Intellectual Capital Management Strategy: The Foundation of Successful New Business Generation

Jack A. Nickerson, Washington University in St. Louis and Brian S. Silverman, Harvard Business School

This paper describes a process that integrates business, technology and intellectual capital strategy to identify and exploit business opportunities. It then discusses how business, technology and intellectual capital strategy are linked. The authors introduce a competitive strategy process (or model) which they call Strategy Integration Analysis (SIA). Two examples of the application of SIA by two different technology-based firms are provided which emphasize the intellectual capital and technology aspects.

INTRODUCTION

Central to most firms' profitability is the identification and exploitation of new business opportunities. In today's hypercompetitive business environment (D'Aveni 1994), firms that do not continuously develop and exploit new business opportunities quickly see their revenue growth diminish and long-term profitability sag, while competitors pass them by. Similarly, firms that fail to effectively manage their new business generation efforts see their stock price stagnate or plummet. This challenge is particularly crucial for technology-based companies, as increasingly rapid technological change has become a primary source of hypercompetition.

The challenge for managers in technology-based companies is twofold. First, how can superior business opportunities be identified? Second, how can managers best exploit these opportunities? Most critically, how can managers capture profits from new business opportunities, while reducing the likelihood of failure and losses? The business press is littered with stories about unsuccessful business launches – cases in which management mispositioned its product, failed to sufficiently understand and satisfy specific customer needs, or lost the market to second-moving competitors.

We contend that most of these mishaps occur because managers often neglect to integrate their business strategy, technology strategy and intellectual capital strategy for a new business opportunity. As a result, managers frequently fail to orient their technological strengths as sharply as possible toward the satisfaction of customer needs or tastes, or inadvertently stake out an unsustainable strategic position. Even when managers successfully marry business and technology strategy, failure to consider intellectual capital strategy may lead them to 'leave money on the table' at best, and at worst may provide an opportunity for competitive imitation to take over the new market.

This paper describes a process that integrates business, technology and intellectual capital strategy to identify and exploit business opportunities. The process reveals underlying sources of competitive advantage, generates prescriptions for the sustenance of these sources of advantage and, in particular, identifies how key interrelationships between intellectual assets, technology and business/market decisions can maintain and enhance competitive advantage.

The paper proceeds by discussing how business, technology and intellectual capital strategy are linked. We then introduce a competitive strategy process (or model) that we call Strategy Integration Analysis (SIA). To better illustrate the process, we relate two examples of the application of SIA by two different technology-based firms. Given the

focus of this journal, we emphasize the intellectual capital and technology aspects of these examples.

WHAT ARE BUSINESS STRATEGY, TECHNOLOGY STRATEGY AND INTELLECTUAL CAPITAL STRATEGY, AND HOW ARE THEY LINKED?

Effective new business generation requires effective management of technology. Many of the world's best technology-based firms have mastered the art of integrating technology strategy and business strategy. In an example made famous by C. K. Prahalad and Gary Hamel (1990), Canon has sustained enormous success for nearly two decades by concentrating on deepening its optics technologies and identifying new business opportunities in which to exploit these optics capabilities. Similarly, many leading firms have devised ways to link their technology strategies with their business strategies by identifying key technological capabilities and/or establishing linkages between technology and marketing personnel. At the very least, firms have diversified into new business to which their existing technological strengths appear to be applicable (Silverman 1997).

However, even many of the firms that have successfully linked business and technology strategy fail to recognize the link between effective intellectual capital strategy and both business and technology strategy. Intellectual capital includes intellectual property (IP), such as patents, trademarks, copyrights, trade secrets and trade dress, as well as intangible assets like idiosyncratic knowledge, relational capital and reputational capital for which no IP exists. Intellectual capital (IC) management involves the establishment of monitoring, measurement and management practices that secure intellectual assets for use by the firm and that scan the environment for competitive threats to/opportunities for these intellectual assets.

Most important, IC management includes processes that enable managers to make strategic business and technology decisions with insight into the implications that these decisions will have for the firm's intellectual capital strategy and vice versa. Firms that fail to do this are likely to fail to capture their share of profits from a new business opportunity as competitors and complementors (i.e., upstream and downstream suppliers and buyers) who have superior intellectual capital positions capture a supra-normal share of the profits.[1]

Effective intellectual capital strategy integration can protect a firm's key technologies from imitation or pre-emption and guide its choice of business and technology strategy; ineffective strategy integration may allow a firm's technological advantage to slip away or lie dormant. Additionally, effective IC management can provide an early warning system for potentially competing technologies thus allowing managers to take pre-emptive steps; ineffective intellectual management may leave the new business team caught flatfooted.

Effective IC management can enable the new business to extract maximum value from its product by protecting all potentially relevant assets; ineffective IC management may allow other firms to siphon away some of this value. In sum, effective intellectual capital strategy integration empowers a firm to control its business and technological destiny; ineffective strategy integration leaves this control in the hands of others.

How can firms link business, technology and intellectual capital strategy to identify and exploit new business opportunities? We propose integrating these strategies through a process we call Strategy Integration Analysis (see Figure 1).

