

Internal Disaggregation in Oticon: Interpreting and Learning from the Rise and Decline of the Spaghetti Organization

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Abstract

Infusing coordination mechanisms that are characteristic of market organization in hierarchies has become a much-used way of simultaneously increasing entrepreneurialism and motivation in firms. However, such “internal hybrids” are inherently problematic, because of fundamental credibility problems related to managerial promises to not intervene in delegated decision-making. This theme is developed using the case of the Danish hearing aids producer, Oticon. In the beginning of the 1990s, Oticon became famous for its radical delegation experiment, the “spaghetti organization.” Recent work has interpreted the spaghetti experiment as a radical attempt to foster dynamic capabilities by imposing loose coupling on the organization (Lovas and Ghoshal 2000; Verona and Ravasi 1999; Ravasi and Verona 2000), neglecting, however, that about a decade later, many of the more radical elements of the spaghetti organization have been left. This paper presents an organizational economics interpretation of the spaghetti organization and its subsequent transformation. In such an interpretation, the spaghetti organization imposed significant organizational costs that could be tolerated as long as the benefits produced by the spaghetti organization dominated the costs. One source of organizational costs that the paper focuses on turn on the potential contradiction involved in combining a strong manager who possesses ultimate decision rights with widespread delegation. A number of implications are developed, both for the understanding of internal hybrids, and for the more general issue of the distinction between firms and markets.

Introduction

Both in academic research and in managerial practice, the search for the sources of sustained competitive advantage (Barney 1991) has increasingly centered on organization related factors (e.g. Barney 1986; Kogut and Zander 1992; Mosakowski 1998). In particular, firms in “knowledge-intensive industries” are argued to increasingly adopt “network organization” (Miles and Snow 1992) and engage in various kinds of “corporate disaggregation” (Zenger and Hesterly 1997). They do so, and are advised to do so, so as to become the “information age organizations” (Mendelsson and Pillai 1999) that may foster those “dynamic capabilities” (Teece, Pisano and Shuen 1997) that are necessary for competing in the emerging knowledge economy. In other words, knowledge-based firm strategies are implemented by the kind of unconventional combinations of coordination mechanisms (Grandori 2000) that are often referred to in terms such as “new organizational forms” (Daft and Lewin 1993), “the non-standard firm” (Helper, MacDuffie and Sabel 2000), or “cellular forms” (Miles et al. 1997).

There is accumulating empirical evidence that firm sizes have been falling worldwide during the last two decades as firms have engaged in downsizing, spin-off and outsourcing exercises (Zenger 1997; Zenger and Hesterly 1997). Thus, established firms have increasingly left activities to the “market,” meaning other (often new) firms. Fundamental advances in IT and measurement technologies have facilitated these changes, while equally fundamental developments in the organization and motives of capital markets as well as increasing internalization have made them necessary. Cutting size, spinning off business units, etc. reduce coordination costs, improve incentives, and help to clarify the nature of the businesses the firm is in. Improvements in entrepreneurial capabilities as well as a better ability to produce, share and re-produce knowledge often result (Grant 1996; Day and Wendler 1998; Mosakowski 1998).

However, firms may be able to reach these goals in a different way — albeit one that to some extent also relies on market (-like) forces — namely by disaggregating

internal organization (i.e., adopting internal hybrids) rather than disaggregating the corporation itself (i.e., adopting external hybrids or engaging in arms-length contracting). A number of contemporary management practices, notably TQM (Jensen and Wruck 1994) and knowledge management techniques (Mahnke 2001), are basically internal hybrids (Zenger 1997). From a short-run perspective, adopting an internal hybrid form may have the benefit of involving fewer lay-offs relative to adopting external hybrids or engaging in arms-length contracting. Moreover, spin-offs, carve-outs and the like are often legally quite complex operations, whereas adopting an internal hybrid may be a matter of *fiat*, and will therefore be an attractive alternative in terms of ink costs expended on corporate lawyers.¹ Further, management may fear that leaving too many activities in the hands of other firms will hollow out the corporation (Teece et al. 1994). Relatedly, considerations of protecting valuable knowledge may enter the picture (Liebeskind 1996).

