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Match Your Innovation Strategy to Your Innovation Ecosystem

by Ron Adner

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High-definition televisions should, by now, be a huge success. Philips, Sony, and Thompson invested billions of dollars to develop TV sets with astonishingly high picture quality. From a technology perspective, they succeeded: Console manufacturers have been ready for the mass market since the early 1990s. Yet the category has been an unmitigated failure, not because the consoles are deficient, but because critical complements such as studio production equipment, signal compression technologies, and broadcasting standards were not developed or adopted in time. Underperforming complements have left the console producers in the position of offering a Ferrari in a world without gasoline or highways—an admirable engineering feat, but not one that creates value for customers. Today, more than a decade later, the supporting infrastructure is finally close to being in place. But while the pioneering console makers waited for complements to catch up, the environment changed as new formats and new rivals emerged. An innovation that was once characterized as the biggest market opportunity since color TV is now competing for consumer attention in a crowded market space.

The HDTV story is a poster child for the promise and peril of *innovation ecosystems*—the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution. Enabled by information technologies that have drastically reduced the costs of coordination, innovation ecosystems have become a core element in the growth strategies of firms in a wide range of industries. While leading exemplars tend to come from high-tech settings (think Intel, Nokia, SAP, and Cisco), ecosystem strategies are being deployed in industries as varied as commercial printing, financial services, basic materials, and logistics provision.

When they work, ecosystems allow firms to create value that no single firm could have created alone. The benefits of these systems—discussed under such labels as platform leadership, keystone strategies, open innovation, value networks, and hyperlinked organizations—

are real and well publicized.

For many companies, however, the attempt at ecosystem innovation has been a costly failure. This is because, along with new opportunities, innovation ecosystems also present a new set of risks—new dependencies that can brutally derail a firm's best efforts. Even if a firm develops its own innovation brilliantly, meets and exceeds its customers' needs, and successfully excludes its rivals, a market may not emerge. Whether—and when—it emerges is determined as much by the firm's partners as by its own performance.

Depending on others for your own success has important strategic implications. Timing is nearly always affected: Getting to market ahead of your rivals is of value only if your partners are ready when you arrive. Resource allocation is another strategic consideration: Because critical bottlenecks may reside outside your own organization, allocating resources externally—to partners—can be more effective than allocating resources internally, to your own project. Yet the most important strategic implication is that risk assessment changes dramatically. The due diligence processes in place at most companies are designed to assess opportunities in which the firm can create value on its own. When value is created in an ecosystem, meeting the traditional benchmarks is necessary, but not sufficient, for success.

Absent a systematic approach for analyzing the risks in an ecosystem, the due diligence process will be incomplete. This is a problem because due diligence is central to setting expectations for the new initiative—the benchmark against which results will be measured. When project expectations are based on shaky foundations, success and failure seem increasingly random despite the best project-management efforts. In other words, bad expectations undermine good execution.

The common mistake that managers make is to plan out the full ecosystem, pick their position within it, and act with all haste to create and defend their role in delivering an integrated product or service to the end customer. By setting strategy with a focus on this goal, managers tend to overlook the process, and the order, through which their ecosystem will emerge over time. Creating strategy that explicitly accounts for the delays and challenges that are inherent in collaborative networks is the key to succeeding in ecosystems.

The success of your company's growth strategy hinges on how well you assess your ecosystem's risks. How, then, can you assess these risks in a structured, systematic way? A first step is to specify the different categories of risk that ecosystems present and to understand how they relate to the markets you hope to serve. Innovation ecosystems are characterized by three fundamental types of risk: *initiative risks*—the familiar uncertainties of managing a project; *interdependence risks*—the uncertainties of coordinating with complementary innovators; and *integration risks*—the uncertainties presented by the adoption process across the value chain. The extent of these risks is intimately related to the target market in which the firm hopes to deploy its innovation. (These three types of risk and their interplay appear in the exhibit "Formulating an Ecosystem Strategy.")

Assessing Initiative Risks: How does your project measure up?

The challenges of delivering a project on time and to specification are familiar to managers, whether the innovation is an RFID chip, a breakfast cereal, or a financial services product. Assessing such initiative risks requires evaluating the feasibility of the product itself, the likely benefit to customers, the relevant competition, the appropriateness of the supply chain, and the quality of the project team. There is extensive literature about how to approach these challenges, and I will not attempt to summarize those insights here. Rather, I will focus on how innovating in an ecosystem affects a firm's efforts to manage these risks. (It is important to note, however, that the firm will need to decide which initiative risks to take on internally and which are better shouldered by a partner; which risks should be internal is not written in stone.)