STRATEGY INTEGRATION ANALYSIS: FOUR FUNDAMENTAL DECISIONS

How should a firm tackle a new business opportunity (NBO)? Strategy Integration Analysis (SIA) is based on the premise that a successful new business strategy rests on identification, protection and exploitation of those unique/idiosyncratic assets/investments that allow a firm to gain and sustain competitive advantage in the NBO. A comprehensive new business strategy is composed of four interdependent decisions, each of which is fundamentally related to the nature of these idiosyncratic assets. A firm with a new product idea must:

1. target a specific set of customers and identify product features that these customers value (what Porter 1980 calls "choosing a 'strategic position'").
2. identify other investments valued by its targeted customers that must be made to support its strategic position.
3. select and invest in a production technology to efficiently produce the requisite set of product features given this strategic position.

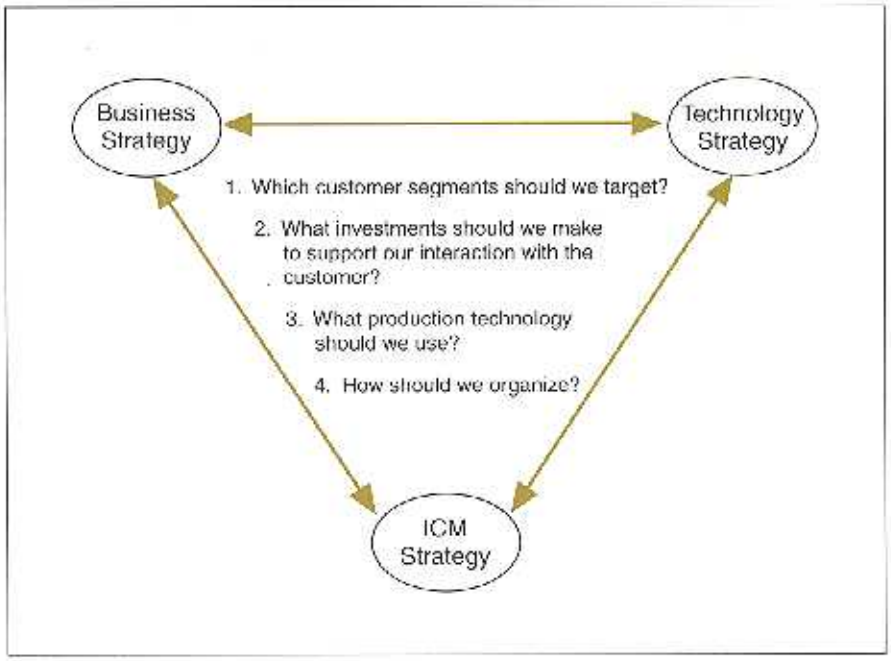

Figure 1: Strategic decision-making for a new business opportunity

4. determine the optimal organization of the venture (e.g., What do we do in-house? What do we contract out? How should we structure relationships with complementors? Which IC management practices should we adopt?).

We contend that these four decisions are interdependent – for example, the optimal production technology may differ depending on the customer segment targeted, the optimal organization of the venture depends in part on the nature of investments made to support the firm-customer transaction, or the organizational forms available to the firm may constrain which strategic positions it finds profitable – and in turn these four decisions are dependent on the nature of unique resources providing competitive advantage in the NBO.

One implication of this is that managers can not accurately compare different strategies until they have thought through all four of these decisions for each strategy, because different strategies will attract different sets of customers and incur different costs (and therefore different profits) at each level of decision. Below, we describe these decisions in more detail.

1. *Targeting customers:* Consciously or unconsciously, a firm stakes out a strategic position whenever it competes in a business. A firm's strategic position is evident in its choice of product features and in the types of customers it attempts to attract. Since in most markets, customers differ in their preferences and willingness to pay, firms choose different strategic positions to attract their targeted customers. For example, Porter (1980, 1985) describes three generic strategic positions: cost leadership, differentiation, and focus.

   Any strategic position must be supported by some kind of idiosyncratic assets if it is to provide competitive advantage. If a firm pursues a 'cost-leader' strategy, the only way it can outperform other firms pursuing such a strategy is if it has some idiosyncratic resource that enables it to achieve lower costs than its competitors.[2] Similarly, a firm pursuing differentiation must have some idiosyncratic resource/asset that distinguishes its product from its rivals' products. Thus a key factor in deciding which customer segment(s) to target requires understanding what idiosyncratic resources of value to the NBO the firm already has, and what idiosyncratic investments firm can make.

2. *Investments in the customer transaction:* Selling to a particular set of customers is often facilitated by investments not embodied in the product. For instance, attracting some customer types may require investments in intangible assets such as reputational or relational capital (e.g., a brand name; a reputation for providing a quality product, reliability, after sales support, or fair dealing). Other investments in tangible assets such as a presence in particular distribution locations or certain retailers and shelf space also may enhance a firm's attractiveness. These investments are made in the customer transaction because they support the exchange between firm and customer, but are not part of the product bundle that exchanges hands. Importantly, many (but not all) of these investments are idiosyncratic – that is, rival firms with investments in different

resources can not easily use those resources to gain advantage in the NBO. Thus, relying on idiosyncratic investments can benefit a firm by making its products more attractive to a targeted set of customers and by creating barriers to entry for potential rivals.[3]

3. *Investments in production cost technology:* Targeting a particular set of customers also has implications for the production cost technology employed by the firm. In our framework, technology can encompass the entire value chain and includes all knowledge involved in the design and production of a product. The production process, including individual processing steps and plant layout, are also important elements of technology.