When presented in this way, one may wonder why firms should ever disaggregate externally: The two alternative means of disaggregation appear to be rather imperfect organizational substitutes. Moreover, external disaggregation seems to be both more painful (e.g., in terms of employee dissatisfaction), costly (e.g., in terms of lawyer bills), and risky (e.g., in terms of the risk of losing valuable knowledge or being exposed to hold-up risks). However, internal disaggregation, that is, the adoption of internal hybrids, also has its distinctive — but so far largely neglected — costs.² The present paper is taken up with these.

Research on new organizational forms is clearly an emerging field. In particular, little is known about the costs of new organizational forms, whereas the benefits have arguably been more thoroughly examined.³ This is particularly the case with internal hybrids.⁴ Therefore, empirical investigation in the form of rich,

¹ On the related idea that there are fundamental legal differences between organizing transactions inside the firm versus organizing across markets, see Williamson (1996).

² However, for an early treatment, see Miles and Snow (1992).

³ This is exemplified and discussed in Mahnke (2001).

⁴ For example, recent work has treated the costs of external hybrids in terms of costs of establishing and maintaining trust (Nooteboom 1999), or, conversely, the costs of being subject to hold-up (e.g., Williamson 1985, 1996). Zenger (1997) argues that disproportionately more scientific work exists on

qualitative methods for data collection may be argued to be a necessary ingredient in research into the costs of internal hybrids. The present paper mixes empirical observation with theoretical reasoning about internal hybrids in an attempt to both illustrate and challenge existing theory. The emphasis is on the costs of internal hybrids, and in particular on commitment problems related to the delegation of decision rights in firms. The root of such problems is that delegated decision rights in firms are always loaned from the holder(s) of ultimate decision-making rights, namely the top-management and/or the owners. Given this, the problem for top-management and/or owners is to commit to real delegation (Baker, Gibbons and Murphy 1999, 2000) and refrain from selective intervention (Williamson 1996). This is because selective intervention will harm incentives to invest in the accumulation of firm or project-specific human capital and the initiation of entrepreneurial initiatives (Aghion and Tirole 1997; Day and Wendler 1998; Foss and Foss 2000).

In the ensuing, these kinds of problems are discussed with reference to changes in decision-making processes and administrative systems (i.e., the organization of task division) that took place in the Danish electronics (primarily hearing aids) company, Oticon A/S, beginning in 1991. Oticon became world-famous for its radical delegation and empowerment experiment — aptly marketed as the “spaghetti organization” —, which introduced “... revolutionary new assumptions of what it meant to work and how one worked” (Gould 1994: 456). The speed and radicality with which then-CEO, Lars Kolind managed to accomplish this major organizational turn-around, particularly in the corporate headquarters/development parts of the Oticon organization, was another remarkable aspect of the experiment. To many observers, Oticon seemed to be an embodiment of the pure project-based organization as well as an outstanding example of achieving integration and recombination of knowledge by means of loosely coupled administrative systems. The spaghetti organization was explicitly seen as a hard-to-replicate source of

external hybrids than on internal hybrids, investigation of the latter being largely confined to work on the multi-divisional form. Recent treatments that are related to the reasoning in this paper by also adopting an overall organizational economics perspective include Zenger (1997), Zenger and Hesterly

competitive advantage (Gould 1994). It is still being perceived as an outstanding example of the benefits of a project-based organization that goes beyond the matrix structure and carries internal disaggregation to an extreme (e.g., Lovas and Ghoshal 2000; Ravasi and Verona 2000; Verona and Ravasi 1999). However, the spaghetti organization in its initial radical form does not exist anymore in Oticon — it has been superceded by more structured administrative systems. The question why this change has taken place will be addressed in the following in the context of the issue of the costs of internal hybrids.

