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Disciplined Entrepreneurship

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For many people, entrepreneurship is about "living the dream." Recently minted MBAs and middle managers in Dilbert-sized cubicles fantasize about striking out on their own, translating a vision into reality and reaping the rewards of their efforts. In recent years, senior executives at established corporations have caught the entrepreneurial bug, too. After cutting costs to the bone, many big companies now hope to drive top-line growth by seizing fleeting opportunities before upstarts and established rivals beat them to the punch.[1]

While the pursuit of opportunity promises outsized rewards to entrepreneurs and established enterprises, it also entails great uncertainty. Uncertainty lurks in every corner and comes in many flavors: known unknowns (what you know you don't know); unknown unknowns (what you don't know you don't know); new information that is imperfect or incomplete; and conflicting signals.[2] It's not all bad news, though; uncertainty can have an upside as well: Technologies sometimes work better than anticipated or solve an even bigger problem than the targeted one, the market may be larger or grow faster than expected, or well-endowed rivals might be asleep at the wheel.

The critical task of entrepreneurship lies in effectively managing the uncertainty inherent in trying something new.[3] Investors have many tools to manage their risk, but individual entrepreneurs and managers cannot wield these same mechanisms. Venture capitalists investing in risky startups, for example, routinely syndicate the uncertainty by taking only a piece of a financing round and sharing the remainder with other investors. Entrepreneurs, of course, cannot easily band together to invest in one another's ventures. Insurance, as a practical matter, is no more promising than syndication. Entrepreneurs can rarely afford the premiums to cover identifiable risks and certainly cannot buy a blanket policy indemnifying them against business failure. Diversification — one of the most powerful tools for investors — is hazardous to the health of most new ventures, because managers and entrepreneurs lack the time, attention and money to hedge their bets.

If they cannot rely on syndication, insurance or diversification, how *can* entrepreneurs and managers cope with the uncertainty that is part and parcel of pursuing an opportunity? A few of the most common approaches are among the least effective. At one extreme, entrepreneurs can ignore uncertainty — simply jump into the fray and make it up as they go along. This

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Entrepreneurs can learn to maintain discipline while pursuing an opportunity and manage — rather than ignore or avoid — the uncertainty that comes with the territory.

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approach was favored by a generation of dot-com entrepreneurs, but given the nasty hangover that followed those heady days, few today want to party like it's 1999. This newfound sobriety has led many would-be entrepreneurs and managers to play it safe and try to avoid uncertainty altogether.[4] But the rewards of entrepreneurship are unattainable without the risks. Other entrepreneurs take a third approach, operating in perpetual fire-fighting mode. They throw themselves indiscriminately at problems large and small and often dissipate their energy in the process.

Rather than ignore uncertainty in the foolhardy hope that the business is coated with Teflon, attempt to avoid it altogether or get burned while perpetually fighting fires, entrepreneurs should instead manage uncertainty by taking a disciplined approach. Over the past five years, I have conducted systematic research into how entrepreneurs manage the inevitable risks while pursuing opportunities. (See "About the Research.") The critical task of entrepreneurship lies in effectively managing the uncertainty inherent in trying something new.[5] Depending on the results of a round of experimentation, the entrepreneur may revise the hypothesis and run another experiment, harvest the value created through a sale, or abandon the hypothesis and pull the plug.

Before discussing each step in detail, it's worth pausing to mention three important caveats. First, while these stages are presented in sequential order, the actual progression an entrepreneur follows is often much messier. For example, entrepreneurs may revise their hypotheses several times, using feedback from potential investors or partners, before they can attract the resources they need to experiment. Second, not all entrepreneurs will walk through the steps in the same way. One might spend months of agony analyzing a hypothesis with sophisticated analytical tools and extensive data, while another might conduct the first-cut evaluation in the morning and begin discussions with potential investors and employees that same afternoon. Finally, this is certainly not the only way to think about entrepreneurship, nor do entrepreneurs explicitly frame their activities in these terms. To the best of my knowledge, Bill Gates has never woken up and thought, "Well, yesterday I assembled resources to test my working hypothesis, today its time to design and run some experiments."

Those caveats aside, this model does provide insights into some of the most daunting questions entrepreneurs face — including how to screen an opportunity, how much money to raise, when to make key hires and how to use limited resources most efficiently. More broadly, the model can help entrepreneurs structure their thinking about managing the uncertainty inherent in trying something new.