   The choice of technology has two strategic implications. First, the product's feature set for the target customers may require investments in idiosyncratic technology, which includes but is not limited to know-how, intellectual property, human assets and physical assets. These investments provide important sources of competitive advantage by providing either barriers to entry or exchangeable assets to ensure design freedom (Nickerson 1996). Second, choosing the lowest production cost technology, which depends on the product and production quantities expected, also may require idiosyncratic investments in physical plant and equipment. Identifying alternative technologies and the extent to which each technology is idiosyncratic is one of the principal challenges of applying SIA.

4. *Choice of organizational form:* Whether investments are idiosyncratic or not is central to strategy analysis because of their influence on the choice of organizational form. We maintain that the choice of organizational form is a function of the extent to which investments in the customer transaction and in the production cost technology are idiosyncratic. At its most basic level, the choice of organizational form is about the choice of ownership. Which activities should the firm own and undertake in-house and which activities should the firm procure on the market through some type of contract?

   Williamson (1985, 1996) and others have argued that firms should keep in house those activities that involve idiosyncratic investments, and contract out those that rely on generic assets.[4] Ownership offers advantage when assets are idiosyncratic because contracts with other firms may lead to costly haggling, adaptation and hold-up problems after the contract has begun. In addition, important knowledge about key idiosyncratic assets is more likely to leak out through such contractual arrangements. When assets are generic (i.e., not idiosyncratic), contracting for them on the market offers the more efficient organizational form.

   For those assets owned by the firm, the question is how to organize the activities? Should the firm employ a centralized or decentralized structure? Should it organize workers functionally or into teams? Should workers be provided with incentive contracts or not and, if so, how should the contracts be structured? Should the firm in-license or out-license technology? Again, several authors have pointed to the role idiosyncratic assets play when choosing an organizational structure (Argyres 1995; Nickerson 1997; Teece 1982; Williamson 1985, 1996).

SIA and intellectual capital

Of particular interest is the role of IC management in these decisions. IC management plays a key role in determining organization of the venture – for example, a firm that has effectively protected its key technologies has a much stronger position from which to negotiate with potential complementors. Firms with a strong IP position can use it to ensure design freedom thereby removing constraints on the choice of technology. Similarly, IC management can affect the investments in the firm-customer transaction – for example, a firm that precludes competitive imitation through effective protection of key technologies may not have to spend as much on customer relationships since customers have fewer alternatives to choose from. In fact, IC management can dramatically affect each of these four decisions.[5]

STRATEGY INTEGRATION ANALYSIS: A SIX-STEP PROCESS

Identifying and exploiting opportunities is best accomplished by tightly linking business, technology and IC management strategy through SIA. Most firms have the requisite knowledge

embedded in their organizations to provide answers to the crucial questions. However, few know how to elicit this information even in an *ad hoc* manner.

We outline below a systematic model to integrate business strategy, technology strategy and intellectual capital strategy to maximize a firm's ability to successfully identify superior business opportunities and organize to extract value from these opportunities. This method is not a cheap fix – it requires dedication of significant effort and person-hours from the multiple functions involved in developing a new technology-based business. However, when put into practice this strategy integration approach can dramatically increase the likelihood of successful new business generation.

The following methodology can be used with any business, be it technology-, service- or even resource-based. Nevertheless, in this paper we focus on its use for technology-based businesses. The methodology is summarized in six steps:

- Step 1. Assemble a multi-disciplinary team including business, technology and legal personnel. The appropriate team should include members from R&D, marketing, patent counsel and possibly manufacturing, and should include the manager of the new business opportunity.
- Step 2. Identify and select a target market and position. This typically involves the creation of a rough business plan detailing targeted customer segments, likely product features, perceived value added and nature of competition.
- Step 3. Identify investments and technology. One way to do this is to start by identifying the value chain of the major activities related to the new business opportunity. We then identify each product or process technology that is relevant to each activity, as well as any transaction-supporting investments required at each activity. We term the result a 'technology value chain' or 'technology tree'.
- Step 4. Identify unique or idiosyncratic technologies that form the basis of competitive advantage by comparing the firm's technology and intellectual position with that of potential competitors. Note that this comparison is done with explicit reference to the proposed business plan, and thus is anchored to bottom-line business strategy rather than to purely technological dimensions.
- Step 5. Choose optimal organizational and IC management configuration based on the preceding four steps. Lay out action plan for mutually reinforcing business technology and intellectual capital strategies.
- Step 6. Evaluate expected profitability of this integrated strategy; repeat process from Step 2 onwards to compare this strategy to other potential integrated strategies.

As suggested above, identifying idiosyncratic technology assets is a principal challenge. Hence, we use two illustrations from our experience implementing SIA to describe each of these steps in greater detail, focusing primarily on the identification of idiosyncratic assets and their implication for IC management and strategy.

ILLUSTRATION 1: CHIPCO

ChipCo, a division of a Fortune 500 firm that produces semiconductors, had recently experienced rapid growth with a series of successful products. ChipCo's products principally consisted of semiconductor chips to original equipment manufacturers (OEMs). ChipCo's management believed that the division's success derived from being first to market with a product that met a new international standard and from aligning its business and technology strategy.

Recently, ChipCo had come under increased competitive pressure not only from competitors introducing similar products, but also because it was the target of a number of patent infringement lawsuits. ChipCo had paid little attention to IC management, and in particular IP management, even though it owned a substantial portfolio of patents. Management's goal was to use Strategy Integration Analysis to develop and implement an IC management strategy to support its current business and technology strategy while minimizing the likelihood of future litigation. The following illustration describes a pilot project undertaken to meet ChipCo's goal.

