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STRATEGY AS GUIDED EVOLUTION

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In this paper, we build on a detailed case study and the theories of evolution in social and cultural systems and intraorganizational ecology to develop a model of strategy as guided evolution. Its primary distinctions from earlier models of organizational and intraorganizational ecology lie in (i) the incorporation of an important—yet realistic—role of top management in shaping the direction and outcomes of the evolutionary processes within firms, and (ii) the incorporation of human and social capital as a critical unit of selection within such processes. We describe the model and discuss the evolutionary and ecological processes associated with it. Copyright © 2000 John Wiley & Sons, Ltd.

INTRODUCTION

In the past few years we have seen an increasing interest in using evolutionary and ecological perspectives in the domains of strategy and organization theory. Important intellectual foundations for this work include the seminal contributions of Nelson and Winter (1982) and Hannan and Freeman (1977), who were among the first to systematically use evolutionary and ecological perspectives to theorize about formal organizations. Their work, in turn, owed much to the contributions of Hawley (1986) and Campbell (1969), who were the pioneers in applying evolutionary and ecological perspectives to social science.

Evolutionary and ecological perspectives have been applied at many levels of analysis, including intraorganizational evolution, organizational evolution, population evolution, and community evolution (see Baum and Singh, 1994, for an overview). In this paper our focus is on intraorganizational and organizational evolutionary and ecological processes (e.g., Burgelman, 1994; Miner, 1994; Noda and Bower, 1996; Barnett and Hansen, 1996). More specifically, we aim to contribute to this perspective by building on a grounded case study to develop a model of strategy as guided evolution. In this model, we conceptualize an organization as an ecological system purposefully designed to guide the evolution of strategy.

The proposed model of strategy as guided evolution has five main elements (see Figure 1). First, there are two *units of selection* in the model: strategic initiatives and human and social capital. Second, the firm's strategic intent defines the *objective function* in the model. As such it reflects top management preferences of the future direction of the firm. Third, *administrative systems*—which include formal structures and organizational routines—serve to facilitate the replication of a natural selection environment inside the firm, thus enabling and guiding the strategy process without traditional, hierarchical mechanisms of command and control. Adminis-

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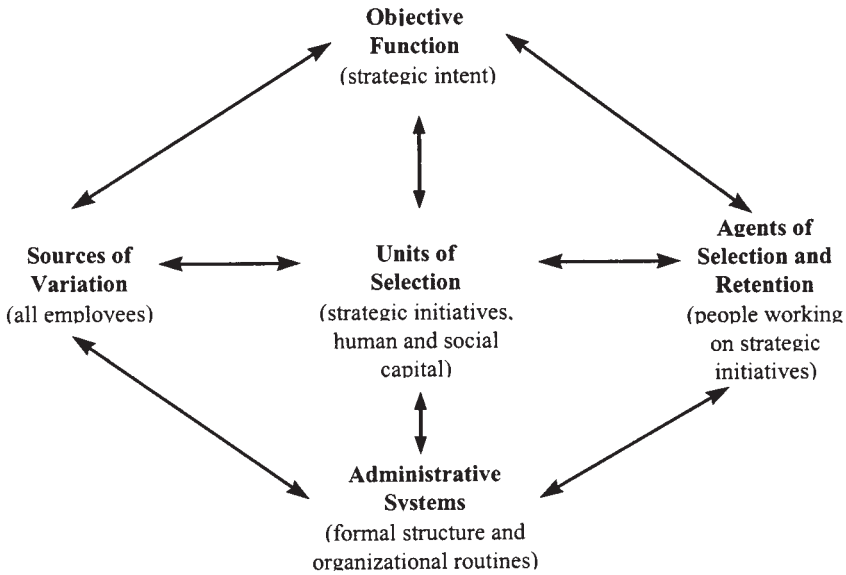

Figure 1. The five elements of guided evolution

trative systems are also exogenous to the model. Fourth, the *sources of variation* in the strategic processes in principle include everyone who may have relevant knowledge of the issues in question. Fifth, the *agents of selection and retention* are multiple, and effectively include everyone who works on a strategic initiative. The sources of variation and the agents of selection and retention are endogenous variables in the model.

The proposed model posits a more active and important role of top management than is implied in organizational ecology (e.g., Hannan and Freeman, 1989; Baum, 1996) which until recently assumed that attempting strategic change is damaging to firm survival and performance, and does not address the role of managers in strategic change processes. It does so by including a role for management in creating and guiding evolutionary and ecological processes within the organization, which in turn helps the firm adapt to, or enact, changes in the external environment. At the same time, it also proposes a role of top management that is more realistic than in strategic adaptation theory (e.g., Child, 1972), which assumes that organizations change at will, and that strategic change is frequent. It does so by explicitly accounting for the important role of inertial forces and evolutionary and ecological processes in shaping the strategy and performance of firms.

The proposed model of strategic management as guided evolution is, in certain ways, similar to Burgelman's (1991, 1994) model of strategy making as intraorganizational ecology. Nevertheless, it differs from that model in one important way. In Burgelman's (1991, 1994) model, the intraorganizational ecological processes operate outside and in addition to the formal mechanisms of the firm. In contrast, our theorizing is grounded in the findings from a field study of a firm that actively tries to leverage evolutionary and ecological forces to manage the processes of formulating and implementing strategy. Hence, in the proposed model, evolutionary and ecological forces do *not* operate outside and in addition to the formal strategies, structures, and systems of the firm, but rather as an integral and important part of these. As we will argue throughout this paper, this difference has several fundamental consequences for how we understand the role of evolutionary and ecological forces in shaping the strategy and performance of firms.

The idea that the evolution of an organization can be guided through indirect intervention in natural evolutionary processes is not new. March (1994: 45), for example, has explicitly discussed this possibility: 'The idea is not that any imaginable organization can be designed and built but that natural developmental processes … can be affected significantly by relatively small, timely interventions. The engineering of evolution involves understanding those processes well

enough to intervene in history and produce organizational effects.' In our model of strategy as guided evolution, it is precisely such interventions that define the role of top management in shaping the strategy and performance of firms.

We will proceed to develop our arguments as follows. In the next section, we will describe the company in which we carried out our field study, and explain the research methodology we adopted. In the main section we will then build on the findings from the case study and on the literature on social and organizational evolution (e.g., Campbell, 1969; Nelson and Winter, 1982; McKelvey, 1982; Boyd and Richerson, 1985; Burgelman, 1991, 1994) to develop our model of strategy as guided evolution. In this section we also discuss the evolutionary and ecological processes in the proposed model, explicating theoretical links within and between levels of analysis as well as with the external environment. Finally, in the last section, we discuss the limitations of our theorizing and the boundary conditions of the proposed model, before we conclude by describing the theoretical merits of the proposed model.

METHODS

We pursued our research in two stages, combining inductive and deductive methods to develop the proposed model. In the first stage of the research we studied the processes of strategic decision making and resource allocation in a Denmark-based multinational firm, which relies on projects as the main way of organizing work. A qualitative method was chosen as the best way to arrive at an encompassing model of strategy making in project-based organizations. Thus, concerns of external validity were traded off against the opportunity to gain insight into an as yet incompletely documented phenomenon (Yin, 1989; Eisenhardt, 1989).

In the second stage of our research—after a descriptive model had been developed—we relied on existing theories of both strategic processes (e.g., Bower, 1970; Burgelman, 1991, 1994) and evolution in social systems (e.g., Campbell, 1969; Nelson and Winter, 1982; Boyd and Richerson, 1985) to inform the development of a theoretical model of strategy as guided evolution. By building on strategy process theory, we sought to go beyond the descriptive logic of the grounded model, and develop a theoretical model based on existing concepts from the literature. At the same time, by explicitly framing the model within an evolutionary perspective, we hoped to benefit from both the internal consistency and the demonstrated explanatory power of this perspective (Van de Ven, 1992).

Research setting

This research is the result of an 8-month study of the interrelationship between strategic decision making and administrative systems at Oticon, a Danish hearing aid company. In the following paragraphs we present some historical information as well as the most relevant company and industry characteristics at the time of the fieldwork.