Assessing Interdependence Risks: Whose projects must succeed before yours can?

If an innovation is a component of a larger solution that is itself under development, the innovation's success depends not only on its own successful completion but on the successful development and deployment of all other components of the system. Consider the expectations set for third-generation wireless networks. In the late 1990s, mobile operators collectively bid

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tens of billions of dollars for spectrum licenses with the expectation of huge revenues by 2003 from the delivery of services such as real-time video and location-based content. In assessing risk, these operators focused much of their attention on whether providers such as Nokia and Ericsson would be able to overcome considerable initiative risk to deliver 3G handsets and base stations.

In order for real-time video to become a market success, however, numerous other ecosystem actors had to develop their own distinct innovations separate from the hardware makers' challenges. For example, new software was needed to reformat live video streams to fit the different screen sizes of users' handsets. Routing software was needed to interact with the operators' CRM and billing systems. Digital rights management solutions were needed to assure content owners that their intellectual property would not be pirated. In other words, the on-time delivery of suitable hardware was necessary, but not sufficient, for the on-time deployment of the solution.

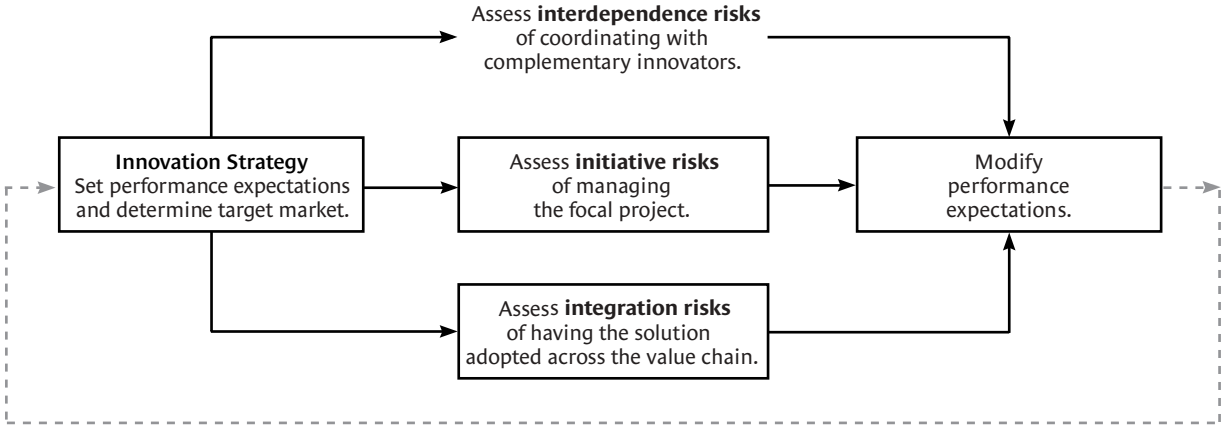
Interdependence risk speaks to the joint probability that different partners will be able to satisfy their commitments within a specific time frame. The more dependent an innovation is on other developments, the less control it has over its own success.

How should the probability of success be assessed? Traditional due diligence—consulting with managers, double-checking with suppliers, examining historical precedents—yields some confidence about a project's successful completion (to spec, on time). Similar exercises can, and should, be undertaken with all key partners.

What you find out may surprise you. Suppose four suppliers meet to discuss the attractiveness of a potential collaboration. All of them commit to assigning their best resources to their respective initiatives, and all believe that the likelihood of delivering their part of the solution within one year is very high—90%. Assume that these individual estimates are accurate. How confident should the four suppliers be in the joint venture?

Formulating an Ecosystem Strategy

Strategy making in an innovation ecosystem is iterative—it has to be, because there are so many interconnected pieces and players. Once managers develop a vision of what market they want to enter, with what offering, they come up with a tentative agreement on the performance expectations that would constitute success. They then uncover, and assess, the risks associated with that plan (interdependence risks, initiative risks, and integration risks). That risk assessment process often forces managers to revise their performance expectations and rethink their initial plan. This rethinking might entail accepting lower performance targets, allocating more resources to the project, reassigning development responsibility among the firm and its partners, changing the target market, forgoing the opportunity, lobbying the government for supportive regulatory changes, acquiring a competitor or partner, and so forth.



