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The Art of Managing New Product Transitions

New product launches are highly complex and can pose major challenges to companies. But managing the interplay between product generations can greatly increase the chances for success.

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Faster time to market and shorter product life cycles are pushing companies into more frequent product transitions, requiring managers to confront the potential rewards and challenges associated with product introductions and phaseouts. Several studies show that most new products fail in the marketplace for a variety of reasons,[1] and both academics and practitioners have identified strategies for improving the chances of success.[2] With a few exceptions, these studies focus on the success of a single product.[3] However, companies often struggle with product transitions even when the new product meets all the requirements for success. Consider, for example, two consecutive generations of high-volume microprocessors that we observed at Intel Corp., the U.S. semiconductor manufacturer. For the sake of this discussion, we will refer to the products as X and Y. (See "About the Research," p. 74.)

Intel originally designed X as a transitional product to pave the way for a stronger performance trajectory than was occurring with the previous platform. While X itself performed only slightly better than the previous generation at launch, its design allowed for performance gains later based on a wide array of computing benchmarks. Intel planned to move a substantial portion of the market to X and then complete the transition to Y, which offered similar performance at lower cost.

Unfortunately, the transition to X did not go smoothly. With capacity in place to support a moderately strong ramp up, early production led to excess inventory. X's failure to meet customers' needs and inability to usurp sales from its predecessor resulted in continued demand and short supply for the prior product. Consequently, competitors succeeded at increasing unit sales of their products.

Intel quickly realized that there were problems with X's components and pricing strategy. Management seized upon several measures to improve sales, including rebates, but X continued to languish. As the introduction of Y approached, the company started an ambitious marketing campaign and price cut to spur sales and regain market share. These actions led to record demand for Y, exceeding all expectations. With limited production capacity, Intel

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About the Research

Our research is based on a three-year study between 2001 and 2004 at Intel Corp. on the risks and drivers affecting product transitions. We conducted about 40 semi-structured interviews with managers in supply chain management, demand forecasting, sales, marketing and product development. After studying multiple historical and current product transitions at Intel, we learned that smooth transitions are difficult to achieve. The complexity of demand and supply dynamics causes tremendous uncertainty before a product launch that is not fully resolved until several quarters after it. We observed that functional teams across the organization had access to specific information (for example, about macroeconomic conditions in Asia or the availability of a particular part) that had significant bearing on the relative demand and supply of old and new products. However, the lack of a formal mechanism to aggregate and utilize such diverse information frequently caused misalignment. We saw the need for a new process to overcome this obstacle. The process we designed begins with defining a specific market objective. Subsequent steps involve identifying and measuring a set of factors across departments for each product (old and new) to assess product drivers and risks; exploring possible risks arising from interactions between products using the transition grid; and developing a transition playbook, including prevention and contingency strategies with which to manage and mitigate transition risks.

struggled to meet demand for some products within the Y family. Finally, after several months, Intel succeeded in balancing demand and supply, eventually regaining the market share it had lost.

Coordinating supply and demand between two product generations can be a difficult and costly problem. Although Intel's Y met all the requirements for a successful product introduction, marketing and pricing decisions enacted in response to limited market acceptance of X significantly shaped the outcome of the Y launch. Intel's operations management team did its best to satisfy customers through the transition. However, customers were frustrated by supply shortages, and the transition had substantial costs: lost revenues from discounting Y, marketing campaign expenses, significant investments in capital equipment and expedited shipping.

If the success of a single product is highly uncertain and can pose a major challenge to companies, the interplay between generations of products greatly increases the level of complexity. For example, when General Motors Corp. redesigned its Cadillac Seville and Eldorado models in 1992, supply and demand problems followed. Based on its initial forecasts, GM had allocated half of the capacity of its Detroit-Hamtramck plant to the redesigned Cadillacs, with the remainder going to Buicks and Oldsmobiles. But demand quickly exceeded supply, leading to the loss of thousands of potential customers. By the time GM was able to produce enough of the most popular models, the damage had already been done.[4] Cisco Systems Inc. had a similar experience in early 1998 with the launch of product 3S-0, which was designed to appeal to the lower end of the market. Unfortunately, because of its impressive performance-price ratio, it cannibalized sales from higher-end products. As a result, sales of higher-end products suffered, but the new product revenue did not compensate for the lost sales.[5]