Company and industry background

Since its founding in 1904, Oticon has played a leading role in the hearing aid industry worldwide. Over this time period, the growth and development of Oticon have progressed through five distinct phases. From 1904 to 1946 the company was a small family-run business that sold U.S.-produced hearing aids in Scandinavia and parts of Russia.

In 1946 Oticon entered the second stage of its development and started its own production of hearing aids in Denmark. This stage was characterized by high growth in demand for hearing aids, and between 1951 and 1958 sales had increased by a factor of 20.

The third stage—which lasted from 1959 to 1974—was characterized by global growth and expansion. In this period, Oticon established subsidiaries in the Netherlands, the United States, Switzerland, Norway, West Germany, Denmark, Great Britain, Japan, Italy, New Zealand, and France, and was represented by agents or its own subsidiaries in nearly 100 countries worldwide. During most of this time period, Oticon enjoyed about a 15 percent share of the worldwide market for hearing aids.

In the fourth stage—which lasted from 1975 to 1986—Oticon focused on consolidating the results of the growth in the previous period, and on streamlining its R&D activities and manufacturing operations. During this time period, engineering and financial control were the dominant concerns of the company, and the organization

became increasingly professionalized in a functional-hierarchical structure.

The fifth stage was triggered by the successful introduction in 1987 of a new dominant design (Tushman and Anderson, 1986) by Starkey, an American producer of hearing aids. In an 18-month period, Oticon's share of the worldwide market for hearing aids was reduced from 14 percent to 9 percent, and the company lost more than half of its equity.

In 1989, Oticon entered the fifth stage of its development, which was characterized by radical change and restructuring. The four senior managers of the company—who had been in charge since 1958—were replaced by Lars Kolind, a much younger executive brought in from the outside. In the first 2 years of his tenure, Oticon became profitable again through massive cost cutting and accelerated development of a few selected products already in the pipeline. Market share, however, remained at 9 percent, and it was not obvious that the company would be able to remain competitive after this short period of intense streamlining and cost cutting. In the second phase of change, Lars Kolind initiated some radical changes in Oticon's market coverage, strategy, organizational structure, and value systems, which collectively amounted to what Anderson and Tushman (1990) have described as an attempt to 're-create' a company. In addition, during this period, the company also changed its office location in Copenhagen, and moved into new headquarters with a new and different organization of offices and work places.

Company and industry situation at the time of the field study

At the end of 1993, when the field study was carried out, the worldwide market for hearing aids was estimated to be DKK (Danish kroner) 6 billion, of which Oticon held a 10.5 percent market share, which equated to a net turnover of DKK 661 million. In 1993 net turnover grew by 23 percent, up from 13 percent the year before. In that year, the company employed an average of 1073 people.

Three main strategic goals characterized Oticon from the re-creation in 1991 and throughout 1993. First, the company's explicitly articulated strategic intent (Prahalad and Doz, 1987) was global dominance, both in terms of market share and geographical coverage. Second, Oticon had decided to focus its efforts on sales to the hearing clinics that served the higher ends of the market. This was believed to create efficiencies in terms of the cost of operations, and in terms of better exploitation of the sophisticated, but expensive, technical solutions of the company. Third, Oticon was determined to combine its traditional strengths in the technical dimensions of R&D and manufacturing with a better understanding of the needs of the market segments it served.

In the re-creation of Oticon, which took place in April 1991, the administrative systems of the company had changed significantly. As mentioned above, as a part of the change process Oticon had moved into new offices, specifically designed to support an organizational structure that relied almost entirely on the use of projects. Except for the top management group, all work was organized in temporary project groups, with their own staff and budget. Any strategic initiative of Oticon—for example a decision to develop and launch a new product targeted at Japanese children and teenagers—would be the responsibility of such a project group. Functional expertise was organized in interest groups, and each employee was expected to have a working knowledge of two functional disciplines. There were no departments, and there were only three levels of formal hierarchy: top management, project leaders, and regular employees.

Advantages of studying the strategy process at Oticon

While our initial contact with Oticon was serendipitous, we elected to carry out a detailed field study in this company because of three features that made the company attractive from both a theoretical and a practical perspective. First, the company relied almost entirely on the use of temporary projects for the organization of work. This allowed us to observe the strategy process in project-based organizations in a 'pure' form. Second, Oticon was involved in all the activities normally associated with a large manufacturing company (research, product development, manufacturing, marketing, and sales). This introduced activities and levels of complexity in our data that are typically not available in studies of traditional service organizations (consulting, investment banking and so on), which rely on

projects for the organization of work. Third, although headquartered in Denmark, the company was global in that it had subsidiaries in most developed markets in the world. This introduced another element of complexity, with the resulting possibility that the findings from the study could be more relevant for other large, complex firms.

Data collection

Data were collected both from primary and secondary sources. The primary sources included 32 semistructured individual interviews with 25 different people at all levels and areas of the organization, as well as with several external consultants and researchers who were believed (by people working at Oticon) to know the company very well (see Table 1 for a list of people interviewed, and their associations with Oticon).

The data collection process started in April 1993 with a 3-hour interview of CEO Lars Kolind in Oticon's headquarters in Copenhagen. On this occasion, one project leader and two regular employees were also interviewed. Over four subsequent visits to the headquarters in the next 8 months, additional interviews were conducted with four more members of the top management group, two project leaders, as well as three employees. Later, in the course of a visit to the company's main manufacturing facility in Thiested, Gotland, the vice president of manufacturing and the vice president of purchasing and logistics were interviewed, together with three employees working at the plant. We also interviewed the CEO of the Swedish subsidiary, who had earlier led several important projects at headquarters, together with two employees in the company's office in Stockholm. Finally, the CEO of

Table 1. Interviewees and their association with Oticon

Interviewees Association of interviewees with Oticon in 1993 (except as stated)		Number of interviews
1.	Chief Executive Officer	1
2.	Chief Financial and Operating Officer	1
3.	VP Finance	1
4.	VP Information technology	1
5.	VP Purchasing and Logistics	1
6.	VP Manufacturing	1
7.	VP Operations	3
8.	Head, Norwegian subsidiary and former VP	1
9.	Head, Swedish subsidiary	2
10.	Project leader responsible for the development of Multifocus	2
11.	Project leader of a strategic initiative aimed at the American market	1
12.	Project leader who worked at the Multifocus project and managed other strategic initiatives	1
13.	Employee at headquarters with secretarial training	2
14.	Employee at headquarters with background and training in engineering	1
15.	Employee at headquarters with background and training in marketing	1
16.	Employee at headquarters with training in engineering and background in logistics	1
17.	Employee at headquarters with secretarial training and background as executive assistant	1
18.	Employee at Swedish subsidiary with background in marketing	1
19.	Employee at Swedish subsidiary with background as technician	1
20.	Employee at main plant in Thiested with background in logistics	1
21.	Employee at main plant in Thiested with background in production	1
22.	Associate with background in manufacturing	1
23.	Doctoral student at Copenhagen Business School who spent several months observing Oticon	1
24.	Manager with a large IT and management consulting firm responsible for designing and implementing the IT system supporting Oticon's project structure	1
25.	Former head of American subsidiary and project leader, now with a major management consulting firm	3

the Norwegian subsidiary, who had been with the company for more than 20 years, was interviewed by telephone.

Some people not employed by Oticon at the time of the research also provided valuable information about the company. A former project leader at Oticon's headquarters in Copenhagen, and later the CEO of the American subsidiary, had subsequently joined a major management consulting firm. He was interviewed in France three times in 1994 and 1995. A doctoral student at Copenhagen Business School who had studied the company on a previous occasion directed our attention to some issues the dominant coalition at Oticon were not likely to bring to our notice. We also interviewed a manager of a major IT and management consulting firm who was in charge of a project advising Oticon on the design and implementation of a new IT system supporting its project structure.

In the first stages of the research, the interviews helped us to develop an understanding of the strategy process at Oticon, and how this process influenced—and was influenced by—the company's strategic goals and administrative systems. At the later stages little new information was obtained, and the interviews gradually became a way of testing for the validity of the data, as well as testing for the internal validity of our conclusions and the model that we were developing. Repeated interviews and discussions in France with the former CEO of the American subsidiary were particularly useful in this regard.