When they work, ecosystems allow firms to create value that no single firm could create alone.

The unfortunate nature of probability is that the true probability of an event taking place is equal to the product (not the average) of the underlying probabilities. While each supplier has a nine-in-ten chance of succeeding, the chance that they will all have succeeded at the end of the year is significantly lower. In this case, it is 0.9 x 0.9 x 0.9 x 0.9, which is 66%.

Reflect on the project review meetings that you have attended. How common is it that a room of individually confident managers recognizes the full frailty of their joint effort?

What if one of our four managers is responsible for a particularly challenging development effort, such that his probability of success is 20%? With just one weak link among the four, the joint probability tumbles to 0.9 x 0.9 x 0.9 x 0.2, which is 15%. These numerical values illustrate the argument. In real business, of course, we don't have access to such fine-grained numbers. We can, however, use simple assessments of risk—a one-to-seven scale, or high/medium/low risk across the system—and apply the same logic. In settings where risk levels are more difficult or costly to specify, going through this exercise will help identify which risk components would be of greatest value to explore in depth.

Now consider the venture—is 15% a bad number? No! There is no such thing as a bad number. There are only bad expectations. Recall that the venture capital industry is built on the expectation of 10%, where bets are made in the belief that nine out of ten investments will be losses. Fifteen percent is fine, as long as the manager is making the investment with an understanding of the true probability of success. Problems arise when the codevelopers gloss over the real risks: "My own initiative has a high chance of succeeding, and since two of my three partners are very confident, the total venture seems pretty secure."

What are the implications of one partner failing to meet its commitment? Generally, failure means delays, which can last weeks, months, or years. Managers must realize that not just the laggard but all his complementors suffer the consequences. Thus, an analysis of interdependence risk can help managers identify the unintended lags and set their expectations accordingly.

The causes of interdependence risk are numerous. Partners may be late because of internal development challenges, regulatory delays, incentive problems, financial difficulties, leadership crises—even their own interdependence with other parties. An in-depth discussion of how a firm can mitigate interdependence risks is outside the scope of this article. The specifics will vary on a case-by-case basis. Note, however, that once the cause of the problem is identified, the solution often presents itself. For instance, if complements will be late to market or will be overpriced, the firm might react by finding new partners or even moving upstream into that business (as Intel did with PC motherboards). If a complementary firm doesn't have an incentive to develop its offering, the firm might create an exclusive licensing deal so that the reluctant partner doesn't need to worry about competition. If the firm is too dependent on a single partner, it might design the product with a flexible interface. And so on.[1]

Assessing Integration Risks: Who has to adopt the solution before the customer can?

In many ecosystems, intermediaries are positioned between the innovation and the final customer. The further up the value chain an innovation resides, the larger the number of intermediaries that must adopt it before it can reach volume sales. As the number of intermediaries increases, so does the uncertainty surrounding market success.

Consider the case of Michelin's run-flat tire innovation. Unlike traditional tires, which become useless in the event of a puncture, the run-flat tire allows the driver to continue driving for 100 more miles at speeds up to 50 miles per hour, indicating its need for service with a simple dashboard light. When Michelin began developing the tire in 1992, it believed that this innovation would be as big a win as the introduction of the radial tire 50 years earlier. The company spent years and untold riches developing the tire, which it trademarked under the PAX label. However, when the tire was finally introduced in 1997, no consumer could buy it. Because the tires connect to a vehicle's electronic system, they can be used only in vehicles whose systems have been designed to accommodate them. Since electronics are added in when new cars are designed, Michelin had to wait until a willing OEM's design window opened. An average OEM takes three to four years to move a car from design to volume pro-

duction. So even if the tire is fortunate enough to be designed into a car model that enjoys market success (an outcome that is far from certain), Michelin's best case is that volume sales will begin three to four years after the tire is introduced. (As it happened, even the few willing OEMs with whom Michelin coordinated design cycles initially offered it as an option on only a very limited set of models.) Michelin still needs to consider other intermediaries as well—garages, which will need to invest in new equipment and training, and dealers, which will need to understand and support the PAX system—each of whom will have to buy into the concept before the end customer is in a position to make a purchase decision. The status of the run-flat tire speaks to the integration risks of innovation ecosystems: Nine years after its introduction, Michelin's miraculous innovation is standard equipment on only a handful of car models.