The design of the paper is the following. The paper begins by developing an organizational economics interpretation of the spaghetti organization (“*The Spaghetti Organization: Simulating the Market in Oticon*”). From this point of view, the spaghetti organization appears at first sight to be a particularly well-crafted hybrid (cf. Zenger 1997). Thus, it consisted of complementary elements that apparently formed a coherent structure, and which was rapidly implemented. Still, that organization gave way to something far more structured. It does not appear plausible to ascribe this organizational change to outside contingencies, such as new technological discontinuities or to dramatic changes in strategic intent. This suggests that the spaghetti organization may have been beset by organizational costs that may have been unanticipated at the time of implementing the organization and which came to dominate the benefit aspects, necessitating a change of administrative systems (“*Spaghetti and Beyond: Some Hidden Costs of Internal Hybrids*”). I further argue that the story of the Oticon spaghetti organization suggests important lessons about the limits to delegating rights within a firm when the CEO and other top-managers in actuality keep ultimate decision rights (“*Discussion: Implications for Economic Organization*”). These implications are important for those firms that wish to implement internal hybrids in the hope of fostering organizations that better utilize and develop new knowledge.

(1997), Day and Wendler (1998), and Mosakowski (1998). Of these, only Day and Wendler (1998) mention the commitment problems that accompany internal hybrids, and only very briefly.

A Note on Method

Basic Method

A basic problem of undertaking research into the Oticon spaghetti experiment is that few of those who were employed when the experiment was implemented in 1990 are still with Oticon, and the rest are very hard to locate. Moreover, the experiment was begun a decade ago, and recollections of it are likely to be strongly influenced by rationalizations and other biases. Therefore, I decided to mainly rely on archival sources, newspaper and magazine articles, and, in particular, the large number of very rich and thick descriptions of Oticon that have been produced by a number of mainly Danish academics, journalists and Oticon insiders throughout the 1990s (in particular, Lyregaard 1993; Poulsen 1993; Morsing 1995; Søndergaard and Døjbak 1997; Morsing and Eiberg 1998; Eskerod 1997, 1998; Jensen 1998).⁵

Thus, the approach followed with respect to understanding the nature of the spaghetti experiment was more that of the historian than that of the qualitative researcher trying to understand recent phenomena or ongoing change. In other words, the emphasis was more on evaluating, comparing and integrating written statements relating to past key events (Van de Ven 1992) than on performing the same operations on oral accounts relating to contemporary or ongoing events. This is a defensible research strategy, because the aim was not so much to uncover hitherto unknown data relating to Oticon, as it was to develop a different interpretation of already existing and very rich data, and discuss implications of this interpretation.⁶

However, the prime mover behind the spaghetti experiment, then-CEO, Lars Kolind, was interviewed (June 2000) about a number of specific issues that were not adequately treated in the existing material. He also commented upon earlier drafts

⁵ Actually, these are so rich that even very recent studies of Oticon, based on a large number of interviews, such as Ravasi and Verona (2000) and Verona and Ravasi (1999) add rather little in terms of descriptive detail.

⁶ For similar research methodologies, see the studies in Temin (1991).

of this paper. Also, the Oticon HRM officer was interviewed in a three hours, in-depth interview (June 2000). The interview mainly focused on the nature of recent changes in administrative systems in Oticon. A subsequent follow-up was conducted to clarify details. Interviews were semi-structured.

The Nature of the Inquiry

It is necessary to reiterate a methodological point already alluded to. Much of the following represents an attempt to pursue as far as possible *one specific interpretation of one specific aspect* of the Oticon spaghetti experiment — namely, an organizational economics interpretation of the organizational costs that this experiment imposed on Oticon —, discuss why it was partially abandoned, and tentatively draw some implications from this that challenge existing theory. Organizational economics *per se* is hardly in an early stage of theory development anymore, given that early work goes back more than six decades (Coase 1937) and the last three decades have witnessed a flurry of work in this field. There is therefore little need for following a logic of grounded theory *per se* (Glaser and Strauss 1967; Eisenhardt 1989). However, a main purpose of conducting analysis of single cases is to be able to pose competing explanations for the same set of events (and perhaps to indicate how these explanations may be applied to other situations) (Yin 1989). Allison (1971) is the classic exemplar here. Moreover, basic considerations of internal validity dictate that alternative explanations be considered.⁷

However, while I shall indeed make reference to other possible explanations of the relevant events, the main emphasis is on developing the specific interpretation. While an eclectic, multiple perspective approach may be superior in the abstract, more insight may arguably be provided in the concrete by pursuing, in a relatively narrow fashion, one specific interpretation and explore the limits of this interpretation. In addition, an adequate multi-perspective account of the spaghetti experiment would require at least a book-length study. Finally, the present account

⁷ Cf. Rumelt's (1996) discussion of the famous Honda case.

does not contradict existing accounts so much as it directs attention to a hitherto neglected interpretation of important aspects of the Oticon spaghetti experiment.