- Step 1: Before putting together the relevant team members, it was determined that ChipCo's semiconductor manufacturing process was comparatively generic and thus was neither a principal source of competitive advantage nor a source of pending patent litigation, which was centred on various elements of the product's design. As a result, a team comprising the marketing manager,

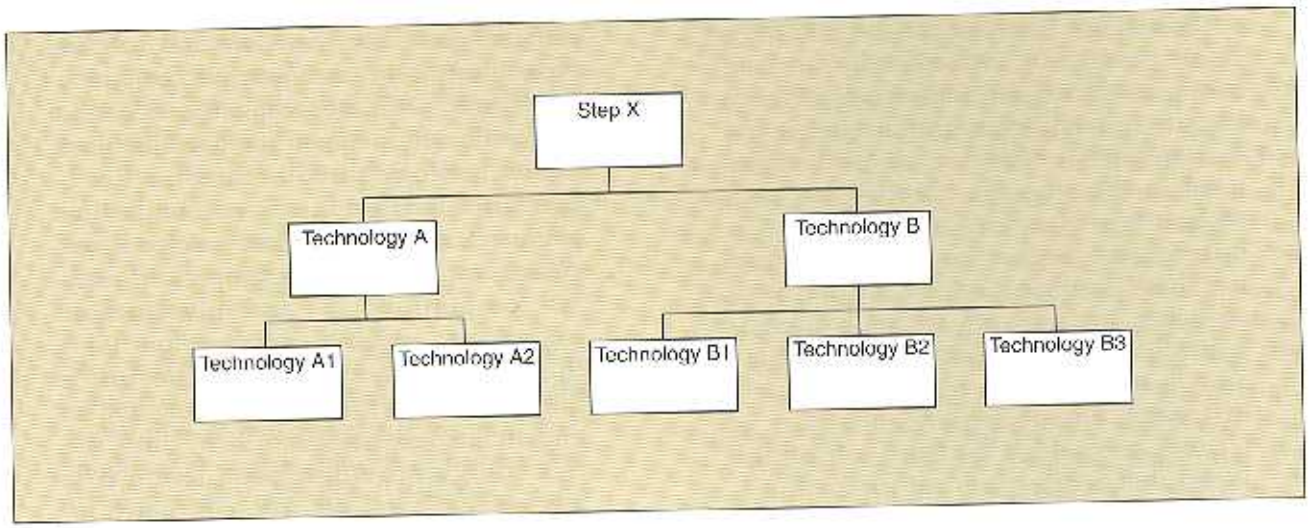

Figure 2: Branch of ChipCo's technology tree

division patent counsel and his assistant, several electronic design engineers, and two facilitators was formed – no manufacturing personnel was invited to join.

- Step 2: Given that the goal was to support ChipCo's current business strategy, only one market position, its current one, was assessed. The team concluded that the firm's success was based on a first mover advantage in providing mass market communication components to OEM and personal computer manufacturers. ChipCo had been the first to introduce a new generation of products that met a new industry standard. It focused on component sales instead of integrating forward into circuit boards and systems. Team members concluded that if ChipCo could be the first mover in future generations, its focus on OEM and personal computer manufacturers would prove highly profitable for at least the next couple of product generations.
- Step 3: The team concluded that ChipCo's market position (and market success to date) was supported by several idiosyncratic investments in the customer transaction. First, it had developed relationships with board and system manufacturers that used its components. Investments in these relationships were ongoing and were believed to provide a competitive advantage for introducing and selling its next generation of components. Second, it had invested in a service and support capability for its components. Engineers provided design and manufacturing support to its customers. These services helped its customers design and debug products and get to market quickly. In some instances, ChipCo engineers would design the customer's entire product.

ChipCo's technology value chain was complicated by several factors. Semiconductors have an extremely complex technology value chain because of the large number of processing steps in production (typically greater than 200) and the large number of electronic technologies that are integrated onto a single die (for instance, each die can contain millions of electronic devices). Working backwards from the final product, the team identified four major steps in producing its semiconductor components: packaging, testing, production and design.

In theory, developing a technology value chain (or tree) requires the identification and evaluation of each and every technology employed in each one of these steps. The team simplified their analysis by focusing on technology embodied in component design because the team identified this area as the principal locus of idiosyncratic technology and current litigation. Constructing a technology tree was further complicated by the fact that ChipCo sells a number of different components, each with different functions and technology. The team chose for the pilot phase a prototypical component noting that several of the component's critical functions and technology could be found on many of its other high volume products.

A technology tree was constructed for a single product by incrementally working backwards from the finished product to identify each and every manufacturing and design step. At each step, all technologies used in the step are identified – each technology is a node on the tree. For instance, the steps immediately prior to a finished semiconductor are final test, assembly, dice and test – we could continue with this process through all production and design steps if need be. In some instances, a node represents a class of technologies which are close substitutes. When this occurs, each substitute also is identified and included in the tree as a node or sub-node.

Figure 2 provides a specific illustration of a branch of the technology tree developed by ChipCo's team. Step X is a class of technology used in the design of ChipCo's product. The present generation product relies on technology A and future generations are expected to rely on technology B. Technology A can be implemented in two imperfectly substitutable ways: technology A1 or technology A2. Technology B can be implemented in three imperfectly substitutable ways: technology B1, technology B2 or technology B3. Note how both current and future products can be included in the same tree.