If benefits don't exceed costs at every adoption step, intermediaries will not move your offering down the line.

Recall that interdependence risk is assessed by *multiplying* probabilities to estimate delays caused by complementary innovators. Integration risk, in contrast, is assessed by *adding* adoption cycles to estimate delays caused by intermediaries.

As an illustration, think about a flat-screen manufacturer that needs eight months to bring a new screen to production. If end consumers require four months to become aware of a new product before they purchase it en masse, how should the manufacturer set expectations for the timing of revenues? Expectations of high revenues 12 months (8 + 4) from the start would be appropriate, but only if the manufacturer sells directly to end users. As an upstream component provider, the screen manufacturer will need to allow for the six months a consumer product manufacturer needs to develop the product into which the screen will be integrated. The screen manufacturer may also need to make allowances for the two-month channel lag during which the distributor stocks the product and trains its sales force. A goal of less than 20 months (8 + 4 + 6 + 2) is likely to lead to missed targets (and, hence, perceived failure).

What if the screen manufacturer could allocate additional resources to reengineer the internal development process and reduce development time by a heroic 50% (from eight months to four months)? In assessing the attractiveness of this investment, the manufacturer should recognize that although it may cut its own development time by half, its total time to market will be reduced by a more modest 20% (from 20 months to 16 months). A series of modest improvements along the downstream chain (for example, coordinating design, marketing in advance, managing channel incentives) may get the product to the consumer faster, and may require substantially fewer resources, than would attempting radical process changes within the firm.

Integration delays are rooted not just in development cycles but also in sales cycles—the time required for adopters at every point along the value chain to become aware of the product, agree to test it, accept the results of the trial, and then scale up their orders. Managing these adoption challenges is the bread and butter of the B2B sales function, but they're often overlooked when initial project goals and milestones are set. Expectations that do not anticipate these delays are bound to disappoint.

The wise analyst will carefully consider the costs and benefits of adoption for each intermediary along the chain. If benefits don't exceed costs at *every* adoption step, intermediaries will not move your offering down the line, and the end user will never have a chance to evaluate it. The cost-benefit assessment, indeed the very metrics used in the evaluation, often varies at different positions along the chain. The principles, however, are uniform. Cost includes *all* costs—direct (the price we charge) and indirect (switching costs, required complementary investments, the risk of something going wrong, and so forth).

It's easy to underestimate the indirect costs. For example, many large enterprises have software licenses for Microsoft Office that entitle them to upgrades at no additional cost, yet many have not shifted from Office 2000 to Office 2003. Clearly, price is not the hindering factor. Rather, it is the transition costs, which require that firm-specific applications built to run on the older generation (macros, forms, and related programs) be requalified and modified to run error free on the new platform. This process can take well over a year, and the cost of potential errors can overwhelm the perceived benefit.

The causes of integration risks are myriad and vary by setting. They are not, however, mysterious. Simply posing the question, "Where are we likely to face integration risks?"

will uncover many of the critical challenges, which will in turn suggest likely solutions. For example, if intermediaries are already well into their own design cycle, the focal firm can delay its own development or pay changeover costs. If intermediaries need to readjust their processes to exploit the innovation, the firm can do the reconfiguration studies for them or price its product as a percentage of realized cost savings. A mitigation strategy that warrants mention is government intervention. Particularly in complex ecosystems, such as those in health care, firms will often turn to governments in an attempt to overcome adoption inertia. For example, many IT providers are currently lobbying their governments to mandate digitized medical records. These efforts substitute one mode of delay (legislative and administrative lags) for another (the monumental collective inertia of the health care system).

The Costs—and Benefits—of Delay

Innovation ecosystems are seductive. It is easy to overestimate the potential for value creation because so many players are combining capabilities; at the same time, it is easy to underestimate the challenges, since surmounting many of them can seem like someone else's problem, not yours. Even if the market appears to be yearning for a product—think HDTV, WiMax, 3G handsets, handwriting recognition—the delays can close the window of opportunity as existing and emerging substitutes reduce the innovation's relative advantage. For example, fuel cell engines have lost

Mapping the Ecosystem

Mapping your innovation ecosystem is the best way to determine whether you have set realistic performance expectations for your innovation strategy. Following these steps can reveal where delays in getting the innovation to market might interfere with your success.