About the Research

Over the past five years, I have conducted in-depth case-study research on how startups and established companies manage uncertainty while pursuing opportunities. In most cases, I employed a comparative case-study design in which a new venture or established firm that successfully managed uncertainty was paired with a similar but less successful firm. I selected research domains characterized by high levels of uncertainty, including Chinese entrepreneurs (eight paired cases), established companies in Brazil (ten paired samples) and enterprise-software (two paired samples), as well as unpaired cases in other domains, such as drug-eluting stents and low-cost airlines. I complemented my empirical research with a systematic reading of the theoretical literature on managing uncertainty in the disciplines of economics, finance, military theory and the philosophy of science. Karl Popper's model of the scientific method proved particularly influential in conceptualizing my clinical findings. My thinking was also shaped by teaching the required entrepreneurship course at Harvard Business School and through discussions with colleagues, particularly Felda Hardymon, Bob Higgins, Bill Sahlman and Howard Stevenson.

Formulate a Working Hypothesis

An entrepreneur or manager begins the process by formulating a hypothesis — a mental model that generally includes a definition of the opportunity, the resources required to pursue it, the value that would be created if it were to be successful and a plan to pursue it.[6] The model may reside implicitly in the head of the entrepreneur or it may be expressed explicitly as a business plan. It may be a rough idea sketched on the proverbial cocktail napkin or an elaborate plan replete with pro forma financial projections and detailed timelines. These are differences in degree rather than kind, however.

A working hypothesis will contain implicit and explicit assumptions about multiple variables — including technology, customer demand, competitive response and the availability of resources — each of which is uncertain. Potential interactions among these variables further complicate prediction, as does the existence of variables that the entrepreneur has failed to consider. Entrepreneurs will find it difficult to predict how customers, competitors, partners — and indeed they — will respond to unforeseen events, further complicating the difficulties of modeling the future. Given these multiple levels of uncertainty, how can entrepreneurs and managers best formulate (and reformulate) their working hypotheses? Some practical suggestions:

Keep it fluid. Framing an opportunity and the associated business model as a working hypothesis subject to verification, modification or rejection in light of new information highlights that the plan is provisional and subject to revision. It's especially

important to be flexible early in the process. Consider the research conducted by the founders of ONSET Ventures, a venture capital firm based in Menlo Park, California, that specializes in early-stage startups. When they formed ONSET, the founders conducted a systematic study of the factors that influenced the success or failure of 300 startups funded by leading Silicon Valley venture capitalists. A key finding from their research was that in nearly every case, the startup's business model underwent at least one major change (and countless minor ones) before eventually stabilizing. A common source of failure occurred when founders and investors committed to a business model too early. ONSET partners codified their insight into a rule of thumb: They expect the business model of each of their portfolio companies to change at least once before it is ready for the next round of investment.

Be sure you have the right to an opinion. Before running an experiment, entrepreneurs can screen their working hypotheses in a manner analogous to the way scientists scrutinize an underlying model before exposing it to a real-world experiment. The first step in screening an opportunity occurs when managers and entrepreneurs step back and ask themselves whether their experience or expertise gives them the right to an opinion on the specific opportunity. Understanding uncertainty is the first step in managing it and requires a deep knowledge of customers as well as competitive, technical and regulatory factors. Newcomers to an industry or region often lack the in-depth knowledge necessary to evaluate an opportunity — they may not know the right questions to ask, let alone how to answer them or where to turn for advice.

Identify deal killers and big bets. When screening opportunities, managers and entrepreneurs must overcome the tyranny of the bell curve. While many things in life follow a normal distribution pattern, entrepreneurial opportunities are not among them. The payout of most new ventures is bimodal — they create significant value if they succeed but are worth little if they fail. Would-be entrepreneurs, then, must identify potential deal killers — variables that are likely to prove fatal to the venture.

Deal killers vary by opportunity: In commercial real estate development, for example, title disputes or environmental liabilities could scotch a deal, while a software startup could be dead in the water if a deep-pocketed rival has a valid claim on the underlying intellectual property. Deal killers are often (but not always) discernable early in the process, and managers and entrepreneurs should try to bring these critical sources of uncertainty to the surface early on.[7] New deal killers may surface as the venture proceeds, while apparent ones may prove to be tractable. However, at any point in time you should be able to answer the question, What are the deal killers now?