Secondary sources were also used to collect background information about Oticon. Such sources included: annual reports and news clippings; internal documents written by Lars Kolind describing the formal strategy, the expected functioning, and the administrative systems of Oticon after the re-creation effort in 1991; a book about the 'new' Oticon written (in Danish) by Per Thygesen Poulsen (1993); and two teaching cases written at INSEAD and IMD about the 'new' Oticon.

Data analysis

Date analysis consisted of two different processes, which were carried out in two different time periods. In the first period—which lasted from April 1993 to May 1994—the first author iteratively collected and analyzed data necessary to develop a descriptive model of the strategy process at Oticon. During this stage, the interview notes were first transcribed, and then arranged and systematized according to topics by a research assistant working with the first author. The descriptive model was then developed in cooperation between this assistant and the first author. The research associated with this first part of the data analysis, as well as the collection of data, was done as part of a research project supported by the Norwegian Fulbright Foundation and the Association of Norwegian Business and Industry.

The second part of the data analysis started in January 1996, and was done by the first and second authors. The purpose of this stage was to use evolutionary theory to develop the descriptive model into a theoretical model of resource allocation in project-based organizations. This analysis proceeded in a process of iterating between the descriptive model and the literature on organizational evolution and ecology (e.g., Campbell, 1969, 1994; Nelson and Winter, 1982; McKelvey, 1982; Boyd and Richerson, 1985; Baum and Singh, 1994; March, 1994; Miner, 1994; Meyer, 1994). This iterative process made it possible to develop the purely descriptive model into a theoretical model compatible with the variation, selection, and retention framework, as it has been applied to evolution in social and cultural systems (Campbell, 1969; Boyd and Richerson, 1985).

A MODEL OF STRATEGIC MANAGEMENT AS GUIDED EVOLUTION

In this section we present our model of strategic management as guided evolution. As described in the introductory section, the model consists of five main elements, viz., (1) strategic initiatives and human and social capital, which are the units of selection; (2) strategic intent, which defines the objective function; (3) administrative systems, which facilitate the evolutionary process; (4) sources of variation; and (5) agents of selection and retention in the evolutionary process, both of which potentially include every employee of the company. We will develop the model by defining and discussing each of the five elements, and then describing how these elements are linked together by a process of guided evolution. To

help guide the reader through the discussion, our arguments are summarized in Table 2.

Strategic initiatives and human and social capital: the units of selection

There are two units of selection in the model; strategic initiatives, and human and social capital. We will discuss each in turn.

Strategic initiatives

The first unit of selection in the model is 'strategic initiatives.' By a 'strategic initiative' we mean a deliberate effort by a firm at creating or appropriating economic value from the environment, which is organized as an independent project with its own profit and loss responsibility.

A key strategic initiative at Oticon was the development, production, and marketing of 'Multifocus'. As an early attempt at commercializing the use of a microprocessor to automatically control the sound level and tone of a hearing aid, Multifocus represented an attempt at introducing a new dominant design in the hearing aid industry (Anderson and Tushman, 1990). Until then, the user had controlled adjustment of the sound level and tone on all hearing aids manually. The technological principles needed to develop such a design had been invented by engineers working at Oticon's center for psychoacoustic research 13 years earlier, but had not been pursued further due to anticipated problems in product development and manufacturing.

In the early 1990s, Oticon was being left behind in the competition for introducing new products in the hearing aid industry. While their competitors were introducing new products that made use of computer-controlled programming, Oticon had nothing new to offer. To address this problem, Lars Kolind, CEO at Oticon, decided that he wanted to sponsor a strategic initiative aimed at developing and commercializing the technology invented in the research laboratory 13 years earlier. His very first act was to recruit Jes Olsen as project leader responsible for the day-to-day management of the initiative, and together they recruited a group of people interested in working on it. After the initiative was defined with a clear goal and business plan—including financial targets—and had attracted its own staff, the top management group agreed to finance it. The strategic initiative was then established as an independent project with its own profit-and-loss responsibility. From an early stage the group working actively on the strategic initiative included two product development engineers, one employee working in manufacturing, and one employee with marketing expertise. As the strategic initiative progressed—and the tasks and problems associated with it evolved—the different employees who became involved in the project included people with engineering, manufacturing, and marketing expertise. Even after the successful launch of Multifocus, the strategic initiative remained as an independent profit center, which sourced resources from manufacturing and marketing.

It should be noted that *not* all strategic initiatives survived the initial stages to become a part of the firm's product line. A strategic initiative could be canceled during, or after, product development, during attempts to establish a commercially viable manufacturing system, or even after market introduction, due to lack of customer interest. Multifocus is an illustrative example because it helps illuminate all the different stages of the development of a strategic initiative, and because it demonstrates how various tasks and functions normally organized and implemented by different departments are coordinated and considered the responsibility of the group working on the strategic initiative.

The evolution of strategic initiatives

Strategic initiatives are subject to evolutionary processes and ecological forces in both an external and an internal market. In the external market, the evolutionary process is defined by the introduction of a new product or service in the marketplace (variation), its initial capacity for appropriating resources in the external environment (selection), and its capacity to do so in later time periods (retention). These processes take place in the context of the other products and services (competition).

The internal processes differ from the external in two main ways. First, competition is not between strategic initiatives competing to appropriate resources in the external environment, but between the alternative strategic initiatives a firm may choose to invest their resources in pursuing. Second, the processes of variation (which stra-

Table 2. A model of strategic management as guided evolution

	Exogenous independent variables		Endogenous independent variables		Dependent variables
	Strategic intent	Administrative systems	Sources of variation	Agents of selection and retention	Units of selection
Definition of variable	Those long-term goals which reflect the preferred future direction of the firm, as envisioned by top management (Prahalad and Doz, 1987).	The basic way in which tasks are divided and work is organized in the firm (Chakravarty and Doz, 1992).	Those who identify/suggest new variants of the units of selection	Those who decide which suggestions will be acted on, and those who decide which of the existing ways will be continued.	The units the selective system is operating on.
	In this model: Top management's decision and articulation of the one main ambition of the firm.	In this model: The organization of all work in relatively independent projects, and the use of practice groups to retain and develop functional expertise.	In this model: Everyone working in the organization	In this model: Everyone (veto principle) working on a strategic initiative	In this model: 'Strategic initiatives' and 'human and social capital'.
Role of variable in the model	Defines the objective function—and thus the preferred outcome—of the strategy process.	Enable and facilitate resource allocation according to a logic of guided evolution.	Provide variance which the selective-retentive system may operate on.	Determine which new variants (of the units of selection) to select, and which previously selected variants to retain.	Focus the strategy process on those variables considered most important to the strategic adaptation of the firm.
Why important in the model	Necessary to define direction and legitimate claims on resources in the strategy process (Winter, 1994) Helps focus variation; reduces disturbances to the existing adaptive system.	The administrative system is necessary to make it in people's self-interest to contribute to the organization's adaptation, and to give them guidelines for how to do so.	Serves to elicit a broad/diverse set of suggestions.	Serves to enable selection and retention based on the knowledge of a large group of people.	The main way (strategic initiatives) and the main resources (human and social capital) the firm relies on to create and appropriate economic value.
Important issues related to the variable	Must remain stable over time periods (Campbell, 1969). Nestedness and maladaptation (March, 1994): 'copying errors' and unintended mutation, recombination, and hybridization of human and social capital (McKelvey, 1982; Nelson and Winter, 1982).	Most people adapt to organizational cues as opposed to the environment (Meyer, 1994). 'Whole–part' competition means that 'firm-level adaptations will be under continual undermining pressures' (Campbell, 1994: 38).	The diversity and general 'quality' of the variation. There must be enough variation for the selective systems to operate on (Campbell, 1969)	Variation-selection is at the expense of the already achieved adaptive system (Campbell, 1969)	For the evolutionary process to function satisfactorily in social systems, there are certain requirements to the frequency, independence, and importance of the units of selection (Campbell, 1969, 1994)

tegic initiatives are suggested), selection (which are started), and retention (which are retained) are not determined by market forces, but guided by beliefs about how a strategic initiative will perform (variation and selection) or informed by knowledge of how well it is actually performing.