1. Identify all the intermediaries that must adopt your innovation before it reaches the end consumer.

2. Identify all the complements (other innovations needed for your innovation) required for you and each of your intermediaries to move the offer forward to the end consumer.

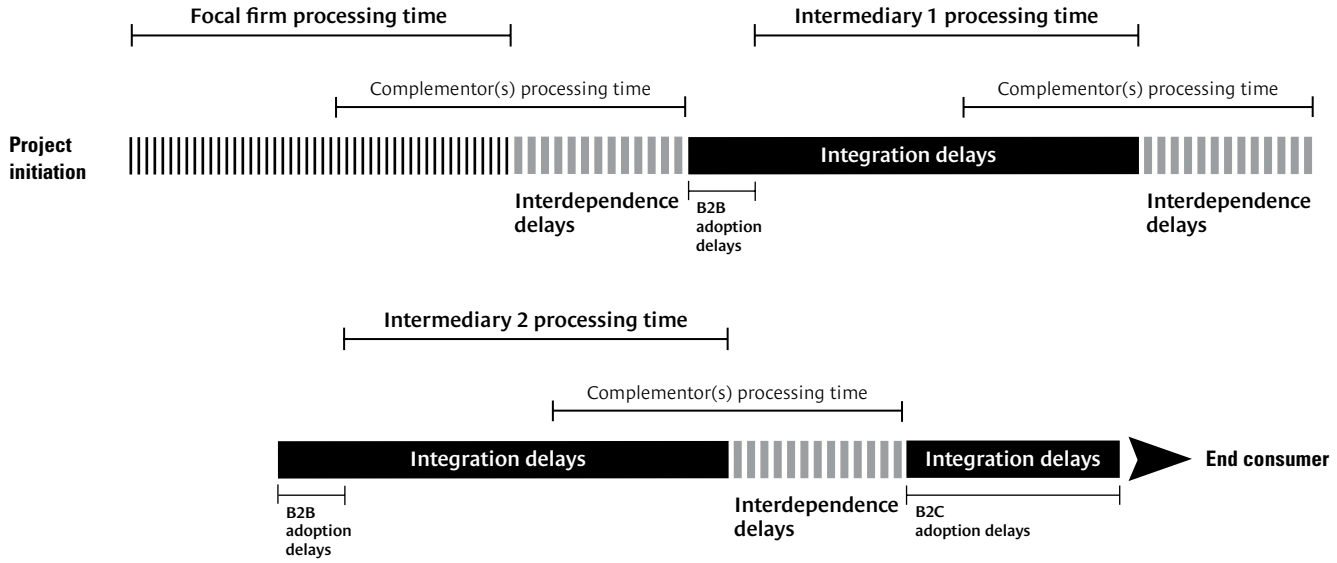
3. Estimate the delays caused by your interdependence with your own complementors (those adding to your innovation with their own innovations).

4. Estimate the delays caused by the adoption process and by the time it takes each intermediary to integrate your solution into its decisions, design cycle, products, and so forth (processing time).

5. Estimate the delays caused by the intermediaries' interdependence with their own complementors and the integration hurdles these intermediaries face in terms of adoption and processing delays.

6. On the basis of those estimates, arrive at a time-to-market for your innovation.

7. Now that you've identified these delays (the interdependence and integration risks), reassess your initial performance expectations and innovation strategy. If the expectations you set at the beginning of the process now seem unrealistic in light of the risks, then consider your options for closing the expectation gap (for example, change your expectations, markets, partners, or strategy).



some of their differentiating appeal as gasoline/electric hybrids have improved. Without a perspective on ecosystem-driven delays, managers can commit to overly aggressive targets that they will ultimately miss.

The upside of delays, though, is that in cases where an innovative firm is far ahead of its ecosystem partners, the firm may benefit from slowing down to let the rest of the system catch up. These self-imposed delays go against the grain—rushing to market almost seems hardwired in businesspeople—but they can be the logical outgrowth of a systemic risk assessment. For example, Apple Computer, with its iTunes offer, was a very late mover into the online music-retailing category, which had been pioneered in the mid-1990s. However, the category was held back by lagging complements: Without adequate digital-rights-management solutions in place, the major music labels would not condone online distribution (driving much of the action underground). Absent these critical solutions, and without the convenience of broadband connectivity, the mass market did not emerge. Apple's brilliance was not in being the first to put down a piece of the puzzle but in being the first to put down the last piece of the puzzle.

