

Product Development in the 21st Century: Critical Factors for Successful Partnerships

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Abstract

Development service organizations in the field of semiconductor and silicon technologies, such as MEMS, are finding it more difficult to succeed with business practices used in the past. Change happens rapidly in a world market, making flexibility a key asset. Development service organizations need to react quickly and effectively when changes occur during the product development cycle.

In managing risk and understanding when their initiative is appreciated, development service organizations become trusted partners that quickly take responsibility as required. Products emerging from this environment will have lower development costs, and most importantly, a shorter time to market.

This paper will describe some of the business factors that development service organizations and product developers should address for optimum results.

Introduction

Product development activities are becoming a key differentiator for many U.S. companies. Our national markets and culture enable a higher level of risk taking, and produce a large share of successful new products on the world stage. Product developers are concerned with several business factors that directly affect development service providers.

1. Time to Market
2. Development Costs
3. Intellectual Property
4. Synergy (with technical developments)

Development service companies keep an eye on these factors as they work with their customers, to help them find the best solutions when development challenges arise.

Parameters of a Partnership

Product developers typically want partnerships with outside resources to allow the product developer to focus on what they do best. Collaboration reduces the strain on internal resources, and can tap into critical areas of outside expertise. A quotation from Business Week highlights benefits related to collaboration between product developers and development service providers.

“Call it an innovation-based economy, where profits and jobs will go to those who have the skills to capitalize on the explosion of new opportunities at the intersection of business and technology. It's a melding of technology with an understanding of business processes and organization -- and it's crucial to the economy's next wave “

'The New Discipline of Services Science', Business Week - January 21, 2005

Profitable collaboration on product development activities will have the four business factors set for mutual success. In other words, the business incentives for both parties relative to the factors have to be discussed, documented, and agreed upon. A win – win scenario gives each participant what they need to be successful and reduces the chance of negative outcomes. Simply paying for a best effort by the development service provider may not be in the best interest of the product developer.

Time to Market

Product developers have many competitive pressures to contend with in the marketplace. Most important of all, the shortest possible time is required from product concept to final delivery. While considerations of cost and performance are important, they are almost always balanced with the effect on delivery schedule.

Deliverables (Goals and Assumptions)

Deliverables listed in a development schedule will break down the time from product concept to final delivery. They can be complex, detailed, and subject to constant change. Agreement to a schedule is typically surrounded by assumptions and conditions, which should be documented.

1. Initial product concept and goals
 - a. Initial assumptions
2. Changes to product concept and goals
 - a. Current assumptions
3. Schedule changes and their cause

Review by all concerned can significantly improve communication on development issues, aligning expectations and saving time for all concerned.

Tradeoffs

Development service providers may be chartered with deliverables not directly associated with shortest time to market. Non-critical deliverables related to product quality, reliability, and manufacturability are good examples of development tasks that may delay initial delivery of a product. These tasks can be minimized to meet delivery schedules, at an unacceptable cost later in the product lifecycle. How can the two parties find an operating philosophy that minimizes risk and delivers product on time?

1. Clearly document the minimum requirements for non-critical deliverables
2. Maintain a priority list of non-critical deliverables

When schedule conflicts arise, lower priority deliverables are automatically delayed, without lengthy project reviews.

Development Costs

The cost of development involves both time and money. Schedules and budgets are set at the beginning of development projects, and have two key components for successful partnerships. Budgets must be available with

enough cost detail, and track budget dollars among items as schedules and priorities change.

How does the product developer effectively spend money to meet the moving target of fast development cycles and lower cost? The answer lies in giving a development service provider continuous, real-time information, and clear responsibility for cost decisions regarding:

1. Cost limits for each budget item
2. Allowable priority changes
3. Product developer decision maker(s) for changes to cost limits and priority

Prior arrangements give both parties the ability to move quickly without excessive time spent in reaching consensus on every development issue. Without a mutual understanding of cost issues and timing, product developers run the risk of cost overruns and much slower progress.

Intellectual Property

IP Protection

As world markets have grown, many new products are offered on a daily basis. Unauthorized copies have become a serious problem. In consumer markets, there is anecdotal evidence of copies appearing BEFORE the new product has even been released. Stealing of the new product design and manufacturing know-how during product development has become a big problem.

Non-disclosure agreements, patents, copyrights and other forms of IP protection depend upon strong and vigorous judicial system. In other countries, IP protection may not be as robust as in the United States. The only real protection is very selective exposure of the product design details. Development service providers should be thoroughly evaluated for their ability to protect IP.