Step 4: After identifying the technology tree, each node was analysed to identify idiosyncratic technology. Identification required a comparative analysis for each node for which the team identified eight different questions. These were: (1) does the technology rely on an employee's tacit knowledge; (2) is the technology needed to satisfy the international standard; (3) does the technology provide a feature/performance advantage over competing products; (4) does the technology lower customers' cost for using the product *vis-à-vis* competitors; (5) are substitutable technologies available to competitors; (6) is the technology, if employed, a source litigation risk; (7) what is ChipCo's patent and license position; and (8) does the technology provide a production cost advantage *vis-à-vis* its competitors. Responses to each question were scored from minus three (disadvantageous) to plus three (advantageous) with zero representing a neutral score.[6]

The team evaluated questions by undertaking a patent search for each technology node as well as calling on marketing, technical, and legal experts whenever necessary (although the team collectively possessed almost all the requisite expertise). Figure 3 provides an illustration of analysis results for the technology tree branch reported in Figure 2.

Numerical evaluations for questions run from left to right in each node with the first row of numbers corresponding to questions one through four and the second row of numbers corresponding to questions five through eight. While the detailed analysis of each node is not offered, it is important to note that Figure 3 suggests ChipCo has

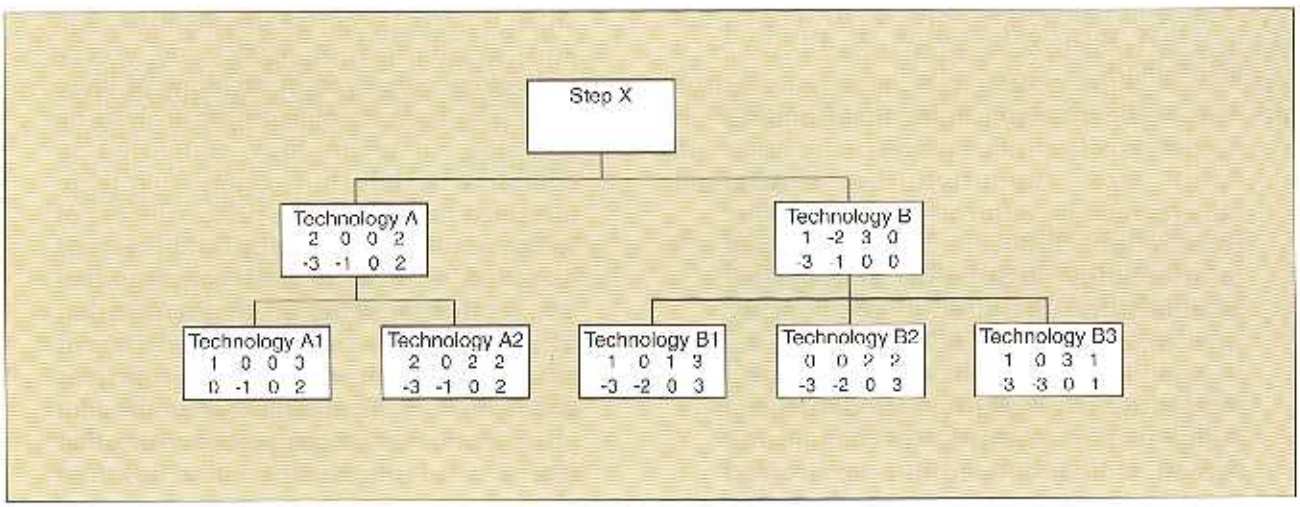

Figure 3: Branch of ChipCo's technology tree after nodal analysis

employees with idiosyncratic knowledge in A2. Also, although several technological substitutes are available for both technology A and B, ChipCo has a disadvantageous patent position in all nodes and may face litigation if it attempts to develop products with these technologies or attempts to design around the technology.

Step 5: By analysing all of the patent tree's nodes, the team quickly discovered weaknesses in the way they managed intellectual capital as well as unexpected weaknesses in their business and technology strategy. The technology tree analysis revealed that ChipCo: (1) faced a litigation risk in its present product generation in several critical nodes; (2) had a disadvantageous patent position in two technologies that were key to future product generations; (3) an employee had developed an innovation that was key for future product generations but the innovation was at risk of appropriation because no patent had been filed; and (4) had hired an engineer who had highly specialized skills that were critical for future product generation but for whom no special steps had been taken to ensure his tenure.

These observations formed the basis of two sets of recommendations. First, options for dealing with ChipCo's disadvantageous position in its current and future product generations were identified. ChipCo's strategic position (i.e., future product features) could be modified to avoid nodes in which it had a disadvantageous IP position. ChipCo could invest in strengthening its IP position in technologies that could be used in exchanges with competitors to gain design freedom. Also, it could seek out licenses or partner with patent owners who were not direct competitors it its markets. The team recommended that the incentives and employment contract for employees with idiosyncratic and strategically important knowledge be structured to guard against unanticipated departures.

Second, the team recommended that SIA be integrated into its ongoing business planning activities to facilitate identifying technologies in which pre-emptive patenting offers strategic advantages and for tracking which patents are embodied in ChipCo products. Also, insights developed by this process could be used to guide both future market position selection and R&D investment decisions.