The Spaghetti Organization: Simulating the Market in Oticon

This section describes the Oticon spaghetti experiment as an example of adopting a particular kind of internal hybrid and develops an organizational economics interpretation of this. This is admittedly a somewhat narrow interpretation. Thus, a recent cottage industry has treated the Oticon spaghetti organization in much broader terms, namely as a particularly successful example of change management (Peters 1992), business process re-engineering (Obolensky 1994), and visionary leadership and strong corporate culture (Yamashita 1998; Jensen 1998). In a more specific vein, the spaghetti experiment has been used for the purpose of developing notions of strategy making as “guided evolution” (Lovas and Ghoshal 2000), as well as to discuss how the deliberate introduction of “structural ambiguity” through the choice of loosely coupled administrative systems (Ravasi and Verona 2000) may help to cultivate “organizational capabilities for continuous innovation” (Verona and Ravasi 1999).

While not denying that the spaghetti organization may indeed have caused a degree of innovativeness that might not have been obtainable in its absence, the emphasis in the present paper is rather on the neglected cost side of the spaghetti organization, and in particular on how the incentive problems alluded to above may have been present in that organization.⁸ Identifying organizational costs not only helps to better understand the relevant trade-offs of adopting a particular internal

⁸ Characteristically, the title of Ravasi and Verona’s (2000) study of Oticon is “Organizing the Process of Knowledge Integration: the *Benefits* of Structural Ambiguity” (my emphasis). There is nothing about the cost side of imposing loosely coupled administrative systems on an organization in their paper. However, note that although the interpretation developed in the present paper differs from those presented in recent academic work on Oticon (notably Lovas and Ghoshal 2000; Ravasi and Verona 2000; Verona and Ravasi 1999), it does not necessarily contradict these contributions, but is complementary to these.

hybrid in the first place⁹ — it also helps to better understand further organizational change. In the following interpretation, the spaghetti experiment is approached as an attempt to simulate a market in the internal organization of Oticon by adopting a team-based organization that comprised the high-powered incentives, delegated rights and autonomous adaptation properties characteristic of market organization (Hayek 1945).

Oticon: Background

Founded in 1904 and based mainly in Denmark, Oticon (now William Demant Holding A/S) is a world leader in the hearing aids industry.¹⁰ For a number of years in the beginning to the mid-1990s, Oticon became one of the best-known and admired examples of radical organizational turnaround. The turnaround aimed at reaching the complementary goals of increasing employee empowerment and responsibility, reducing product development cycles, increasing contact to customers, mobilizing dispersed and “hidden” existing knowledge, and building new knowledge — all contributing to the explicitly stated strategic intent of achieving (once again) world dominance on the hearing aids (Kolind 1990). Oticon CEO, Lars Kolind, the architect of the spaghetti organization turnaround, became a favorite of the press, consultants, and academics alike.¹¹ In retrospect the reasons for this are the following ones.

First, the experiment embodied a large number of those non-traditional management practices that were gaining currency at that time. It was seen, and cleverly marketed, as an embodiment of loose coupling, project- and team-based

⁹ Thus, while recent studies of Oticon put most of the emphasis on dynamic efficiency (i.e., the spaghetti organization as a means of fostering dynamic capabilities), the present paper put more of an emphasis on static efficiency. However, both considerations are necessary for getting a full picture of efficient organizational design (Ghemawat and Ricart I Costa 1993).

¹⁰ See Lotz (1998) for a careful analysis of the hearing aids industry, with particular emphasis on patterns of innovation. The history of Oticon prior to the introduction of the spaghetti organization is extensively covered in Poulsen (1993) and Morsing (1995), and, briefer, in Gould (1994) and Lomas and Ghoshal (2000: 877-878).