The other hump in the bimodal distribution is the good news. Here, too, multiple variables influence possible payoffs, and entrepreneurs must clearly identify what they see as the key drivers of success. One way to do that is to ask, What are we betting on here? It could be a better mousetrap, access to a brand or technology that others lack, a critical relationship or the ability to move quicker than established players. Clarity on deal killers and big bets helps focus subsequent experiments. Note that a venture's big bet is not simply the inverse of its deal killers. In developing a new drug, for example, the big bet is on the compound's therapeutic benefits, while the deal killer is potential toxicity.

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Assemble Resources

Before testing their working hypotheses, entrepreneurs must assemble the resources necessary to conduct the experiment. They need not only hard assets such as cash, equipment and real estate but also intangible resources such as intellectual property, a network of potential employees and access to a partner's customers and distribution capability. The process of prying resources from their current uses is difficult, time consuming and easy to get wrong. Entrepreneurs can raise too little (or too much) money, hire the wrong people at the wrong time or enter into partnerships that later prove fatal. The iterative experimentation model provides insight on managing some of these common dilemmas.

Raise enough money to fund the next round of experiments. How much money to raise is a perennial dilemma for entrepreneurs.[8] On the one hand, a war chest of cash on the balance sheet is the ultimate hedge against uncertainty. Unlike such resources as specific technology or brand positioning, cash is fungible and can be deployed against any unforeseen contingency. Consider JetBlue Airways, whose founder and CEO, David Neeleman, sees a war chest as critical in the volatile airline industry. At the end of 2003, JetBlue had cash on the balance sheet equivalent to 57% of its revenues that year (versus 31% for rival low-cost airline Southwest Airlines Co.). On the other hand, stockpiling cash entails obvious costs: Entrepreneurs and managers may get sloppy and squander funds on first-class travel or fancy parties. Providers of capital generally demand control in return for their money, and founders' equity can be diluted if a large amount of money is raised at a low valuation.

Framing entrepreneurial management as a series of iterative experiments provides a way to think systematically about how much money to raise. Entrepreneurs and managers should raise sufficient capital to finance the experiment they next envision, with a cushion built in for contingencies. If the experiment fails, they've limited the investment required to buy that information. If it succeeds, the entrepreneur or manager can wave the results in front of investors to win a higher valuation in the next round.

This was precisely the approach taken by Conor Medsystems Inc., another startup based in Menlo Park. Conor has pioneered a novel cardiac stent with hundreds of small reservoirs drilled into the metal. These tiny holes can calibrate the release of drugs into a patient's bloodstream and potentially offer great advantages over the stents currently on the market. Chairman and CEO Frank Litvack believed that Conor's product could seize significant share in a market projected to grow to $5 billion by 2007. While fundraising in the spring of 2003, he decided to secure $30 million — enough money to see the company through clinical trials in both Europe and the United States and to file its product application with the U.S. Food and Drug Administration with sufficient cushion to weather unforeseen contingencies. Litvack could have raised more, but he wanted enough only for the next round of experiments.

Stabilize the business model before making key hires. Another vexing question is when to bring on top executives.[9] ONSET's research on successful startups uncovered an important pattern: Startups enjoyed a much higher likelihood of success if they delayed hiring key managers until initial rounds of experimentation had produced a stable business model. Entrepreneurs and their investors could then specify the expertise and experience they needed. Companies that hired too early, in contrast, ran the risk that the incoming CEO would come in "knowing the answer" and fail to revise the working hypothesis as experiments warranted. Firms that hire too early often get the perfect CEO for the wrong business model.

But what should the management team look like in the early iterations of experimentation before the business model is fixed? In the early stages, the key attributes are passion and flexibility. The ideal candidates look more like the "best overall athletes" than "best in class" in a specific event. The best athletes will often require guidance and help to reformulate the working hypothesis, assemble resources and structure experiments. ONSET's partners — who all have both startup and large-company experience in the industry they specialize in — may focus on helping a single seed-stage venture for as long as a year. Early-stage entrepreneurs without access to ONSET's experienced venture capitalists should actively seek out advisers to help them fill in the gaps in their knowledge.