The Multifocus example illustrates these processes and their interrelationships. Processes of variation, selection, retention, and competition in the external environment contributed to Lars Kolind's belief that Oticon needed such a product. Specifically, Oticon's main competitors were launching similar products (variation); these products sold well when they were first introduced (selection), and continued to do so in later time periods (retention). As a consequence, Oticon was losing market share (competition).

These external processes, in turn, influenced the internal processes at Oticon, as exemplified by Lars Kolind's suggestion to develop Multifocus (variation) and the selective agent's decision to do so (selection). Once launched in the external market, Multifocus proved to perform well (external competition), which influenced the selective agent's decision to continue to invest in it in later time periods (internal competition and retention).

There are two main advantages of considering strategic initiatives as a unit of selection. First, strategic initiatives are typically (though, as we will discuss, not always) defined in terms of a firm's relationships with the external environment. They represent the means by which the firm expects to justify its existence and create and appropriate economic value from the environment. Whereas 'routines' (Nelson and Winter, 1982), or 'comps' (McKelvey, 1982), or even 'resources' (Wernerfelt, 1984) are rather general constructs and are likely to direct attention only to the internal functioning of the firm, strategic initiatives direct attention to the relationship between the firm and its environment. Second, strategic initiatives reflect a level of organizing that is becoming increasingly common. Under labels such as 'self-managing teams,' 'project groups,' and 'profit centers', large complex companies appear to be creating small, relatively autonomous entities responsible for one or more strategic initiatives. As a result, strategic initiatives are likely to be easily identifiable and empirically observable.

Human and social capital

The second unit of selection is 'human and social capital.' We define human capital as 'knowledge, skills, health, and values' which are embodied in people (Becker, 1993: 16). We define social capital as 'relations among people which have the potential to facilitate productive activity' (Coleman, 1990). Both Becker and Coleman emphasize that human and social capital serve a similar function to physical and financial capital in facilitating economic activity.

Although human capital and social capital are separate concepts, we refer to them as one unit of selection because in the context of variation, selection, and retention they are both embodied in people,[1] and cannot be separated from one another, or from the person in which they are embodied.[2] Also, as a unit of selection, human and social capital complements the unit of strategic initiative. Whereas strategic initiatives refer to *what* the firm plans to do to justify its existence, social and human capital represents the resources that will define *how* the firm plans to do those things.

When Lars Kolind 'recruited' Jes Olsen to take responsibility for managing the day-to-day operations of the Multifocus project, he tried to anticipate some of the difficulties that were likely to be associated with this strategic initiative. Resistance from engineers and people working in manufacturing—who shared the conception that it would not be possible to develop and manufacture a product like Multifocus—would require a

[1] More precisely, social capital is embedded in the *relations* between people, not embodied in the individual person. However, for practical purposes one cannot select on these relations, but has to select on the people who hold the social capital defined by these relationships. If, however, selection was understood to operate at the group level, it would make sense to talk about selection operating at the level of the relationships between these people. This, however, would fail to take into account the relationships between members of the group and those who were not members of the group. Only by understanding selection as operating on the social capital possessed by an individual is it possible to take into account the larger network. What we lose by understanding selection to operate at the level of the individual employee is the extent to which recruiting someone to a strategic initiative changes the patterns of relations in which this person is embedded, and that we therefore change an individual's social capital by recruiting him or her to a specific project.

[2] More precisely, human and social capital are the genealogical units that replicate through the interaction of individuals in an ecological environment (see Baum and Singh, 1994, for a detailed discussion of these processes).

certain degree of persistence and stubbornness to overcome. Motivating and coordinating a group of people under these circumstances would require some leadership skills. Finally, the technical sophistication of the desired product would favor someone with a technical background. Lars Kolind believed that Jes Olsen had all of these qualities, and that his human capital therefore would help him do a good job after taking charge of the strategic initiative.

To what extent Kolind considered Jes Olsen's social capital when he decided to ask him to take responsibility for the Multifocus project, we do not know. As it turned out, however, Jes Olsen's social relations proved to be important: one critical problem in the development of a prototype of Multifocus was to find a microprocessor which would be small and powerful enough to fit inside a hearing aid. One evening—while drinking beer with some of his engineering friends working at Microtronic, a Danish company specializing in micromechanics—Jes Olsen mentioned this problem. One of his friends knew of such a microprocessor, which was subsequently used in the Multifocus product line.

The purpose of discussing Jes Olsen's role as a project leader in Oticon is to illustrate two points. First, human and social capital are important in facilitating productive activity (Becker, 1993; Coleman, 1990). Second, both human and social capital are embodied in people, which means that the processes of variation, selection, and retention of these two forms of capital will have to take place at the individual level (Campbell, 1994). As a consequence, when you select one, you automatically also select the other.

The evolution of human and social capital

As these processes show, within a model of guided evolution human and social capital is produced and replicated through the allocation and reallocation of individuals to and from strategic initiatives. Employees compete to be considered for (variation), to join (selection), and to stay with (retention) the most attractive strategic initiatives a firm has to offer. Similarly, the people responsible for a strategic initiative compete to attract the attention of (variation), to recruit (selection), and to keep (retention) the most talented people in the firm.

These changes in allocation of individuals to and between strategic initiatives have the effect of gradually changing the human and social capital they hold. That is, a change in activities leads to the depreciation of some skills, knowledge, and relationships, and to the appreciation of others (Coleman, 1990: 317–321). By working on a new strategic initiative an individual will gradually learn new skills and develop new business relationships, thereby acquiring new human and social capital. Similarly, parts of an individual's skills, knowledge, and business relationships will not be put to use at the new strategic initiative, and will therefore gradually depreciate (Levitt and March, 1988).

Possible problems with units of selection and evolution in social systems

For the evolutionary process to function satisfactorily in social systems, there are certain requirements to the properties of the units of selection. First, there must be enough variance for the selective forces to operate on (Campbell, 1969). Unless there is variance, no new forms of the unit of selection will be selected. If this is the case, the previously selected forms will be retained from period to period, in which case it does not make sense to refer to the process as *evolution.*

Second, in order to make it possible for the selective process to operate at the specified level of analysis, the units of selection must be independent from one another, or the process of selection will be 'bumped' up to a higher level (Campbell, 1994). For example, it does not make sense to say that the finance department of a firm was selected against, as departments in a functional-hierarchical structure are not operating independently of one another, but are specialized units in a larger system. In other words, in a firm where all work is organized in functional departments, selection cannot take place at the level of the individual department, but will have to take place at the level of the whole firm.

Third, in organizations—which are social systems where the evolutionary process is guided by actors in the same system (Boyd and Richerson, 1985; Van de Ven, 1992)—the units of selection must be important enough to warrant the attention of the actors who comprise the sources of variation and the agents of selection and retention, yet not so important that the units of selection cannot possibly be selected against.

As units of selection, strategic initiatives and human and social capital are well suited for enabling natural evolutionary processes to take place. First, they are important enough to warrant attention, yet not so important that their destiny cannot be left to be decided by evolutionary forces, because it is likely (in a large organization) that a large number of strategic initiatives will be conceptualized, selected, and discontinued in any given year. Similarly, in large organizations, the people that hold human and social capital represent important, but not indispensable resources. Second, as defined above, both strategic initiatives and human and social capital are relatively independent units, which will allow the evolutionary process to operate at the specified level. Third, given the diversity and scope of large organizations, there will be enough variance for the internal selective system to operate on.

Strategic intent: the objective function

By 'strategic intent' we mean those long-term goals that reflect the preferred future position of the firm, as articulated by its top management (Prahalad and Doz, 1987). In the early 1990s, Oticon's strategic intent was to 'become the favored partner of the world's leading hearing clinics, by excelling at both technological leadership and the development of customized solutions to the most demanding segments of the market' (Kolind, 1991). This strategic intent was ambitious, in that it aimed not only to build on Oticon's traditional strengths in engineering and technical solutions, but also reflected the need to make the firm more attuned to the specific preferences of the various segments of the market.