Companies must learn to manage transitions to sustain their competitive advantage. Our field studies at Intel show that while numerous factors affect the rate and success of product transitions, inadequate information sharing and coordination among groups is one of the more important challenges to successful transitions.[6] Lack of information can prevent managers from adequately assessing the state of the transition and impair the effective design and implementation of contingency planning in the face of unexpected changes. For instance, during Intel's product X-Y transition, the marketing team did not thoroughly investigate the production capacity upside to support the new marketing plan for product Y, leading to supply shortages.

The alignment of actions and decisions across different internal groups and across organizations helps level expectations and synchronize responses across the various teams involved in the transition, thereby improving the company's ability to anticipate and react to environmental changes. The ability to adapt to change while meeting market objectives is a critical aspect of managing product transitions. To promote alignment across groups and the development of prevention and mitigation strategies, we have developed a framework and a process for helping managers make decisions during product transitions.

Using our framework, managers can design and implement appropriate policies to ramp up sales for new products and ramp down sales for existing products, balancing the supply and the demand for both so that combined sales can grow smoothly. (See "Smooth and Troubled Product Transitions.")

Although the approach does not eliminate the uncertainty of product transitions, it provides managers with an overall understanding of the risks and challenges and suggests possible courses of action. Early experience suggests that the process can lead to more robust, efficient and effective product transitions.[7]

Managing Product Transitions

The process of managing product transitions begins by identifying specific market objectives. Once these have been selected, companies need to understand the product drivers and risks and

conduct a factor assessment, which involves monitoring and measuring the factors affecting both old and new products. The process also necessitates a detailed analysis of the risks arising from interactions between products and the development of a transition playbook, which amounts to a catalog of primary and contingency strategies for preventing and mitigating transition risks. As market conditions change, managers need to be prepared to initiate the process again.

Identifying Product Drivers and Risks Our research on multiple generations of products at Intel suggests numerous factors that affect the adoption rate and success of a new product. The factors fall into two general categories of risks and drivers: demand and supply. Although either a demand risk or a supply risk can lead to a complete product failure, successful product introductions depend on a balance between demand and supply. Demand risks reflect the market's uncertainty about a new product (for example, concerns about product attributes and transition policies). Supply risks often stem from the challenges of utilizing new manufacturing processes or product designs, or the difficulties of producing and distributing the product. Across demand and supply risks, we focused on a set of factors that influence the success of product transitions. (See "Product Drivers and Risk Factors," p. 76.)

The eight factors cover most of the risks affecting the adoption rate of a new product. They encompass *product features* (product capability); *process features* (internal execution); *supply chain features* (external alignment and execution); *managerial policies* (pricing, timing and marketing); and *externalities* (environmental indicators and competition).

Although organizations may have access to detailed information about the product drivers and the risk factors affecting them, individual functional groups rarely have a complete picture of the overall forces impacting a product introduction. Our process provides a method for developing a cross-organizational transition assessment. This structured and repeatable process benchmarks the prospects and sales forecasts of new products against the experience of current and prior generations of products.

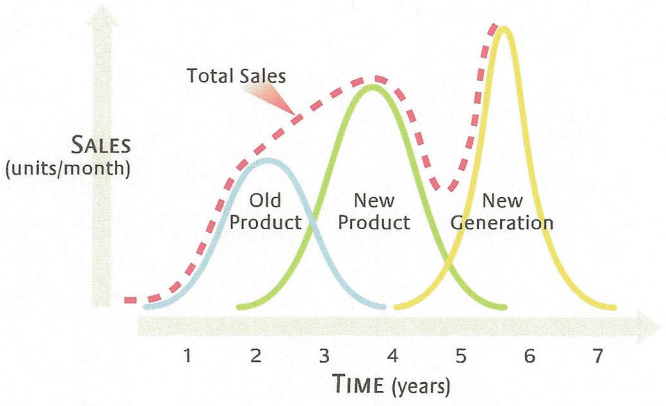
Assessing Relevant Factors Effective planning depends on collaboration and shared insight across the organization. If the best information is distributed among many different groups, the most one can expect is disjointed decisions. During the factor assessment phase, managers conduct a complete evaluation of the risks impacting a product, highlighting the different challenges. This provides managers with an opportunity to make decisions based on specific information.