ILLUSTRATION 2: 'CHEMICAL BROTHERS'

'Chemical Brothers' is a Fortune 500 firm involved in production of commodity and specialty chemicals. A stand-alone group within the firm has responsibility for new business generation. Recently this group had dedicated a team to investigate the potential for combining existing technology with newly developed compounds to create a new type of chemical compound with unusual properties. The team management had identified literally dozens of potential applications for the new product; some of these applications would require a new way to 'deliver' the chemical compound, and all of them would require some type of hardware to 'respond' to the chemical compound. Chemical Brothers had little prior experience with such delivery and response technologies.

Management was concerned that: (1) it could not make an informed decision about prioritization of these applications, and (2) it might fail to ensure that the firm would capture the bulk of the resulting benefits. IC management at the firm typically involved communication between R&D personnel and patent attorneys with little input from business/marketing personnel. The management team was concerned that this system might lead to an inappropriate level or scope of intellectual property protection to support the new business. Management's goals were thus to use Strategy Integration Analysis to: (1) improve its business action plan and (2) ensure that it pursued an intellectual capital strategy that in conjunction with its business and technology strategy, would enable Chemical Brothers to capture the greatest possible share of profits from the venture:

Step 1: The team initially included the four engineers most closely involved in the development of the relevant technologies, the marketing manager for the new business project, the corporate patent attorney who had written and filed the company's existing patents in the relevant technological areas, and the business manager for the project. As the project progressed and it became clear that other technologies within the firm were also relevant, several additional engineers were brought onto the team.

Step 2: After several attempts to simplify the myriad of potential applications, the team settled on a categorization of potential customers according to size of customer and characteristics of customer needs (e.g., frequency, likely purchase order size,

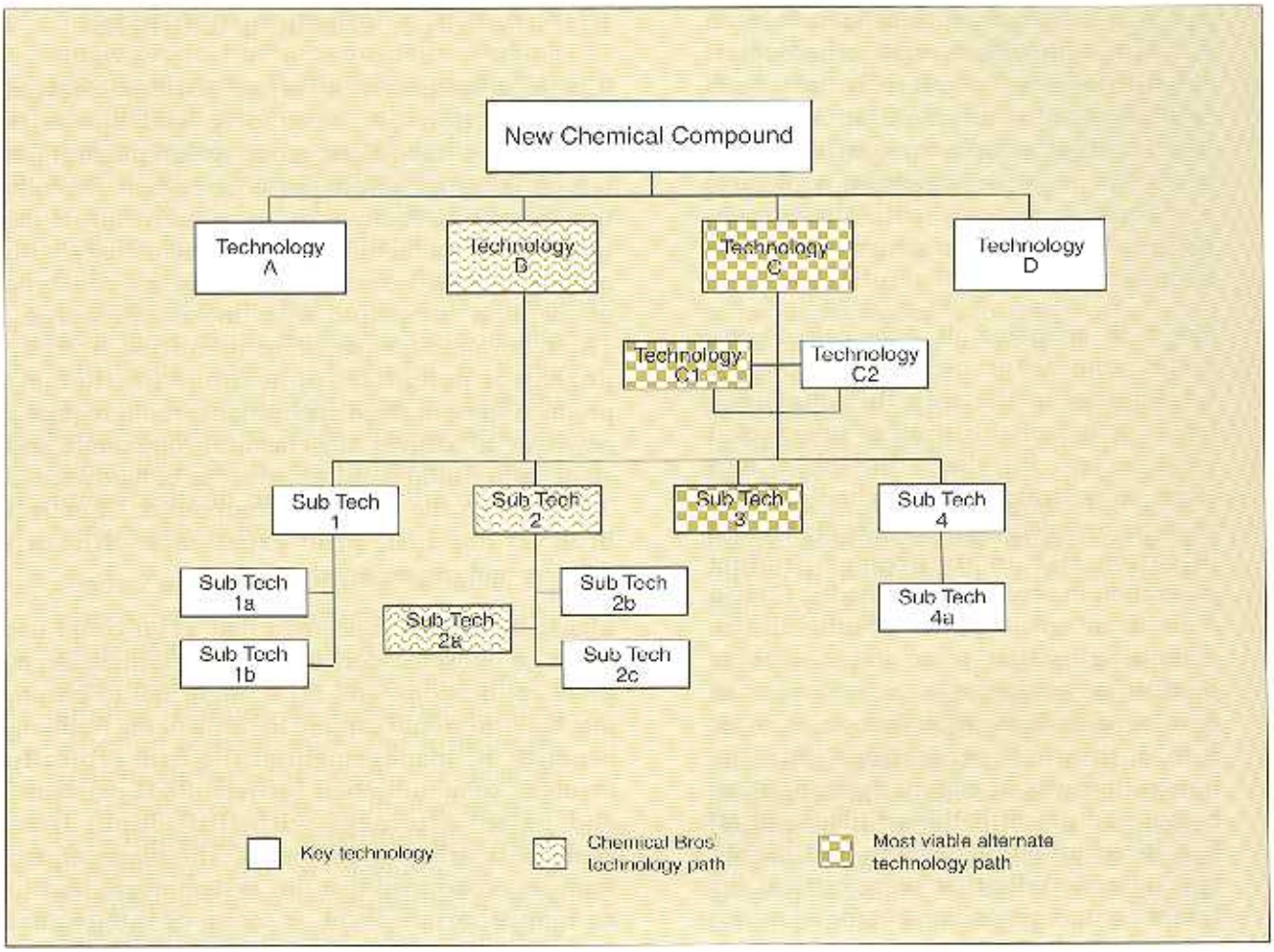

Figure 4: Strategic decision-making for a new business opportunity

requirement of complementary products to use this product, etc.) and the degree to which the application required other elements of a system. This reduced the overwhelming range of applications to a relatively simple matrix and allowed the team to concentrate on representative applications from each of several cells.