The role of strategic intent in guided evolution

In the context of a model of strategic management as guided evolution, the strategic intent of the firm defines the objective function of the strategy process.[3] As March (1994) has noted, a key problem in attempting to 'engineer' or guide evolutionary processes in social systems is to specify what part of the system one is to optimize. This is a problem because social systems are nested in space; i.e., they consist of many different parts, which are interrelated with one another. Because what might be best for one part of the system (e.g., the engineering department) may not be what is in the best interest of another part of the system (e.g., the marketing department), it is necessary to specify clearly what part of the system one wants to optimize on. In addition, when attempting to optimize the performance of the firm, top management will also have to deal with the problem of whole–part competition (Campbell, 1994; Baum, 1999). Finally, because social systems are also nested in time (March, 1994), there may exist a conflict between optimizing for the immediate future, and optimizing for the long-term future of the firm. Nevertheless, in the context of a model of strategic management as guided evolution, the purpose—and thus the objective function—of the strategy process is to optimize the *long-term* performance of the *firm*.

The strategic intent serves two important functions in our model. First, it gives the evolutionary processes inside the firm something to 'aim' for. As Winter (1994: 261) puts it, in the absence of clearly articulated strategic goals, 'decision making about rival claims on resources has no legitimate basis.' Guided evolution refers to intervening in evolutionary processes in an attempt to shape organizational outcomes, and an important part of this intervention is to define the preferred direction of the strategy process. Through a clearly articulated strategic intent, top management communicates what they see as the preferred future position of the firm, and this preference is assumed to guide the actions by the sources of variation and the agents of selection and retention. Second, in social and cultural systems, variation is at the expense of the already achieved adaptive system (Campbell, 1969). In

[3] As such it is one example of what Campbell (1969: 76) has referred to as 'vicarious selectors': 'Another type of internal selection criterion occurs when processes of evolution build in internal selection criteria which are vicarious representatives of external selectors.' Such vicarious selectors play an important role in theorizing on organizational and intraorganizational evolution, as Barnett and Burgelman (1996: 7) have suggested: 'external and internal selection, together, determine the fates of organizations. Those that continue to survive have an internal selection environment that reflects the relevant selection pressures in the external environment.' Yet, as Campbell (1969) and Baum (1999) have cautioned, once vicarious selectors have been established, external selection processes will also act on the control system itself. We discuss this in more detail below under the heading 'Forces influencing the evolution of strategic intent.'

other words suggesting new ideas, and considering them for selection, is costly to the firm. By concentrating the variation of new forms of the units of selection on a single objective function (the strategic intent), this cost can be reduced. This is the case because much 'unnecessary' variation can be weeded out at an early stage by the sources of variation themselves.

The development of strategic intent in guided evolution

As the objective function in the model, the strategic intent of the firm is exogenous to the evolutionary and ecological process associated with the two units of selection in the model (strategic initiatives and human and social capital).[4] It is defined and articulated by top management, and reflects their vision of what is in the best interest for the long-term performance of the firm. Hence, deciding and articulating a strategic intent is essentially a top-down process.

This is where the concept of strategic intent differs from the concept of strategic context in what Barnett and Burgelman (1996: 15) and Noda and Bower (1996: 160) have described as the Bower–Burgelman (B-B) model of the strategy process. In the B-B model, strategic change is conceptualized 'as retroactive rationalization of strategic initiatives'[5] in which the top manager's role is limited to being 'willing enough to recognize strategically bottom-up initiatives and capitalize on them rather than pass them by' (Noda and Bower, 1996: 188). Even this limited top management role in shaping the strategic context is constrained because of political considerations: 'successful leaders, who know that influence for any manager is based on the success of his interventions, are very cautious in their public position … Deferring the announcement of public commitments until learning reduces uncertainty in new business development can be a wise choice for top managers who are concerned to preserve and enhance their "power" within the organization' (Noda and Bower, 1996: 188).

In contrast, when Lars Kolind developed and articulated Oticon's ambitious new strategic intent in 1991, the company was still recovering from having lost half its equity and nearly 30 percent of its market share over a few years in the late 1980s. At that time, Oticon had no new businesses that could justify this intent. As such, it was clearly not an interpretation of a strategic initiative emerging from the front line of the company. Furthermore, the new intent of Oticon was articulated and communicated by Kolind despite serious misgivings and concerns by several mangers at different levels. As described by one of them, 'many people believed that Kolind was out of his mind, and that he finally had lost control of the situation. This perception didn't really change before the success with the MultiFocus line.'

This indicates that Kolind's articulation of a new strategic intent was based on an *ex ante* determination of what he believed to be the best future position of the company. Nevertheless, evolutionary change processes inside and outside the firm clearly inform this articulation, as we will discuss next.

Forces influencing the evolution of strategic intent

Evolutionary change processes operate on a firm's strategic intent in that it may be suggested (variation), it may be changed (selection), it may exist over several time periods (retention), and a firm has to choose one strategic intent among several possible (competition). We understand top management's articulation of a firm's strategic intent to be influenced by four related forces: (i) the competitive fitness of the firm; (ii) autonomous strategy processes; (iii) top management's

[4] It is exogenous to the internal ecological processes in the sense that it guides the coevolution of strategic initiatives and human and social capital and, in any given time period, must remain fixed to do so effectively. This is not to say that the strategic intent is not exposed to evolutionary change processes, nor that these are not influenced by processes and outcomes in the firm, as we discuss below. The key analytical distinction here is between (a) the role of strategic intent as an objective function (at a higher level of analysis) that guides the internal evolutionary, ecological, and coevolutionary processes in the firm, and as such needs to remain fixed for a certain time period, and (b) the role of strategic intent as a unit of selection in its own right. In the proposed model these two roles are reconciled by understanding top management to decide and articulate the firm's strategic intent so that it remains fixed within time periods. Although evolutionary change processes may be expected to operate on the strategic intent also within these time periods, their effect may be understood to accumulate and have a sudden effect on the strategic intent, rather than gradually influencing it. This is similar to the punctuated equilibrium logic of organizational change.

[5] See Burgelman's (1994) description of the role Andy Grove and the top management group played in transforming Intel from a 'memory company' to a 'microprocessor company' for an example of how retroactive rationalization is used in the Bower–Burgelman model.

conception of the external environment; and (iv) top management's conception of the value of the firm's stock of human and social capital.

Perhaps the most salient influence on the strategic intent of a firm is its competitive fitness, as represented by the performance of its portfolio of strategic initiatives. In any given time period, the results and cash flows associated with strategic initiatives that compete for resources in the external environment provide insight into the appropriateness of a firm's strategic intent. In periods where top management anticipates industry convergence, it would expect the firm's portfolio of strategic initiatives to perform well (Tushman and O'Reilly, 1997). If it does not, that could be an indication that divergent change is taking place, and that the firm's strategic intent is no longer appropriate. This, in turn, may trigger a change in the firm's strategic intent, as it did at Oticon when the introduction of a new dominant design by Starkey exposed Oticon to severe financial losses, which in turn triggered a re-creation of the company and the introduction of a new strategic intent.[6]

Autonomous strategy processes represent a second source of evolutionary change in a firm's strategic intent. Within the direction set by a firm's strategic intent, people have some leeway in deciding which external opportunities to pursue and which forms and combinations of human and social capital to preserve and develop. Over time, this freedom may result in the actual decision-making and resource allocation processes exercising some 'stress' on the strategic intent. This process is identical to what Burgelman (1983a, 1983b, 1990, 1991) has referred to as autonomous processes of strategy making: 'such autonomous initiatives are often significantly different from induced ones in terms of technology employed, customer functions served, and/or customer groups targeted. They often derive from new combinations of individual and organizational skills and capabilities (Penrose, 1959; Teece, 1982) that are not currently recognized as distinctive or centrally important to the firm' (Burgelman, 1991: 246).

This shift in direction of decision making and resource allocation may represent a response to a possible shift of an industry's evolutionary trajectory (Tushman and Anderson, 1986). That is, if divergent evolutionary change is taking place in the external environment, the people working in the firm may respond by shifting to strategic initiatives and types and combinations of human and social capital that are more appropriate to the new trajectory, even if they are in contrast with the firm's articulated strategic intent. This, in turn, may influence the perceptions and convictions of the top management group, thereby leading to a change in strategic intent.