To assess the actual values of specific factors, it is necessary to interview key players in functional groups involved in managing the new product (including marketing, sales, planning and forecasting). Each group scores all eight factors from their particular vantage point, using a five-point scale (with one very favorable and five very unfavorable). The scores can be compared with baselines from past products. Since different functional groups typically have privileged understanding and information about specific areas, each group scores every factor and documents the reasons motivating their scores. Sharing the comments and consolidating the information provides everyone with an understanding of how each group assesses the overall risks for a given product. After meeting with all groups, a cross-functional product management team can develop a composite score for each factor, providing a simple metric for the state of a product. (See "Mapping Intel's Transition from X to Y," p. 78.)

Since managerial and environmental changes continually impact product sales, updating factor assessments allows managers to identify risky areas and evaluate the results of previously implemented strategies. In our experience, however, updating information too frequently can be a distraction since it often takes time for strategies to kick in. Frequent updates may also induce managers to take premature or unnecessary actions. The frequency of updates should depend on the industry in question and the life expectancy of the products. For example, in high tech, the appropriate interval between updates might be monthly, whereas in other industries it might be no more than every quarter or any time a significant change occurs in one of the factors

Smooth and Troubled Product Transitions

New product transitions should be organized to allow companies to increase sales over time without disrupting sales or profitability. When transitions are rocky, total revenues decline.



(such as competitors launching a marketing campaign or lowering their prices). Managers should balance the availability of new information and the amount of time required for decisions to have a measurable impact.

Looking Across Product Generations To understand the risks of a transition from one product to another, it is important to evaluate the interplay between products. A simple method for doing this is to study the interactions between demand and supply risks for the products. Using the composite factor analysis, managers can assess an overall demand risk and an overall supply risk for each product by assigning weights to each factor that composes demand and supply, and then creating a weighted average. For example, by comparing the overall demand risk of a given product to a threshold value, managers can rate the risk above that level as high and below it as low. As a result, the demand and supply risks for either the old or the new product can be either high or low. For any product transition, there are 16 possible combinations of risks, which can be represented in something we call a transition grid. (See "A Sample Transition Grid: Demand and Supply Risks of Two Products.")

Generally, comparative rankings of demand and supply risks indicate that risks for the new product have a stronger impact on profitability than risks for the old product and that companies have less ability to manage demand risks than supply risks. Therefore, demand risks and new product risks tend to have higher risk scores than supply risks and old product risks, respectively. Based on comments from the functional groups, transition team members can use these comparisons to gain insight into key questions, including: Are we producing the right products? Can we meet customer demand? And do customers want the products we supply?

Positioning a particular product transition within the grid enables transition teams to look beyond a single product and evaluate the potential impact that products may have on each other. Even when only one of the products is prone to supply or demand risks, managers should consider potential demand cannibalization and spillover effects on the other product as well as the potential for supply imbalances.

Developing a Transition Playbook Companies often resort to contingency strategies to rescue a product after it is launched. However, their ability to rescue a product using contingency strategies is limited.[8] Factor analysis and the transition grid provide strategic and tactical assessment tools for anticipating potential challenges in launching new products. However, they do nothing to generate

Product Drivers and Risk Factors

Eight factors significantly contribute to demand and supply risk during product transitions.