Step 3: The team diagrammed the technology tree for each of two representative applications which differed primarily in the way the chemical compound would be 'delivered'. While initial attempts adhered closely to the value chain, the team found through subsequent iterations that following a hierarchical tree structure made more sense for their business. Working down from the top of the tree, the team identified three technologies it considered key to securing competitive advantage in the two applications. Two of these were expected to provide superior properties to the chemical compounds and one was perceived to offer cost advantages in the large-scale production of these compounds. In addition, the team identified two alternate technologies that it considered the most potent threats to its chosen way of meeting customer needs in these applications (see Figure 4).

Step 4: The team identified its competitive position with respect to these key technologies by undertaking a patent search in which all patents relevant to each technology were identified, the patent documents were obtained, and the engineers and patent counsel assessed relative position by ranking these patents according to dominance and scope. The completed technology tree revealed to the team their level and source of competitive advantage at each of the key technologies. It also revealed in which technologies the firm held a superior or inferior intellectual property position. Finally, it identified: 1) specific IP gaps to be exploited, and 2) specific patents assigned to other firms

whose licensing-in would enhance Chemical Brothers' competitive advantage in the new business.

For the second application's technology tree, it became clear that Chemical Brothers had no competitive advantage in delivery of the product, and, in fact, could not gain much negotiating leverage with the firms that did have control of this type of delivery. Chemical Brothers was thus at risk of having its profits expropriated in applications requiring this type of delivery.

Finally, the team diagrammed the technology tree for the 'response' hardware needed to complement its new product. The team identified two technologies it considered crucial for this piece of the system to work properly. Of particular interest, the team recognized that at least one of these crucial technologies could be influenced by Chemical Brothers: specifically, by altering its chemical compounds, Chemical Brothers could alter characteristics of the response hardware's 'trigger'.

It is important to note that while the analysis in steps 3 and 4 was largely driven by the engineers on the team, the team members from other functions played a large role in ensuring that the decisions about key technologies were based on business and IP criteria rather than on solely technological grounds.

Step 5: Based on the above analyses, the team revisited its matrix of potential applications. Given the need for some applications to rely on outside development of a delivery system and given the team's perception that Chemical Brothers would have to give up too much of the gains from the product and proprietary information about the product to work with any of the prospective deliverers, the team decided to focus its efforts on those applications for which delivery was less of a concern. Given the new focus on a narrower set of applications the team was able to identify a small set of existing customers, with whom Chemical Brothers already had a close relationship, to serve as beta test sites. This, in turn, suggested some further investments in specific customer relationships that the team might want to make to ensure successful (and closely-held) beta test results.

Regarding the technology and IC strategy, the team identified specific technologies to receive top priority in terms of technological advance and intellectual property protection, which provided input for future R&D allocation decisions. Given the gaps in existing patent protection identified by the team, in conjunction with the revised prioritization of potential applications, the team also developed a set of goals for scope of IC coverage in the next set of patents on the key technologies. In addition, given the identification of two alternate technology threats and the team's assessment of patenting in these areas, the team established a set of procedures to monitor technological advances in these fields, with particular attention devoted to research by particular companies.

Finally, as it became clear to the team that: (1) a great deal of the gains from this product could go to the providers of response hardware if the team was not careful, but that (2) the team could influence the nature of competition in the response hardware area. The team developed a coherent plan of action to: (1) develop technological improvements that would affect the response hardware characteristics, (2) aggressively pursue IP protection for these improvements, explicitly including the response hardware elements and (3) use the resulting IP as a bargaining chip in subsequent licensing negotiations with potential hardware providers.

DISCUSSION AND CONCLUSION

In this paper we described a process called Strategy Integration Analysis that integrates business strategy, technology strategy, and IC management strategy in the context of new business opportunities. SIA, we argued, facilitates the identification of superior business opportunities and their exploitation by revealing underlying sources of competitive advantage, generating prescriptions for the sustenance of these sources of advantage, and in particular identifying how key interrelationships between intellectual assets, technology and business/market decisions can maintain and enhance competitive advantage. Assessing potential opportunities with SIA allows managers to maximize returns from pursuing new business opportunities because it helps them compare the expected profits and sources of advantage for each alternative.

The paper illustrated SIA with two case studies. In the first illustration, ChipCo had successfully integrated its business and technology strategy, but paid little attention to its IC management. Lack of attention was manifest in several IP lawsuits filed against the company. Undertaking an SIA based in its current strategic position, the principal idiosyncratic assets on which ChipCo's present and future business success rests were identified. The analysis revealed that ChipCo's business strategy was at risk from additional litigation, a disadvantageous patent position for future product generations, appropriation of patentable but as of yet unpatented innovations, and an employment contract for a highly specialized engineer that did not provide adequate incentives to ensure his tenure. These risks were used as a basis for recommending IC management practices and modifying ChipCo's business and technology strategy to strengthen its current and future business opportunity.

> "Effective intellectual capital strategy is crucial to the strategic analysis of new business opportunities."