The strategic intent may also evolve based on changes in top management's conception of the external environment. For example, Kolind's development and articulation of a new strategic intent for Oticon was partly informed by learning from the strategic activities of its competitors. More specifically, although Oticon was performing very well in 1990, Kolind invested much of his time and energy to learn more about the different market segments in the industry, and how Oticon and its competitors were serving those segments. During this period he had visited several of the competitors, a large number of hearing aid clinics, which were perhaps the most important outlet for the product, and attended all the key conferences where the different players in the industry presented their latest offerings.

The findings were not encouraging. As Kolind put it: 'I was surprised to learn that whereas several of our most important competitors where pioneering new technologies (hearing aids to be placed in the ear, and hearing aids with automatic volume and tone control), Oticon had nothing new to offer. I became convinced that we needed to change our strategy to remain competitive in the future.' Thus, Kolind's articulation of a new strategic intent, which put a much higher emphasis on innovation and industry leadership, was influenced by his conception of the external environment.

Finally, a firm's strategic intent may also evolve in response to how well suited its stock of human and social capital is to exploit the opportunities that are available in the external environment. In the case of Oticon, Kolind's articulation of the firm's strategic intent was partly an acknowledgement of the firm's historical strengths in engineering sophistication and quality, as well as its extensive social network with high-end hearing aid clinics.

Potential problems with the role of strategic intent in guided evolution

Three potential problems associated with such guided evolution in social systems should be

[6] See the foregoing in the section on 'Company and industry background' for a more detailed discussion of these processes.

noted. First, the strategic intent guides the direction of the evolutionary process, and must remain unchanged over several time periods for the process to function effectively (Campbell, 1969). If the strategic intent changes too frequently, there will not be enough time for the evolutionary system to adapt to these changes.

The second problem relates to the possibility of maladaptation. The purpose of guided evolution is to improve the long-term position/performance of the firm. As March (1994) has noted, there is no guarantee that the evolutionary process will be adaptive. This is so because the strategic intent, which defines the objective function of the process, may not necessarily be adaptive for the firm. If the positions associated with the intent are not beneficial in the long run, the evolutionary process will be maladaptive.

Finally, the existence of a strategic intent to guide the production and replication of human and social capital does not guarantee that this will happen. In the proposed model, the strategic intent is subject to interpretation by the individuals who produce and replicate their human and social capital. As such it is subject to 'copying errors' that may result in unintended mutation, recombination, and hybridization of human and social capital (McKelvey, 1982; Nelson and Winter, 1982). Although such trial-and-error learning may be adaptive to the firm (Baum and Singh, 1994; Burgelman, 1994), it may also result in a loss of valuable competencies.

Administrative systems

By 'administrative systems' we mean the basic way in which tasks are divided and work is organized in the firm (Chakravarty and Doz, 1992). Administrative systems are configurations of structures, systems, culture, and leadership practices. Here we will discuss the three most important characteristics of the administrative systems in Oticon: (1) the kinds of hierarchical positions and their associated responsibilities; (2) the use of projects to organize work; and (3) the organization of functional expertise.

Hierarchical positions and their responsibilities

At Oticon, the only permanent allocation of employees was to one of two groups: people were either a member of the top management group, or they were 'associates.' The members of the top management group had five main responsibilities: (1) to develop and articulate strategic goals which defined the strategic intent of the organization; (2) to sponsor strategic initiatives; (3) to allocate financial capital to strategic initiatives; (4) to recruit people to the organization; and (5) to take responsibility for the development of one area of functional expertise and knowledge in the organization.

All employees who were not members of the top management group had two main responsibilities: (1) to work on at least two strategic initiatives at any given point of time; and (2) to have experience in two or more functional areas, in at least one of which he or she had to be an expert. In addition, some employees served as project managers, but then only as a temporary role for the duration of the project.

The use of projects to organize work

All work was organized in project groups. There were basically two kinds of project groups. First, a project group could be responsible for a strategic initiative, similar to that of the Multifocus example discussed earlier. In this case, the group would be responsible for a project that was directly engaged in creating and/or appropriating economic rents for the company, within the guidelines defined by the strategic intent of the firm. Second, a project group might be responsible for more internally focused tasks. Examples of these kinds of projects included a group of engineers, computer programmers, accountants, and some external consultants working to develop a new and better system for project management and control. A group that was responsible for the yearly consolidation of accounts represented a somewhat special case of such projects. In this case, the distinction between a project group and a department became somewhat blurred, as account consolidation was a highly specialized, functional task.

Although computer programmers and associates with accounting/finance expertise frequently contributed to and worked on cross-functional project groups, computer support and finance/accounting were areas of expertise which Oticon found difficult to integrate fully into a project structure. This problem had been 'solved' by accepting that it might not be possible to have an organization where all activities were organized in 'true' project groups. Although important to the overall func-

tioning and performance of the firm, the work on these projects differed from those that were responsible for a strategic initiative, in that they were not directly engaged in improving the firm's exchange relationship with the environment, but rather served as a support function for this process.

The organization of functional expertise By organizing all work in projects, Oticon had to do without functional departments as a means to organize and develop functional expertise. This posed a potentially serious problem, in that the firm could fail to develop and accumulate the functional expertise needed to stay competitive. Oticon had chosen to deal with this problem by creating 'functional expertise groups,' which were led by a member of the top management group, who had the requisite training and experience in that area. In addition, each 'associate' was required to have expertise in one functional area, and most associates were active members of two expertise groups.

Two issues related to this way of organizing functional expertise should be noted. First, it is a way that is very similar to how functional expertise is organized in some 'knowledge-intensive' industries such as management consulting and investment banking (Eccles and Crane, 1988). This is not to say that it is without problems, only that it is a way of organizing functional expertise that has been developed and tested over several decades by firms in these industries.

Second, the organization of work in projects, and organization of functional expertise in 'functional expertise groups,' may appear to be identical to what is known as the 'matrix organization.' This is not the case. In a matrix organization, all employees report to two superiors: one from the market side of the business, and one from the functional side of the business. Each superior is supposed to have equal (or, at least, shared) power and influence over the activities of the employee. The way Oticon was organized, the primary building block of the organization, and the primary responsibility of the people working in it, was to contribute to the projects they worked on. Developing and retaining functional expertise was also important, but was clearly secondary to contribution to the projects. To the extent people reported to two or more 'bosses,' it was because they were required to work on at least two projects in any given time period. Another difference existed in the permanence of the structures. In a matrix organization, the matrix of functional and market responsibilities is assumed to remain fixed. At Oticon, the project groups only remained fixed for the duration of the project.

Administrative systems vis-à-vis 'structural context'

It is useful at this stage to clarify the differences in the role of administrative systems in our model of guided evolution and the role of 'structural context' in the Bower–Burgelman model. In the B-B model, structural context essentially serves as a control mechanism (Bower, 1970: 71)—as a retention device for existing strategic goals that are developed (variation) and planned (selection) by the top management group (see discussions in Miner, 1994). In other words, it represents an effort on the part of top management to incorporate a rational planning approach to management. At the same time, it is viewed as highly ineffective: as Noda and Bower (1996: 186) noted, 'structural context, once designed and institutionalized as part of a firm's administrative systems and processes, seems to present a strong source of a firm's inertia … and continuously exercises strong selecting forces *regardless of possible subsequent changes in top managers' intentions*' (emphasis added).

In the guided evolution model, the administrative systems (together with the other elements of the model) serve a very different role. Its purpose is not to control the retention of predefined strategies, but to help manage the coevolution of strategic initiatives and human and social capital on a distributed basis. More specifically, the intention is to ensure that the variation, selection, and retention of strategic initiatives and human and social capital are informed by the local knowledge of people within the firm.

Administrative systems and whole–part competition

Competition and divergent self-interests of individuals and groups may lead to behavior and results that are beneficial for individuals or groups, but not for the firm as a whole (Campbell, 1994; Baum, 1999). Such 'whole–part' competition—this 'mixture of cultural-level group selection and biological individual selection means that firm-level adaptations will be under continual undermining

pressures' (Campbell, 1994: 38). This tension is also discussed by Meyer (1994: 111), who notes that 'A venerated but largely forgotten tradition in bureaucratic theory reminds us of goal displacement whereby rules and regulations become ends in themselves and impede the achievement of organizational objectives … but these strategies can be very adaptive for individual people … what is maladaptive for the organization is adaptive for at least some people in it.'