Risks	Factors	Definition (Example)
Demand Risks	Environmental Indicators	Demand due to macroeconomic and business forces/cycles (overall business climate)
	Competition	Overall threat posed by competitive products (market share, manufacturing capacity)
	Product/Platform Pricing	Product/platform price relative to alternative products (bill-of-material cost, expected price changes)
	Timing	Timing relative to past, present and future alternative products (time since last introduction, time until next introduction)
	Marketing Indicators/Policies	Positioning and measures of market response (market size, number of potential product applications, budget size, breadth and timing of advertising, promotions)
	Product Capability	Product capability relative to alternative products (performance, quality, longevity, reliability, compatibility with previous generations, complementarity with other products)
Supply Risks	External Alignment and Execution	Acceptance and drive from supply chain partners (partners' ability to manufacture products using state-of-the-art technology and standards, acceptance of the new product within the product platform)
	Internal Execution	Ability to supply the product in volume (execution of internal design, designing products for manufacturability, manufacturing (or testing) capacity and flexibility, distribution)

A Sample Transition Grid: Demand and Supply Risks of Two Products

The table below provides a snapshot assessment of a typical transition. When both products have high demand or supply risks, the product interactions may further intensify the risks. For example, demand risk is high for both generations of products in rows 10, 14, 15 and 16, suggesting that managers need to monitor inventories closely.

Rank	Old Product		New Product		Comment	Risk Category
	Demand Risk	Supply Risk	Demand Risk	Supply Risk		
1	Low	Low	Low	Low	Most desirable transition.	1
2	High	Low	Low	Low	Customers do not want old product (indifferent to line below).	1
3	Low	High	Low	Low	Limited availability of old product indifferent to line above).	1
4	High	High	Low	Low	Customers do not want old product; challenging to supply it.	2
5	Low	Low	Low	High	Challenging to supply new product.	2
6	Low	Low	High	Low	Customers do not want new product.	3
7	Low	Low	High	High	Customers do not want new product; challenging to supply it.	3
8	High	Low	Low	High	Challenging to supply new product; customers do not want old.	4
9	Low	High	Low	High	Challenging to supply either product.	4
10	High	Low	High	Low	Customers do not want either product.	5
11	Low	High	High	Low	Customers do not want new product; challenging to supply old.	5
12	High	High	Low	High	Customers want new product; challenging to supply it.	5
13	Low	High	High	High	Customers want old product; challenging to supply old and new.	5
14	High	High	High	Low	Can only supply new product, but customers do not want it.	5
15	High	Low	High	High	Can only supply old product, but customers do not want it.	5
16	High	High	High	High	Customers do not want either product; challenging to supply them.	5

specific strategies or fallback alternatives when the original plans don't materialize. By assessing the state of a transition early on, companies can gain an overall understanding of the risks impacting the transition and factors requiring immediate attention, allowing them to adopt prevention strategies.

Rather than having to react to problems in the heat of battle, companies can use prevention strategies to help identify the levers that may have the most direct impact on the outcomes they are trying to achieve. Some levers can impact several high-risk factors at once, but only in a longer time frame. As such, these holistic levers target the product road maps rather than the immediate transition. Others affect specific factors that hinder supply or demand during the transition at hand. Managers considering prevention strategies need to consider cost as well as ease of implementation, recognizing which levers are available and which ones they control. For example, companies can have strong influence over pricing, the timing of product introductions, product capability and internal execution but only indirect con-

trol over what their competitors do. Managers need to be mindful that prevention strategies can have unintended consequences; once they signal a new strategy, competitors might follow suit.

Weighing these kinds of considerations in advance allows managers to address potential weaknesses before they become crippling. Although a well-designed strategy often takes several factors into account, companies are frequently most vulnerable to factors they have the least control over and rely too heavily on the factors they can control most easily. For instance, a company might have several different ways to mitigate the risk of a supply problem caused by development or production issues. One option may be to increase prices, thereby reducing the likelihood

Mapping Intel's Transition From X to Y

In transitioning from product X to product Y, Intel's primary market objective was to recover market share lost by X. The transition was built on four main factors. On the demand side, the product/platform pricing risk fell from high (for X) to medium (for Y) based on lower component costs and price cuts that accompanied the launch of Y. The risk linked to marketing indicators also improved, from medium to low, since the price-performance ratio made Y an attractive mainstream product. In addition, external alignment improved from medium to low as customers, many of whom had resisted X, looked forward to using Y. On the supply side, risk associated with internal execution rose (from low to medium) for two main reasons: Capacity for producing Y was limited, and the higher-speed products in the Y family reduced factory output. (Since Y was larger than X, it required more factory runs to produce the same number of units.) Overall, the factor assessment process highlighted the differences between the two products: There was high demand risk for X, whereas for Y there was little demand risk but some new supply risk.