Outsource functions that distract you from critical experiments. Entrepreneurs and managers should focus their limited time, attention and resources on experiments that reduce critical sources of uncertainty. Everything else they can afford to outsource. Consider the example of easyJet Airline Co. Ltd, one of Europe's leading low-cost airlines. When the European Union liberalized air travel in the 1990s, a host of new entrants flocked in. Over 80 new airlines entered the market in 1995 and 1996 alone, but the mortality rate was high: 17 of the 56 airlines that entered the market in 1995, for example, went bankrupt in their first year. Many of these companies failed for a very simple reason — they ran out of money.

When he founded easyJet, Stelios Haji-Ioannou was betting that European consumers would flock to low-price airlines and that he could quickly build a brand that would allow easyJet to capture a significant percentage of new customers. The deal killer in the equation was perceived lack of safety. He focused his attention on a series of low-cost experiments in marketing, advertising and public relations to attract customers and build brand awareness.

To better focus on these critical experiments, Haji-Ioannou outsourced operations that were not central to testing his brand-building hypothesis to firms specializing in catering, maintenance, baggage handling, ground personnel and fueling. He also leased planes in order to preserve capital for marketing experiments. Many of his early rivals, in contrast, bought as many planes as they could in an attempt to win market share and tried to do all services themselves, thereby spreading both financial resources and management attention too thin. Interestingly, by transferring responsibility for maintenance to a partner specializing in that function, easyJet was also able to use outsourcing to manage the deal-killer risk of an accident.

Despite the importance of partnerships, many new ventures manage them haphazardly. At one extreme, some new ventures try to do everything in-house. At the other, some ventures rush willy-nilly into dozens of partnerships with any company that will say yes, never articulating the business case for these relationships or figuring out the costs of making them work. As a result, they end up with a long list of partnerships that amount to little more than names on a press release. Partnering to focus on the key experiments can help entrepreneurs and managers get this balance right.

Design and Run Experiments

"No business plan," to paraphrase the Prussian Field Marshal Helmuth von Moltke, "survives contact with reality." There are limits to how thoroughly entrepreneurs or managers can screen a working hypothesis, and at some point they must take the plunge and test their plan in the real world through an iterative series of experiments. In the entrepreneurial context, an experiment is a test designed to reduce sources of uncertainty critical to the suc-

cess of a new venture before deciding to commit additional resources. Common examples include undertaking customer research, building prototypes, launching regional service and working with beta customers. Based on the results of their experiments, entrepreneurs may decide to cut their losses, revise their working hypotheses and run another experiment, or harvest the value they have created.

Partial experiments. Experimental design can be divided into two broad categories: partial and holistic experiments. Partial experiments reveal information about a single critical source of uncertainty. They work best when a known unknown is involved and the value and cost of obtaining the information can be quantified. They can test potential deal killers, as when a real estate developer commissions a U.S. Environmental Protection Agency assessment before buying land or an entrepreneur does a patent search to ensure that intellectual property rights are secure.

Partial experiments work best when a known unknown is involved and the value and cost of obtaining the information can be quantified.

Partial experiments can also test big bets. The founders of Boston-based Kingsley Management Llc, for example, were convinced that they had a better mousetrap in their proprietary, touch-free, automatic car-wash system. The big question, however, was whether their solution would appeal to consumers in many regions of the United States or have only niche appeal in places such as Green Bay, Wisconsin, where extreme weather and use of salt on the roads generate one of the highest rates of car washing in the country. The founders' initial screening of the opportunity and discussions with potential investors had revealed several variables that might influence consumer adoption, including whether the car washes were placed in warm versus cold regions, large cities or small towns, gas stations or supermarkets. Kingsley's founders used their initial round of funding to explicitly test consumer adoption in markets that differed on these dimensions.

Holistic experiments. In contrast to partial efforts, holistic experiments simultaneously test multiple variables and interactions among them on a small scale. Typical examples include introducing a product or service in a test market before rolling it out more broadly and building a prototype with a development partner. Such experiments work particularly well in revealing unknown unknowns. Consider the case of E Ink Corp., founded by an MIT professor to commercialize technology that could replace traditional paper and ink with a flat surface (including everything from books to posters) that could receive new content and update itself wirelessly. E Ink initially introduced its technology as a prototype in several grocery stores, where it was used to update signs in the aisles. The management team was surprised to learn from these experiments that in many supermarkets, copper roofs and aisles of metal cans blocked the wireless signals required to change the signs.

