teams:
Staffing small company product development teams can be tricky. A low cost efficient team that can execute quickly is needed to keep development cost low, however, the last thing you need is a large team eating away at the fixed cost line year after year. Given the long product lives, it only makes sense to outsource some activities in order to keep product development cost low while at the same time keeping overhead low. The question is what to outsource.

Some activities are core and some are not. Maybe it is the ability to define products for your market niche. Maybe it is a specific technology or manufacturing process. It is almost always better to focus on what you are already good at, then it is to try to improve on what you're not good at. Being the best in the world in at least one thing, your core, is likely to be more successful than being an "also run" in everything.

It is rare that small companies in niche markets have a product development core. Outsourcing to companies that have a core product development focus will allow you to focus on your core. A product development company can bring in resources, processes, reference design, leadership and technology awareness needed to efficiently develop products without burdening the fixed cost overhead.

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Funding

Follow a Process:
Product development is sometimes described as "herding cats". There are thousands of decisions to make. Each decision linked to each other and dependent on a range of information about markets, customers, technologies and people. Adhering to a well proven methodology is the only practical way to manage the processes.

Requirements: If you do not know where you are going, then any direction will do. Having a written definition of "success" is the first step in the product development processes. Having a clear understanding of technical specification, unit cost, development budgets, etc. at the beginning of the project goes a long way to ensuring the project gets pointed in the right direction.

Conceptual Design: There are many ways to solve the same problem. The essence of good engineering is understanding that there is no one perfect design, merely designs that meet individual requirements to differing degrees. Each possible solution will have a different effect on the degree to which the requirements will be satisfied. The key is understanding all possible designs and how they satisfy the requirements and choosing the one design that best meets all the requirements.

Detail Design: Once the requirements are enumerated and the correct concept for meeting the requirements has been determined, a detail design creates all of the documents necessary for the product to be manufactured. A Master Book is created that can be used to manufacture a product that meets the requirements.

Design Verification: Once the Master Book is complete and a prototype is built, the efforts turn to ensuring the design will meet the requirements set out in step one.

Pilot Production: Transferring the design to manufacturing is the final steps in the product development processes.

This process provides a pathway from idea to production in a controlled manor that safeguards the resources of the company. Each one of these product development steps is a “gate” where a “go” or “no go” decision should be made.