Based on this analysis, it should not have been surprising that Y would cannibalize sales of X. In fact, that is what happened: Intel faced shortages of Y and excess inventory of X. An effective strategy for Intel would have been to set a higher price for Y rather than offering it at a discount. As contingencies, Intel could have lowered the price of X in hopes of promoting sales and allocated more manufacturing capacity to Y. Such actions would have rebalanced demand between the two products both in the short term and in the long term. Although price discounting and a marketing campaign potentially might have helped X, using them on Y led to shortages.

Intel recouped its lost market share in the quarters following the launch of Y, so the transition achieved some success. However, the lack of supply strained customer relationships, and by pushing factories to the limit and operating with insufficient inventory, Intel's operating costs rose during that period.

Factor	Product X	Score	Product Y	Score
Environmental Indicators	Demand and economy relatively slow; no imminent improvement on horizon	3	Demand and economy relatively slow; no imminent improvement on horizon	3
Competition	Competing products are better aligned to mainstream market	3	Competitors' sales strong relative to historical levels but limited by manufacturing capacity	2.75
Product/ Platform Pricing	Platform cost significantly higher than prior generation	4	Reduction in overall platform cost and marketing decision to cut prices	2.5
Timing	Released less than one year after prior generation; Y known to be only a few quarters away	3.5	Release closely follows X; Y will not be replaced in the near term	3
Marketing Indicators	Positioned toward higher end of market with higher price and performance	2.75	Price reduction brings product back to mainstream market segments	1.5
Product Capability	Faster clock speed than prior generation, but benchmarks show only modest performance gains in many applications	3.5	Potential clock speed is high, but overall speed gains are impaired by localized bottlenecks	2.5
External Alignment and Execution	Strong resistance to adopting some new technologies in the platform; higher materials cost; platform architecture will change with Y	3.5	New architecture and accompanying platform materials cost reduction bring record number of design wins; price cuts enable greater performance at lower price points	2
Internal Execution/Risk	Supply positioned for moderately paced ramp up	1	Decreased supply capability due to less efficient production and lower yields associated with road map acceleration	2

that the products customers order are out of stock. This approach could shift demand to the future, but it may prompt customers to buy competing products. In considering their options, companies need to evaluate the costs. Rather than increase prices, the company may be better off outsourcing capacity to other producers. But that is not always feasible in light of concerns about proprietary information and lead times. To preserve the option of using outsourcing as a contingency strategy when the need arises, companies may need a corresponding prevention strategy to line up alternative resources ahead of time.

Once companies complete their transition risk assessments, managers can create playbooks containing relevant transition scenarios, prevention strategies and contingency strategies. A good playbook identifies events or scenarios that lead to major risks, assesses the impact these events may have on new and current products and lays out prevention and contingency strategies for the transition team. (See "A Sample Transition Playbook.")

A Sample Transition Playbook

A transition playbook identifies relevant scenarios and maps their impact on old products (OP) and new products (NP) to outline possible prevention and contingency strategies. Scenarios should be developed in response to risks identified in the factor assessment and the transition grid.

Events/ Scenarios	Demand for NP higher than expected	Supply problems for NP	Demand for NP lower than expected
Impact on OP	• Demand cannibalization	• Demand spillover	• Demand spillover
Expected Outcome	• Supply shortage for NP • Excess supply for OP	• Excess demand and hence possible supply shortage for OP • Supply shortage for NP	• Supply shortage for OP • Excess supply for NP
Prevention Strategies	• Supply portfolio • Product pricing • Internal execution	• Product design • Internal execution (process yield) • Product pricing	• Product characteristics • External alignment and execution
Contingency Strategies	• Gradually phase out OP • Outsource OP • Decrease OP price • Increase NP price • Allocate more capacity to NP	• Gradually phase out OP • Outsource OP or NP • Decrease OP price • Increase NP price • Allocate more capacity to NP	• Gradually phase out OP • Increase OP price • Increase production of OP • Accelerate road map • Decrease NP price (rebates/promos) • Heavy marketing of NP • Work on external alignment and execution

Even well-planned and well-executed product transitions often require strategy updates. By mapping out prevention strategies, risks and contingency strategies in advance, a transition playbook can minimize risks. It allows managers to monitor key supply and demand risk indicators, so they can make strategy revisions and invoke contingency strategies as needed.