In the second illustration, Chemical Brothers investigated a new business opportunity in which dozens of potential applications for a new technology had been identified. Chemical Brothers' principal challenges were to identify which applications offered the greatest business potential and to ensure that the firm appropriated the profits generated by these applications. The narrow, detailed focus provided by the SIA enabled Chemical Brothers to: 1) identify a small set of applications with superior profit potential, 2) develop strategies regarding protection of key intellectual property and investment in key customer relationships of importance given these applications, and 3) establish procedures to monitor developments in the few competing technologies that posed potentially serious threats to Chemical Brothers' approach.

As these two case studies illustrate, effective intellectual capital strategy is crucial to the strategic analysis of new business opportunities. When properly integrated with business and technology strategy, intellectual capital strategy is a formidable competitive weapon that can serve as the linchpin for new business success. ❑

Notes

[1] Brandenburger and Nalebuff (1996) define a complementor as follows: "A player is your complementor if customers value your product *more* when they have the other player's product than when they have your product alone." An alternate definition of complementor is a provider of complementary assets needed to successfully commercialize your product (from Teece, 1986).

[2] If the resource were not idiosyncratic or unique, rivals would be able to buy or imitate it and the firm's advantage would be eroded.

[3] At the same time, of course, a firm that makes an idiosyncratic investment to support its strategic position in an NBO will suffer a loss in value should it redeploy the investment to its next best use.

[4] Thus, investments in idiosyncratic intangible and tangible assets to support a firm's strategic position are best organized under common ownership, integration. Additionally, Masten *et al.* (1991) have described another type of idiosyncrasy in which time and space considerations lead to integration. For instance, if the opportunity cost to an assembler for a single input delivered late is high, integration is preferred to arms-length contracts.

[5] In *Co-opetition*, Brandenburger and Nalebuff describe Nintendo's successful strategy for entering and dominating the video game industry. They analyse Nintendo's strategy of pricing its console (hardware) at or below cost to generate installed base, and making its profits on video game (software) royalties. But why didn't Atari, the incumbent, recognize Nintendo's plan and imitate or pre-empt Nintendo? In fact, Nintendo's security chip – which prevented unlicensed video games from being played on the Nintendo system – enabled Nintendo to pursue a below-cost penetration strategy because the firm could ensure that it would earn money on every video game subsequently sold. Atari did not have such a chip, and thus could not license the right to make software for the Atari system, and therefore could not ensure that it would earn profits from video game sales. Without this guarantee, Atari could not price its console as aggressively as Nintendo. While Brandenburger and Nalebuff discuss the value of the security chip for ensuring quality and enforcing royalty

payments, they do not discuss the effect of this intellectual capital on permitting Nintendo to pursue strategies not available to the incumbent firms.

[6] For display purposes, the comparative rankings were also colour coded from red (-3) to white (0) to green (3), which allowed for quick visual identification of advantageous as well as disadvantageous nodes.

Bibliography

Argyres, N. S., "Technology Strategy, Governance Structure and Interdivisional Coordination," *Journal of Economic Behavior and Organization*, Vol. 28, 1995, pp. 337-358.

Brandenburger, A. M. and Nalebuff, B. J., *Co-opetition*, New York: Doubleday, 1996.

D'Aveni, R. A., *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*, The Free Press, New York, 1994.

Masten, S. E., Meehan, J. W. and Snyder, E. A., "The Costs of Organization," *Journal of Law, Economics and Organization*, Vol. 7, 1991, pp. 1-25.

Nickerson, J. A., "Strategic Objectives Supported by Licensing," in *Technology Licensing*, Sullivan, P., and Parr, R. (Eds.), J. Wiley, New York, 1996.

Nickerson, J. A., *Toward an Economizing Theory of Strategy: The Choice of Strategic Position, Assets, and Organizational Form*, Dissertation, Walter A. Haas School of Business, University of California at Berkeley, 1997.

Nickerson, J. A. and Silverman, B. S., "Integrating Strategic Positioning and Transaction Cost Economics: An Operationalization of Fit in the Interstate Trucking Industry," Working Paper, Washington University, John M. Olin School of Business, St. Louis, 1997.

Porter, M. E., *Competitive Advantage*, The Free Press, New York, 1985.

Porter, M. E., "What Is Strategy?" *Harvard Business Review*, Vol. 74, 1996, pp. 61-78.

Prahalad, C. K. and Hamel, G., "The Core Competence of the Corporation," *Harvard Business Review*, Vol. 68, pp. 79-91.

Silverman, B. S., "Technological Resources and the Direction of Corporate Diversification: Toward an Integration of the Resource-Based View and Transaction Cost Economics," Working Paper, University of Toronto, Rotman School of Management, 1997.

Teece, D. J., "Towards an Economic Theory of the Multiproduct Firm," *Journal of Economic Behavior and Organization*, Vol. 3, 1982, pp. 39-63.

Teece, D. J. "Profiting from Technological Innovation," *Research Policy*, Vol. 15, 1986, pp. 286-305.

Williamson, O. E., *The Economic Institutions of Capitalism*, The Free Press, New York, 1985.

Williamson, O. E., *The Mechanisms of Governance*, Oxford University Press, New York, 1996.

Professor Jackson Nickerson may be contacted at Washington University in St. Louis, Campus Box 1133, One Brookings Drive, St. Louis, MO 63130, USA. Tel: +1 314 935 6374, Fax: +1 314 935 6359, E-mail: nickerson@simon.wustl.edu.

Professor Brian Silverman may be contacted at the Harvard Business School, Soldier Field Road, Boston, MA 02163, USA. E-mail: bsilverman@hbs.edu.