Holistic experiments also allow managers to test and refine their business models before scaling the operations. Consider Noodles & Co., a chain of restaurants specializing in cooked-to-order noodle dishes from around the world. Noodles grew from one restaurant in 1995 to 80 sites by the end of 2003. Founder Aaron Kennedy deliberately opened one restaurant in Denver and another in Madison, Wisconsin, to test the concept in two very different markets. Noodles' early experience with its first two restaurants, however, was not auspicious. The spring of 1996 brought a scathing review in a Madison newspaper, disappointing financial results for both sites and record rainfall flooding the basement of the Madison restaurant.

Rather than give up, Kennedy and his team drove from Madison to Chicago to tour successful noodle shops, compare them to Noodles sites, and decide whether to call it quits or revise their business model. Based on their research they decided to stick it out, but only after identifying 15 key changes, such as switching from steam tables to sauté lines to increase freshness and warming up the restaurants' color scheme. The Noodles team tested the modified business model in the existing sites and two new ones over the following two years. Once their revised model gained traction, Noodles began scaling rapidly by adding more than 20 new sites per year starting in 2002.

Stage experiments. Entrepreneurs can take a page from a venture capitalist's playbook and stage investments by starting with relatively low-cost tests of deal killers or big bets before proceeding to more expensive holistic experiments. The FDA's human clinical trial process for testing new drugs illustrates the logic of staging experiments. The first and least expensive step tests new compounds for toxicity (a deal killer if ever there was one) while subsequent and more expensive trials test benefits relative to established drugs.

In holistic experiments, it's important to test all the critical sources of uncertainty and their interactions. Noodles' gradual roll out of restaurants, for example, allowed the team to simultaneously test and refine every aspect of the business model, including menu, location, pricing, décor and even human resources policy. E Ink, in contrast, designed experiments that

were successive but not holistic. Its managers initially plotted their market entry in three stages — first entering the market for large-area displays (such as supermarket signs), then moving to flat-panel displays for consumer electronics and finally into paperless books. These stages allowed the company to refine the technology but not to learn cumulatively about other sources of uncertainty, since the three markets had different customers, distributors, competitors and so on. What E Ink managers learned about copper roofs and tin cans in supermarkets would not help them to succeed in the paperless book market.

Experiment creep often occurs when an experiment drags on too long. People become vested in its success and lose their objectivity.

Avoid experiment creep. Entrepreneurs must guard against experiment creep, which occurs when an experiment drags on too long, costs too much or lacks clarity about which sources of uncertainty are being tested. It often occurs when the people running the experiment become vested in its success, lose objectivity and cast their results in the most favorable terms possible. This is a tricky problem because entrepreneurs have to maintain the passion, optimism and persistence required to overcome the innumerable setbacks they will encounter when pursuing an opportunity. Designing the experiments carefully can help to strike this delicate balance between objectivity and relentlessness.

Entrepreneurs and managers can avoid experiment creep by inviting outside parties to participate actively in designing experiments and reviewing results. ONSET, for example, follows a process it calls "projection and reflection," in which the partners present their nascent portfolio companies to later-stage venture capitalists, who identify what they see as the deal killers and big bets and suggest what types of experiment would increase the startup's value by reducing key sources of uncertainty. The later-stage VCs later evaluate the results of these experiments when they decide whether to invest in the next round of funding.

Large companies also have to keep an eye on experiment creep. At 3M Co., CEO James McNerney found that company scientists were pursuing numerous projects, some of which lacked clear market potential. He and his team have injected discipline into the new-product development process: Projects are now selected more on the basis of commercial potential than on technical elegance; tighter links exist between the scientists and the business units; and investments are focused on rapidly growing geographic and product markets, such as health care, display and graphics, and China.

THE ITERATIVE EXPERIMENTATION model is designed to add discipline without killing the entrepreneurial spirit. Of course, there is more to entrepreneurship than discipline — the creativity to envision new things, the passion to follow through on a vision and the grit to execute are all essential. A disciplined approach, however, can help entrepreneurs manage the many forms of uncertainty that they will encounter on their path.