Although companies place enormous emphasis on new product introductions, products with many successful attributes still experience difficulty when they interact in unexpected ways with current products. Transition mapping provides a structured approach to collecting information and coordinating actions across the organization. It pulls together the key differences in perspectives from different functional groups, saving companies from some of the second-guessing and manipulation that often occurs when important information is revealed later. While our process was developed at Intel and has been used successfully in transitions there, it can be applied broadly to different settings. The implementation details will change depending on the industry, the company and the product, but the overall methodology will stay essentially the same.

EVALUATING PRODUCT INTERACTIONS is central to the success of product transitions. By anticipating risks, companies can seek ways to align their products. Playbooks can help managers develop robust prevention and contingency strategies to deal with the supply and demand risks identified by the transition grid. They can help managers see potential shifts in the business environment before they occur, allowing managers to make timely adjustments that are particularly critical for products with short life cycles and long production delays.

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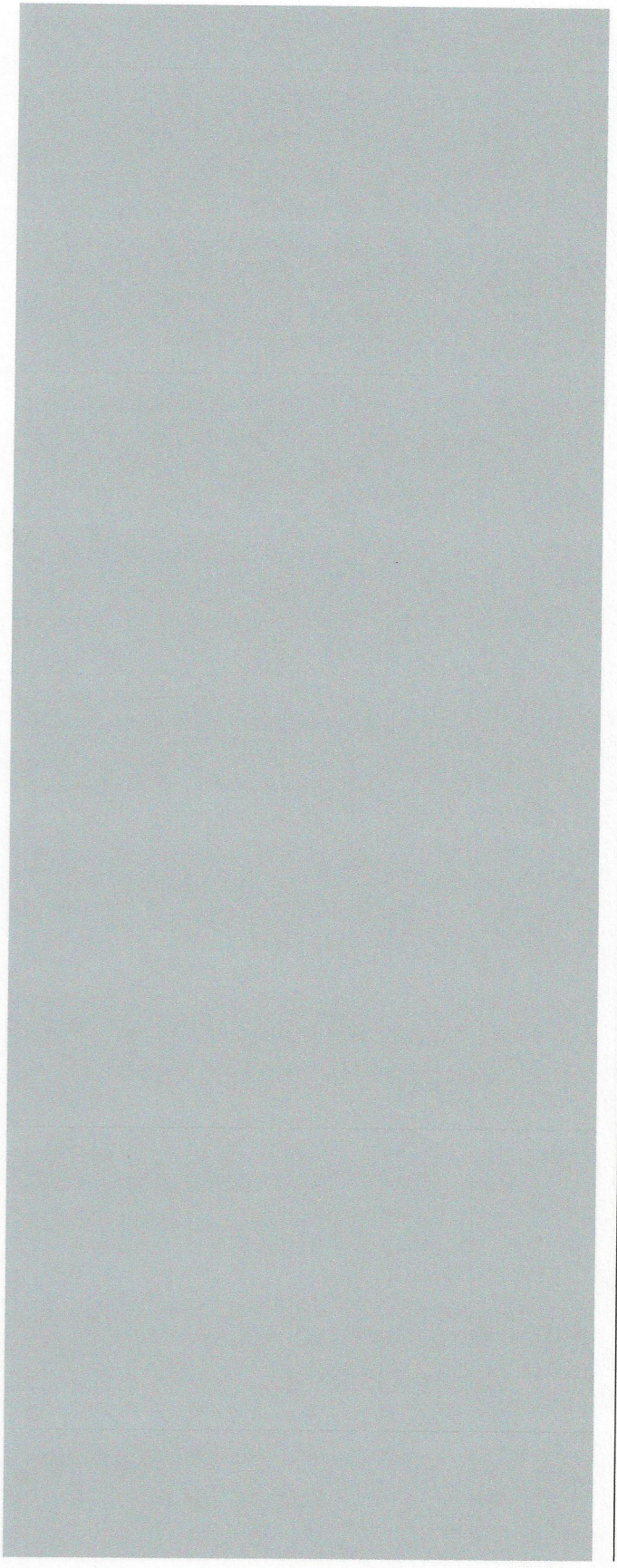
1. See, for example, G.S. Lynn and R.R. Reilly, "Blockbusters: The Five Keys to Developing Great New Products" (New York: HarperBusiness, 2002); E.E. Bobrow and D.W. Shafer, "Pioneering New Products: A