The exhibit "Mapping the Ecosystem" presents a diagram of a generic ecosystem; it clarifies the ways in which interdependence risk and integration risk contribute to delays. If you take the time to map your own system, the exercise will force you to be explicit about the timing and order in which components are expected to emerge and to confront the consequences of different delays for your innovation strategy.

Target Markets and Ecosystem Risk

The nature of ecosystem risk that an innovator will face depends on the market the innovator hopes to serve. For example, firms that make photovoltaic technologies, which convert sunlight into electricity, face very different internal and external risks in different target markets. The magnitude and character of development challenges, the required complementary innovations, and the downstream adoption requirements will vary greatly depending on whether the target market is municipal power generation (which requires generating millions of watts of power), residential backup power (a few thousand watts), or pocket calculators (a fraction of a watt).

Choosing how to trade off the size of the market opportunity and the magnitude of the inherent ecosystem risk—how to prioritize the possible options—is the essence of innovation strategy. Consider the case of pen-based computing. The holy grail, exemplified by the vision behind Apple Computer's Newton PDA, was to couple a pen interface with handwriting recognition capabilities; together, these would free users from the tyranny of the keyboard. Apple and its partners invested huge sums attempting to realize this vision and hence redefine personal computing. They ended up offering an imperfect system whose technical shortcomings led to terrible publicity and, ultimately, withdrawal from the market.

In contrast, Palm also used a pen-based interface but eliminated handwriting recognition. The technology required users to enter their data using a specially adapted symbol set, the Graffiti system, which was much easier for the product to process correctly. In doing so, Palm significantly diluted the value proposition of the original PDA and changed the size of the opportunity. The Newton had attempted to replace personal computers, whereas the Palm attempted to replace date books. Lowering its sights in this way meant that Palm dramatically increased the likelihood of success, albeit in a smaller market.

Although the run-flat tire hasn't taken off in the commercial market, it has met with success in the smaller, yet still significant, defense market, where it is used as a substitute for track treads in vehicles such as the U.S. Army's Stryker troop carrier. With fewer intermediaries, more concentrated buyers, and greater perceived benefit, the military market was a better fit, at least in the short run.

Multiple target markets are available for almost any innovation. Ecosystem maps for different target markets can vary dramatically, even when the core innovation remains the same. A complete view of the different ecosystems is the key to effectively assessing options and prioritizing opportunities.

Strategy in Ecosystems

A growing number of firms in both high- and low-technology industries are pinning their hopes for profitable growth on platforms, services, and solutions. Many of these ventures

will not meet their target expectations unless every element in a family of complementary innovations succeeds. Managing this risk is no small challenge. Failure in ecosystems is sometimes caused by technical difficulties in standalone innovations and sometimes by the difficulty of coordinating innovations across the system. Often, though, failure occurs because a market does not emerge within the time frame required to support the investment. When you compete in an innovation ecosystem, you must expect and plan for delays, compromises, and disappointments that are, to a substantial extent, outside your control. You should either craft an innovation strategy that mitigates your risks or consider forgoing the opportunity.

In some ways, this message should feel like familiar ground. Ecosystem challenges can be viewed as traditional project management challenges writ large, extending beyond the firm's usual internal boundaries to encompass external factors. That said, crafting strategy in an ecosystem requires the firm to consider traditional questions in somewhat nontraditional ways:

Where to compete. When ecosystem risks are high, markets are uncertain regardless of a firm's confidence in its own innovation. In prioritizing market opportunities, it becomes increasingly important to assess both the project and the system. A complete assessment may show that an opportunity with low internal risks and high external risks is inferior to one with the opposite risk profile.

When to compete. Development costs often rise exponentially when schedules are compressed. Such costs are justified when being first to market offers significant advantage. In an ecosystem, however, being ready with your component ahead of your direct rivals may not confer any advantage if your complementors are not ready when you are. Correct expectations of innovation interdependence and value chain integration may lead firms to slow their development cycle and, in doing so, both conserve their resources and benefit from opportunities to update their strategies over a longer time period.