Sources of variation and agents of selection and retention

We can now describe how the different elements of the model operate together in a process of guided evolution by showing how the sources of variation, the agents of selection, and the agents of retention function within the strategy process. By sources of variation we mean those who come up with and suggest new ways of doing things. By agents of selection we mean those who decide which of these suggestions will be acted on. By agents of retention we mean those who decide which of the *existing ways* will be continued, and which will be discontinued. These definitions are based on the suggestions of Campbell (1969). They are also in line with the analyses in Boyd and Richerson (1985) and Miner (1994).

Variation, selection, and retention of strategic initiatives

At Oticon, there was a special emphasis on expanding the pool of ideas and suggestions about new strategic initiatives. In principle, encouraging everyone working in the organization to contribute such ideas and suggestions did this. In practice such contributions were motivated and facilitated by encouraging all employees to start a project. About half the projects that were started at Oticon were based on suggestions from individual members of the top management group, the other half from the rest of the employees.

For a suggestion to be selected, and become a strategic initiative organized as a project, the person suggesting it had to get support from three groups of people, which represented the three selection agents in the strategy process. First, the suggestion had to be sponsored by one member of the top management group. Second, the suggestion had to be supported by a group of employees through their commitment to join the project team. This included finding someone who would agree to be the project manager. Third, the suggestion had to be funded by the top management group.

The way in which a project was discontinued was exactly an inversion of the way in which it was started. The people working on the project, the sponsor, or the top management group all had the right to stop supporting the initiative. When a project was discontinued, the work unit was disbanded and the remaining resources of any sort were 'redistributed' to support other strategic initiatives.

Variation, selection, and retention of human and social capital

The way in which variation, selection, and retention of social and human capital took place was partly determined by the variation, selection, and retention of strategic initiatives. For example, when Lars Kolind suggested that Jes Olsen become the leader for the Multifocus project, this represented variation in that it suggested a new way to allocate Jes Olsen's human and social capital. When the Multifocus project was started, this was not only a selection of the project by Jes Olsen and the other selective agents (Lars Kolind, the top management group who financed it, and the employees who volunteered to work on it), but also a selection of the use of Jes Olsen's human and social capital on that same project. To complicate matters further, in order to be able to lead the project, Jes Olsen had to stop working on another project, which as a consequence was discontinued. This represented a decision to not retain a project that had been selected in a previous period.

This example illustrates how Oticon had created a system where variation, selection, and retention of projects were largely determined by where people wanted to invest their human and social capital. As indicated above, this created an internal ecological environment where employees competed to join and stay with the most interesting projects, and the people responsible for a strategic initiative competed to attract and retain the most talented individuals. This was true for the member of the top management group sponsoring the initiative, for the project leader, as well as for the people working on it. The excep-

tion was the commitment of resources by the top management group, which decided whether or not to finance the project.

A central problem of evolution in cultural and social systems is the tension between the creation of new variants (strategic initiatives) versus the retention of previously selected variants (strategic initiatives). This is a problem because both are needed for continued survival, and because investing in one is often at the expense of the other (Campbell, 1969; March, 1991). At Oticon, an effort was made to balance this tension by linking people's self-interest with the outcomes of how they managed this tension. More specifically, once a strategic initiative was selected, the people who agreed to work on it were likely to continue working on it, unless they became convinced that it had no future. Their reputation—both in terms of their ability to make good decisions, and their ability to make things work—was invested in the project. The purpose of the mechanisms that allowed people to leave a project if they did not believe in it was not to enable people to join and quit projects as they liked. Rather, the purpose was to give people an opportunity to 'vote' with their human and social capital, and to send a signal if they became convinced that continued investment in the project was a waste of resources. In addition, it provided a legitimate way in which people could test their ideas, and possibly act on their entrepreneurial capabilities.

The coevolution of strategic initiatives and human and social capital

As would be clear from the foregoing discussion of the variation, selection, and retention mechanisms for strategic initiatives and human and social capital, these two units of selection in our model are tied together in a coevolutionary process; that is, as the genealogical entities of replication, human, and social capital are embodied in individuals. These individuals in turn, interact in both an external and an internal ecological environment (McPherson, Popielarz, and Drobnic, 1992), and through this interaction human and social capital is produced, replicated, or destroyed (Baum and Singh, 1994).[7]

[7] See Baum and Singh (1994) for an extensive discussion of how genealogical entities are produced and replicated through the interaction of ecological entities.

There are two important implications of such coevolution. On the positive side, to the extent top management can influence where and how employees use their time and energy, they can also influence what human and social capital is created and maintained. In the proposed model, this is done in two ways: first, by relying on a strategic intent to guide the evolution of strategic initiatives, thereby influencing the production and replication of the human and social capital that coevolve with them; and, second and related, by relying on a strategic intent to signal what human and social capital top management expects to be valuable in the future, thereby influencing what skills, knowledge, and business relationships people are motivated to build and maintain.

On the negative side, to the extent the strategic intent is not providing effective selection pressures in the internal ecological environment, the result may be random drift when undirected changes in the firm's stock of human and social capital accumulate from one time period to another (McKelvey, 1982; Hannan and Freeman, 1989). As a consequence, valuable human and social capital may be gradually lost. Likewise, if the strategic intent is changed, but does not guide the coevolution between strategic initiatives and human and social capital in an adaptive direction, existing valuable human and social capital may be lost. Finally, if the strategic intent is changed too often, a firm may lose existing human and social capital through too frequent variation (e.g., mutation, recombination, hybridization), and not be able to focus long enough on a certain set of issues to develop and retain valuable human and social capital in any particular area.

DISCUSSION AND CONCLUSION

In this concluding section, we first discuss the limitations of our theorizing and the boundary conditions of the proposed model. We then discuss the merits of strategy as guided evolution in comparison to alternative formulations of the strategy process and the implications for strategy process research.

Boundary conditions

While grounded theorizing from single in-depth case studies has historically had an important

role in the field of strategic management (e.g., Bower, 1970; Mintzberg and McHugh, 1985; Burgelman, 1994; Ghoshal and Bartlett, 1994), such a research approach inherently suffers from the problem of questionable generalizability. In the present case this problem is even more acute because the strategic and organizational characteristics of Oticon are clearly different from the functional-hierarchical approach that tends to be more common in industrial companies. We have tried to compensate for this limitation by explicitly framing our model within a well-established theory, but we must still acknowledge that the model of guided evolution, as we have presented it here, can lay claim only to being a tentative model of the strategy process, in need of further research and validation in a wider variety of contextual settings. While lacking in empirical generalizability, the model is also likely to be constrained by two boundary conditions that may be inferred from theory: (i) the complexity of the problems addressed, and (ii) the type and degree of interdependence of the tasks.

Complexity of problems

The model is best suited for organizations that face complex problems, such as Oticon. Research suggests that complex problems are best addressed by decentralized, compartmentalized, semi-autonomous units, such as the work groups responsible for strategic initiatives in the proposed model (Baum, 1999; Kauffman Macready, and Dickenson, 1994). To the extent the problems faced are not very complex, traditional and more bureaucratic approaches to organizing may be more appropriate.

Type and degree of interdependence of problems

In addition to complexity, the problems need to be relatively independent from each other. As discussed above, if the problems are interdependent, one cannot easily select against one part of the system without also selecting against the interdependent part, and it would not be possible to replicate 'natural' evolutionary processes in the firm. This could potentially become a problem in the proposed model. Nevertheless, as we have also discussed above, this problem is addressed by organizing a firm's activities in relatively autonomous strategic initiatives.