Market Survival Guide" (New York: Irwin, 1987); and R.M. McMath and T. Forbes, "What Were They Thinking?" (New York: Crown Business, 1998).

2. See R.G. Cooper, "How New Product Strategies Impact On Performance," Journal of Product Innovation Management 1, no. 1 (January 1984): 5-18.

3. See N.P. Trepanning, "Understanding Fire Fighting in New Product Development," Journal of Product Innovation Management 18, no. 5 (September 2001): 285-300. See also C. Billington, H.L. Lee and C.S. Tang, "Successful Strategies For Product Rollovers," Sloan Management Review 39, no. 3 (spring 1998): 23-30.

4. M.L Fisher, J.H. Hammond, W.H. Obermeyer and A. Raman, "Making Supply Meet Demand in an Uncertain World," Harvard Business Review 72, no. 3 (May-June 1994): 83-93.

5. The Cisco Systems transition example is based on a 2001 white paper, "Strategizing for Success: Cisco Systems Overcomes a Product Transition Dilemma," ZDNet UK, London, February 20, 2001, http://whitepapers.zdnet.co.uk/0,39025945,60045032p-39000468q,00.htm.

6. Billington, Lee and Tang corroborate this finding and present a high-level process for managing new product transitions. They recommend dual-product rollovers (that is, introducing the new product before the end of life of the old one) for transitions with high demand and supply risks and solo-product rolls (the new product introduction concurring with the old product's end of life) for low demand and supply risk environments. Oftentimes, however, the industry dictates the choice of solo versus dual roll. Dual-product roll is standard in the high-tech industry where product platforms are common, even for products with low demand and supply risks. Further, the process proposed by Billington, Lee and Tang does not provide much insight into tactical and operational decisions regarding pricing, capability, marketing budgets or product deployment, all of which can have a substantial impact in the success of a transition.

7. We tested the transition mapping process, particularly the factor analysis process, using a large-scale product transition at Intel. For this transition, Intel's central business planning group felt that sales of the new product would come in fairly strong. Defining x as the realistic "whisper" estimate among forecasters, a figure of roughly 1.2x was circulated to drive supply. Meanwhile, estimates aggregated from the geographical sales organizations suggested lower sales, ranging over time from 0.65x to 0.9x. Based on the results of the factor analysis and historical sales in the same product family, the transition mapping team predicted that sales were unlikely to exceed 0.93x and would likely be lower. The drivers for this recommendation included solid evidence that component cost would reduce demand early in the transition and that the complexity of the new platform posed significant supply risk. Sales forecasts were revised downward from 1.2x prior to the launch to about 0.9x six weeks after launch and then dropped even lower. By the beginning of the second quarter after launch, the forecast, informed by the transition mapping process, was trimmed to 0.79x for the first two quarters' total sales. This helped avoid overbuilding supply for the new product while maintaining sufficient stocks of the old product. The process also supported decisions, such as increasing the marketing budget, that helped drive product sales early in the life cycle.

8. For example, refer to H.L. Lee and C. Billington, "Managing Supply Chain Inventory: Pitfalls and Opportunities," Sloan Management Review 33, no. 3 (spring 1992): 65-73; or G.A. Zsidisin, A. Panelli and R. Upton, "Purchasing Organization Involvement in Risk Assessments, Contingency Plans, and Risk Management: An Exploratory Study," Supply Chain Management 5, no. 4 (2000): 187-198.

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