How to compete. Operating in an ecosystem takes the issue of boundaries (determining which activities to undertake within the firm, which to undertake with partners, and which to take to the open market) to a new level of complexity. Beyond assessing incentives and capabilities, the firm must also address the question of ecosystem leadership. Firms face a choice between taking an active or a passive role in guiding ecosystem development. If you lead an ecosystem, you'll have a chance to tailor its development to your own strengths. (Marco Iansiti and Roy Levien in *The Keystone Advantage* and Annabelle Gawer and Michael Cusumano in *Platform Leadership* provide a rich exploration of these issues.) However, attempting to take the leadership role carries its own risks: It often requires massive resource investments over long periods of time before you find out whether the opportunity is real and whether you have managed to secure the orchestrator role. Taking a less ambitious ecosystem role also requires new choices—which leadership candidates to follow, how aggressively to commit, how to defend turf. In all cases, a clear understanding of the full ecosystem and its dynamics is critical for successful strategy.

When it comes to managing strategy execution, companies are generally on firmer ground, since they confront challenges in managing complementary innovators and adopting intermediaries every day. Established organiza-

A Note on Frameworks

Management frameworks in general, and strategy frameworks in particular, should be approached with suspicion. They rarely tell us anything we don't already know. (The elements presented in the framework this article describes, for example, are well known to anyone involved in innovation.) When approaching a given opportunity, we all have a certain intuition about what the right course of action is, and a framework will rarely change this belief. Quite the contrary—cynics will argue that most frameworks can be applied to make any decision look good. Indeed, they are correct.

My own perspective is that the value of most frameworks lies not in changing a manager's initial intuition but in clarifying the issues that arise when managers with different instincts try to debate the right course of action. A structured framework can transform the debate from a battle of guts, ultimately resolved on the basis of reputation, power, and eloquence (often in that order), into a comparison of the assumptions being made about a given situation's fundamental structure.

A framework presents elements and relationships that provide a grammar for the debate. These debates tend to be productive in that they are fine grained—people can move past areas of agreement, focus on areas of disagreement, and analyze why they hold different beliefs. They either achieve a consensus or make a decision knowing precisely where and why they disagree. In the case of disagreement, the debate will highlight critical assumptions that managers should be particularly mindful of as the venture progresses.

Bad expectations can destroy value as easily as bad execution.

tional functions take on different management tasks: Supply chain management coordinates with upstream partners, project management oversees the focal innovation, B2B and B2C marketing manages relations with downstream adopters, and business development works with complementary innovators. Managers in these roles have practiced routines for accommodating and adjusting to emerging challenges.

Although these managers' routines are often effective, it is worth reflecting on whether, and how, their *collective* input is incorporated into the initial process of setting performance expectations. Without a clear process for assessing ecosystem risks, they are unlikely to formulate strategy by seeking input from the full set of actors. The likely, and more common, process is that managers in different roles, confronting ecosystem challenges that were not considered in the original strategy, make tactical adjustments—the familiar, reactive changes to project specification, target segment, scope of the offer, partner support allocations—that collectively lead to unintended changes to the strategy. A group risk-assessment process will deliver better expectations and more relevant strategy. (See the sidebar "A Note on Frameworks.")

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Conventional wisdom holds that the success of managers depends on the results they deliver. But what is often overlooked is that these results are themselves evaluated *relative to expectations.* It is results relative to expectations that determine success or failure. In reflecting on Apple's Newton disaster, analysts have argued the problem had less to do with the performance of the Newton itself than with the sales expectations that had been set. Bad expectations can destroy value as easily as bad execution. Consider, however, the relative allocation of time, resources, and energy your firm devotes to setting project goals compared with managing the project after the goals have been determined. Setting expectations is extraordinarily important to the success of a new venture; never an easy task, it is even harder, and even more critical, in the context of new opportunities whose success depends on the success of wholly separate developments. If managers learn to assess ecosystem risks holistically and systematically, they will be able to establish more realistic expectations, develop a more refined set of environmental contingencies, and arrive at a more robust innovation strategy. Collectively, these actions will lead to more effective implementation and more profitable innovation.

1. I am grateful to my students, whose research projects brought to light many of the examples used in this article, and to Matthew Krepps for his insights on mitigation strategies.

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