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2. Theorists have delineated multiple ways in which our knowledge of the future is incomplete, which I group under the broad term "uncertainty." These categories include: *Risk,* or a variable known to be relevant to an agent's decision (for example, financial return to investors) with a known probability distribution. See F. Knight, "Risk, Uncertainty and Profit" (Boston: Houghton Mifflin, 1921); *Complexity,* or "the minimum number of distinct variables a formula or model must possess in order to reproduce the characteristic patterns of a structure." Complexity multiplies both the number of relevant variables that must be included in a model and their potential interactions, thereby increasing the difficulty of predicting outcomes. See F. Hayek, "Studies in Philosophy, Politics and Economics" (Chicago: University of Chicago Press, 1967), 25; *Ignorance,* or "unknown unknowns," which results when a variable's existence or importance is unknown to an agent at a point in time. Israel Kirzner placed this at the center of his theory of entrepreneurial discovery. See I.M. Kirzner, "Perception, Opportunity and Profit: Studies in the Theory of Entrepreneurship" (Chicago: University of Chicago Press, 1979); *Indeterminism* that results because an agent's actions — particularly in response to unforeseen events — influence ultimate outcomes. Because the agent can respond creatively to unforeseen events, outcomes are not determined by initial conditions. See K.R. Popper, "The Open Universe: An Argument for Indeterminism" (London: Routledge, 1982).

3. Economic theory linking entrepreneurship with the management of uncertainty has a long and distinguished pedigree. The first definition of an entrepreneur, made by Richard de Cantillon in the 1750s, defined the entrepreneur's role in terms of bearing the uncertainty inherent in a new undertaking. See R. de Cantillon, "Essay on the Nature of Commerce in General" (New Brunswick, New Jersey: Transaction Publishers, 2001). More recently, the economists collectively known as "The Austrian School" studied the role of entrepreneurship and focused on entrepreneurs as economic agents who deploy resources in new uses and therefore face challenges of incomplete knowledge about the returns from the resources in their new deployment. See J.A. Schumpeter, "The Theory of Economic Development" (Cambridge, Massachusetts: Harvard University Press, 1934),

64-83; and L. von Mises, "Human Action: A Treatise on Economics" (San Francisco: Fox & Wilkes, 1996), 252-256.

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5. The philosopher Karl Popper conceptualized science as an iterative process of identifying an anomaly between existing theory and empirical data, forming a tentative hypothesis to explain the anomaly and then eliminating errors in the hypothesis by submitting it to logical scrutiny and empirical testing. This process creates new knowledge that the scientist uses to refine his understanding of the anomaly, which in turn stimulates further logical analysis and experimentation. For an in-depth description of Popper's thought, see K.R. Popper, "Conjectures and Refutations: The Growth of Scientific Knowledge" (London: Routledge and Kegan Paul, 1963). For an accessible summary see, K.R. Popper, "Unended Quest: An Intellectual Autobiography," vol. 1 in "The Philosophy of Karl Popper," ed. P.A. Schilpp (La Salle, Illinois: Open Court Publishing, 1974); and B. Magee, "Philosophy and the Real World: An Introduction to Karl Popper" (London: Fontana, 1973). While Popper's model provides insight into the entrepreneurial process, it requires adaptation to fit business. The stimulus for the process is not an anomaly between theory and empirical data, but rather a gap in the market that could potentially be filled at a profit by a novel combination of resources. It is also necessary to add a step in which the entrepreneur assembles resources to test a hypothesis.

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7. For an accessible and useful process to surface and test assumptions, see R.G. McGrath and I.C. MacMillan, "Discovery-Driven Planning," Harvard Business Review 73 (July 1995): 44-54.

8. For an in-depth and practical discussion of financial issues facing entrepreneurs, see W.A. Sahlman, "The Financial Perspective: What Should Entrepreneurs Know?" in "Entrepreneurial Venture," eds. W.A. Sahlman, H.H. Stevenson, M.J. Roberts and A.V. Bhide (Boston: Harvard Business School Press, 1999), 238-261.

9. Knight argued that the selection of managers is the single most important means of managing uncertainty because individuals vary in their propensity to bear and ability to manage them. See Knight, "Risk, Uncertainty and Profit," 291-298. Recent research has focused on the team, rather than the individual entrepreneur, as a mechanism for managing uncertainty. See, for example, K.M. Eisenhardt and C.B. Schoonhoven, "Organizational Growth: Linking Founding Team, Strategy, Environment and Growth Among U.S. Semiconductor Ventures, 1978-1988," Administrative Science Quarterly 35, no. 3 (September 1990): 504-529.

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