Implications for strategy process research

Based on their review of three decades of strategy process research, Chakravarty and Doz (1992) came to the conclusion that this line of inquiry has yet to develop into a coherent literature stream, with its own strong and easily identifiable paradigm. Even more damning for this subfield of strategy is the recent lament of Joseph L. Bower—one of the pioneering contributors and the shaper of the resource allocation model that, in some ways, gave the subfield its academic identity—that 'process research has only had a limited impact on research in strategic management' (Bower, 1996). Perhaps we could also add that its influence on practice has also not been as significant as could have been hoped. Indeed, in the world of practice, the last decade has witnessed a 'process revolution', but it has been influenced far more by those who have worked outside of the so-called 'process school', and of academia, in general (e.g., Hammer and Champy, 1993). In what follows we discuss three ways in which the proposed model may contribute to strategy process research having a greater impact on strategy research and practice: (i) a robust underlying model to build on; (ii) a realistic role of leadership; and (iii) a link to the resource based view in strategy.

A robust underlying model to build on

As identified by Bower (1996), perhaps a key reason behind the limited progress of strategy process research within the academic domain has been the absence of careful modeling based on standard concepts. In the absence of a rigorous yet robust underlying model, strategy process research has been neither focused nor cumulative.

By explicitly adopting an evolutionary perspective, the guided evolution model we have presented in this paper builds on a long tradition within strategy process research. Mintzberg's (1978) discussion of emergent strategy, Quinn's (1980) description of strategy as logical incrementalism, and Bower's (1970) model of the resource allocation process, for instance, were evolutionary

in their underlying logic. Guided evolution shares the spirit of these contributions by sharing the understanding of strategy as emerging gradually from the day-to-day actions and decisions made by a firm.

Earlier contributions were, however, largely descriptive, without any grounding in an established theory. Where we go beyond these studies is by explicitly grounding our model in the evolutionary framework of variation, selection, and retention. As argued by several scholars from diverse disciplines (e.g., Alchian, 1950; Campbell, 1969; Nelson and Winter, 1982; March, 1994; Van de Ven, 1992), this is a logically consistent, standard model that is well suited for studying social and cultural systems.

Both Burgelman (1994) and Miner (1994) have shown that this evolutionary model can serve as a robust and general framework for strategy process research. It is more general than just the emergent, evolutionary view of strategy: as Miner (1994) has argued, it can also be applied to a rational planning approach and is robust irrespective of whether one conceptualizes an organization as a 'natural' or an 'artificial' selection environment (see Levinthal, 1994: 174).

A realistic role of leadership

However, where ecological models of the strategy process have tended to suffer from some deep-seated ambiguities is with regard to their treatment of the role of leadership. After all, the roots of the evolutionary perspective lie in the models of biological evolution that emerged from a challenge mounted by science to the need for an unexplained source of guidance and normative authority in explaining the existence of mankind. When applied to social systems, it has tended to similarly find deterministic explanations of their evolution and outcomes, devoid of any role of voluntary choice and leadership (e.g., Hannan and Freeman, 1977). While recent extensions have considerably diluted this deterministic flavor (e.g., in March's, (1994), discussion of the evolution of evolution and in Burgelman's, (1991), conceptualization of intraorganizational ecology), most evolutionary models can still only admit to a very indirect and relatively *ineffective* role of leadership.

We believe that the model of guided evolution provides for a more realistic role of management than is available in most extant models. The distinction is perhaps best explained by contrasting our model with that of Burgelman's (1983a, 1991, 1994), which is both the closest in spirit to our conceptualization and also the model that our work directly builds on.

In Burgelman's view, autonomous and induced strategic initiatives operate together to create the variation that the selective system operates on. Whereas the induced strategic initiatives represent the formal strategy and reflect existing organizational learning, the autonomous strategic initiatives challenge existing strategy and represent bottom-up experimentation. Selection—which consists of deciding what autonomous initiatives to formally support and which induced initiatives to keep supporting—is ultimately the responsibility of top management.

In contrast to this view in which autonomous strategic initiatives serve to challenge the formal strategy of the firm, guided evolution is based on the experiences of a firm that has attempted to replicate a natural selection environment within itself. As a consequence, the distinction between induced and autonomous strategic initiatives is not as salient or as useful here as in Burgelman's model. For example, in a process of guided evolution, all strategic initiatives are autonomous in the sense that someone in the organization initiates them. Yet, they are all induced, in the sense that the process of variation–selection–retention is guided by a strategic intent that is defined by top management.

As a result of this difference, guided evolution posits a role of top management that is very different from the role one can infer from Burgelman's model. In Burgelman's model, the key task of top management is to resolve the tension between the autonomous and induced strategy processes by acting as the selection filter—i.e., through resource allocation. Yet, as the work of March and Simon (1958), Quinn (1980), Lindbloom (1959), and others have shown, in practice this role of top management is severely constrained. These constraints are clearly acknowledged by researchers within the Bower–Burgelman tradition: as has been noted by Noda and Bower (1996: 186), top management's role in shaping the strategic context tends to be retroactive rationalization and their influence on structural context is believed to be severely constrained because of inertial forces. Paradoxically,

the reasons for most of these constraints are to be found in the institutionalized administrative systems and processes. In other words, the control systems developed to ensure efficient implementation of past strategies end up constraining top management's discretion in later time periods.

In the model of guided evolution, in contrast, the role of top management is primarily twofold: (i) to create a set of administrative systems that would replicate the processes of natural selection within the organization; and (ii) to guide those processes by defining the strategic intent and the units of selection in the evolutionary process. In other words, top management has traded off direct control through the structural context (i.e., the implementation of predefined product–market strategies) against greater control of the strategic intent.

A link to the resource-based view

Beyond the inclusion of what we consider to be a more realistic role of leadership, the model of guided evolution also focuses attention on the role of human and social capital in the strategic processes of a firm. There is a growing recognition, in the fields of both strategy and human resource management, of the central importance of these resources in influencing the strategy and performance of firms (see, for example, Pfeffer, 1994). Beyond reflecting this importance, the use of human and social capital as units of selection in guided evolution has the added advantage of linking this model of the strategy process with the resource-based view that has come to dominate the literature on strategy content.

While the resource-based view of strategy initially shifted the focus of analysis from factors external to the firm (such as industry structure) to factors internal to the firm (i.e., resources), the initial conceptualization of resources was abstract (see Conner, 1991). Increasingly, however, there is recognition that many of the 'dynamic capabilities' (Teece, Pisano, and Shuen, 1997) that underlie a firm's competitive advantage are grounded in people and their relationships—i.e., in the firm's human and social capital (see Itami, 1987).

Just as strategy emerges from the day-to-day actions of the firm, so is human and social capital created and reproduced as a consequence of the day-to-day activities of the firm. Although one should not discount the important role of recruitment and formal education and training for the acquisition of new knowledge and skills, the most important way in which a firm develops its human capital is as a by-product of the work people do, in the normal course of their day-to-day activities (Lucas, 1993). This is equally true of social capital. As Coleman (1990: 317) wrote, 'because many of the benefits of actions that bring social capital into being are experienced by persons other than the person so acting, it is not to that person's interest to bring it into being. The result is that most forms of social capital are created or destroyed as a by-product of other activities'. Put differently, the creation and destruction of human and social capital of a firm is a by-product of its use of existing human and social capital and this recursive process of deployment and development of human and social capital lies at the heart of a firm's competitive advantage, as conceptualized within the resource-based view.

The model of guided evolution provides a link between strategy content and strategy process because of its focus on the coevolution of human and social capital and strategic initiatives. At the start of a time period, a firm's capabilities are represented by a certain configuration of human and social capital. This human and social capital is invested or reinvested in one or more strategic initiatives. Over time, the activities associated with these strategic initiatives have two important effects. First, the strategy of the firm at the end of that time period is shaped by the outcomes of these strategic initiatives. This can be seen as the 'exploitation effect' of the firm's activities—i.e., its exploitation of its idiosyncratic stock of human and social capital. Second, the ways in which these resources are employed will influence how (if at all) the firm's human and social capital changes over this time period. This is the 'creation effect' of the firm's activities.

What emerges from the model of guided evolution, therefore, is the hypothesis that firms that are able to choose strategic initiatives which effectively exploit its existing human and social capital while, at the same time, facilitating the development of new, valuable human and social capital, will perform better in the long run than those that are not able to achieve this synergy between exploitation and creation. Note that this hypothesis is entirely consistent with the 'stepping stone logic' of Wernerfelt (1984) and the distinction between 'resource stocks' and 'resource

flows' made by Dierickx and Cool (1989) within the literature on the resource-based view.

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