¹¹ The Oticon case is reported to be the best selling IMD case (Gould 1994) ever (Børsens Nyhedsmagasin 8. november 1999). Kolind’s dramatic and symbol-laden way of implementing the

organization and empowerment driven to their extremes. Second, although other firms adopted similar disintegration exercises, and had done so earlier (Semler 1989), the turnaround in Oticon was remarkable for the speed with which it took place. Third, the spaghetti organization apparently delivered rather quickly what was expected of it. Thus, it demonstrated its innovative potential by re-vitalizing important, but “forgotten” development projects, that, when implemented in the production of new hearing aids, produced significant financial results, essentially saving the firm from a threatening bankruptcy, as well as by turning out a number of new strong products. The background to all this was the following one.

From being the world leader at a 15 % market share in 1979 and with subsidiaries in West Germany, Great Britain, The Netherlands, the United States, Norway, Switzerland, France, and Italy, Oticon lost that position in less than a decade. By the end of 1987, market share had fallen to 7%. The results were massive financial problems. One rather direct cause of a continued fall in market share in the last years of the 1980s was the introduction in 1987 by the US firm, Starkey of a new hearing aid that was considerably more sophisticated than any existing Oticon product. More generally, the technological paradigm (Dosi 1982) in the hearing aids industry was gradually changing through the 1980s from “behind-the-ear” hearing aids to “in-the-ear” hearing aids (Lotz 1998). The capabilities on which Oticon’s success in the 1970s had been founded were miniaturization capabilities. While these had been critical for competitive advantage in the “behind-the-ear” hearing aid paradigm, new technological capabilities in electronics, which were not under in-house control by Oticon, were becoming crucially important in the emerging in-the-ear paradigm. Moreover, digital signaling processing was appearing as an increasingly important technology that would transform productive processes in the industry. At the end of the 1980s, Oticon management had to realize that the competition had leapfrogged Oticon in terms of technological developments and in terms of reducing the time length of product development. However, realizing this

Oticon spaghetti structure as well as the structure (or, perhaps, non-structure) itself are still being given extensive treatment in management textbooks (e.g., Boddy and Paton 1998).

took time and was painful; acting on the realization was apparently even more painful.

On all relevant accounts (e.g., Poulsen 1993; Gould 1994; Morsing 1995; Foss and Hertz 2000), Oticon was locked into a competence trap that was reinforced by strong groupthink (Janis 1983), characterizing both the management team and the employees. A symptom of this was that around 1980, the dominant opinion among managers and people in development at Oticon was that the in-the-ear hearing aid would turn out to be a commercial fiasco. At any rate, in-the-ear hearing aids were not Oticon turf (Poulsen 1993). The self-image of the company clearly was one of being a traditional industrial company with its strongest technological capabilities in miniaturization and specialized in mass-producing the behind-the-ear hearing aids and developing that technology incrementally. The dominant ethos in the company was one defined by engineering people, not by marketing people; technology, not customers, was central. Administrative systems were organized traditionally with functional departments, the managers of which together constituted the senior executive group.

When problems began to accumulate, various attempts were made to change the situation; however, they were either too insignificant and incremental or did not survive political jockeying inside Oticon.¹² The executive team had been in control of Oticon for just about thirty years. It was the same team who had taken the company to a number one position in the world market in the late 1970s. As a consequence of the mounting difficulties, Oticon's Foundation Board decided that new management was needed to handle the crisis. In 1988 Lars Kolind assumed his position as new CEO. Holding degrees in mathematics and management, an important part of his background was the international scout movement.¹³

¹² For example, the executive of the international division launched a campaign to renew Oticon's image, called the "Partner Project." The idea was to create a close relationship with hearing care professionals all over the world, and to try to get a better idea of the customers' needs in this way. The project was killed when three of the four senior executives did not support it (Poulsen 1993).