IP Sharing

IP comes in several forms, typically a trade secret, patent or patent license. Whatever form may apply, a product developer may want to use their own IP, and may be interested in capturing additional IP coming from the development work. This should be discussed with the development service provider at the beginning of a project.

However, product developers may depend upon IP from the development service provider. Or the new product may create IP that was jointly developed. In both cases, and others that could be easily imagined, who should own, control, and/or have use of the IP? There are no easy answers to those questions. Several other questions may help product developers and development service providers find agreement.

1. Is the new IP core to your business?
2. Are you willing to pay for capturing and protecting the new IP?
3. Can you share the new IP, with restrictive covenants if necessary?

Most development service providers take great care to effectively use their own IP for customer benefit, and protect customer IP. Joint consideration of IP issues before the project begins will eliminate the potential for later misunderstandings and can be used as a valuable incentive for both parties.

Synergies

Current technical knowledge is an important benefit to product developers when they use outside resources in their development effort. Development service providers typically use their expertise to find the most practical solutions to individual development tasks. However, another benefit may be available at the beginning of a development project.

A recent advance in a specific technology may have a significant impact on the design and/or performance of a new product. Product developers should consider a preliminary review of the new product design intent and manufacturing methodology with the development service provider, taking care to minimize exposure of unrelated IP. Technology advances known to the development service provider could offer meaningful advantages to a new product concept.

Conclusion

The ability of product developers to profitably find expertise and execution related to new product development tasks is a major part of our national advantage in a global market. Factors for a successful product development partnership, as shown in Figure 1, provide the product developer and development service provider with a solid framework to build upon. Careful consideration of key business factors should be done from start to finish of the product development cycle.

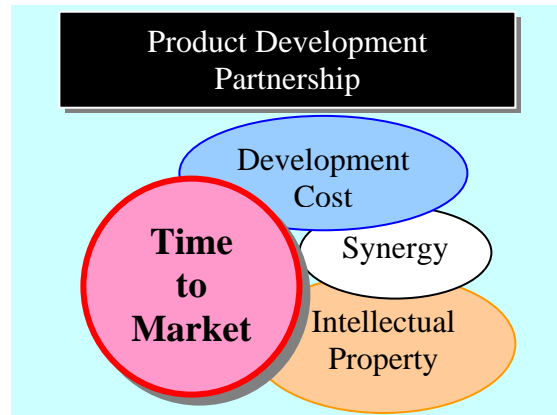


Figure 1: Key Business Factors

From a recent article in IEEE Spectrum magazine, development service organizations are actually driving new concepts such as 'services science'. According to Paul M. Horn, senior vice president and director of research for IBM:

"Just as computer science emerged in the late 1940s, I believe services science will emerge as a discipline. Researchers at the forefront of this new discipline bring the rigors of scientific inquiry to bear ... We're really defining the periodic table for the underlying elements that make up all (*service*) businesses." says Horn, who thinks such research could spark a \$500 billion market.

IEEE Spectrum, URL: <http://www.spectrum.ieee.org>
(Modified: 29 October 2004)

One of the market drivers for 'services science' is the explosion of interest in silicon based devices, using semiconductor related technology to create new products in biotech, MEMS, nanotechnology, and optical displays. Many product developers need a broader and deeper understanding of silicon based materials and their effect on product functionality. The critical need to apply new technologies to new products has become a powerful selling point used by development service providers.

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Director of Engineering at Aspen Technologies, received his Ph.D. from the University of Michigan in 1988. He joined Aspen Technologies in 2001, bringing with him 20 years of IC, and MEMS experience. Through his career, he has had design and engineering responsibility for a wide range of semiconductor products including analog ICs, pressure sensors, micro-machined fuel injectors, and airbag accelerometers, many of which reached high volume production. Dr. Spangler is the author of over 20 technical publications and 7 patents and he currently serves on the International Steering Committee for the Solid State Sensors and Actuators Conference for IEEE.

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Aspen Technologies is a successful world-class advanced-packaging service provider located in Colorado Springs, near the world famous 'Garden of the Gods' National Landmark. Its mission is to enable its customers to rapidly bring new products to market through the creative application of advanced microelectronic package and assembly technologies, innovative engineering, and scalable manufacturing solutions. Aspen has a large customer base, providing engineering and manufacturing services for many leading IC, MEMS, biomedical, start-up companies and military suppliers. Aspen has become a proven leader with an experienced engineering staff, having more than 270 years of IC and MEMS experience in standard and cutting-edge microelectronic packaging technologies. Aspen Technologies is ISO 9001:2000 certified as part of its strong commitment to excellence in quality, fast time-to-market, continuous improvement, and cost reductions.

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