¹³ It is arguably significant that Kolind had been particularly impressed by the ability of that movement to organize and coordinate large-scale gatherings (e.g., international jamborees) in an efficient, flexible and rapid manner, not as a result of detailed planning and management, but rather

Upon assuming his new job, Kolind basically concentrated all decision-making powers in his hands; for example, virtually all expenses, even trivial ones, had to be approved of by him. He used this centralization of power to cut costs dramatically, implying lay-offs amounting to 15 % of the employees at the headquarters. However, in a paradoxical way, he combined almost dictatorial concentration of power with a great open'ness and with great communicative skills. For example, the rather drastic cost-cutting measures were very openly communicated, and their necessity carefully explained. About a year after assuming his position, Kolind realized that the cost-cutting measures, which had almost immediately improved the company's financial situation, had been fully exploited. Although the measures were necessary and yielded substantial financial results, they were only short-term measures. They were inadequate to cope with the decisive changes that were underway with respect to products and processes in the industry and which were prompted by changing preferences on the part of customers towards more advanced and aesthetically pleasing designs and changing technologies (i.e., the application of digital signal processing technologies). Something more radical was needed with respect to the strategic orientation of the firm and the administrative systems that could back this up — trying it was made possible by the accumulation of substantial slack resources which the cost-cutting exercise had produced.

Trying Spaghetti

That “something” was sketched in a 6 pages memo, presented to Oticon employees on April 18, 1990 under the heading, “Think the Unthinkable” (Kolind 1990). The objective of the vision embodied in the memo was to create an increase in profitability by 30% over the next three years. This required a change of corporate vision and mission: The company should be defined broadly as a first-class service firm with products developed and fitted individually for customers, rather than narrowly, as a manufacturing company producing traditional high-quality standard

as an emergent result of a strong and shared set of values that served to orchestrate and coordinate decentralized initiatives. Kolind's reorganization of Oticon may be interpreted as an attempt to mimic the coordination capabilities of the scout movement.

behind-the-ear hearing aids. Customer orientation should be key. In order to meet these objectives, the document sketched a complete overhaul of the Oticon organization. Kolind baptized the new organization the “spaghetti organization,” in order to emphasize the point that the new organization should be able to change rapidly, yet still possess coherence. The new structure should be explicitly “knowledge-based” (Kolind 1990) and “anthropocentric,” yet based on “free market forces” (Lyregaard 1993). It should therefore be capable of combining and re-combining skills in a flexible manner, where skills and other resources would move to those (new) uses where they were most highly valued, with only minimal intervention on the part of Kolind and other managers being required to secure this aim.

The new administrative structure was primarily to be implemented in the Oticon headquarters (i.e., administration, research and development and marketing), although various aspects of the spaghetti-organization were also implemented in the production plant in Thisted (DK) and in various sales offices outside of Denmark.¹⁴ In order to symbolically underscore the fundamental transformation of Oticon, the company headquarters moved, at 8 am on 8 August 1991, to a completely new location in Hellerup just north of Copenhagen. All of the furniture of the old headquarters was auctioned off. In the new building, all desks were placed in huge, open office spaces. Employees were not supposed to be permanently located at particular desks, but should move flexibly from desk to desk, bringing only a trolley with necessary paper with them. Inside a huge glass tube, placed in the lobby of the company headquarters, a steady stream of paper fell down, emphasizing the ambition to run the headquarters in a virtually paper-less way. Finally, all formal titles were done away with. Evidently, symbolism clearly loomed large in all of this. Still, the initiatives with respect to the design of office space, etc. were quite functional in supporting the fundamental changes in administrative structure that the spaghetti organization implemented in the Oticon headquarters. Thus, the huge,

¹⁴ For details on the planning and implementation of the turnaround, see Gould (1994) and Morsing (1995). The reorganization plan was initially very strongly resisted by Oticon management.

open office landscape constituted the physical infrastructure of an almost completely flat organization that was supposed to work by means of principles that were explicitly designed to emulate the functioning of a market system (Lyregaard 1993).

The new organization amounted to breaking down the old functional department-based organization into an almost completely flat, almost 100 percent project-based organization. Departments gave way to “competence centers” (e.g., in mechanical engineering, audiology, etc.) that broke with the boundaries imposed by the old departments. And rather than being assigned tasks from the above, employees now had a choice to decide which projects they would join. All projects were to be announced on an electronic bulletin board, where employees who would like to join them could sign in. The much noted “multi-job” principle meant, first, that employees were not restricted in the number of projects they could, and, second, that employees were actively encouraged (and in the beginning actually required) to develop and include skills outside their skill portfolio.¹⁵ Each project would hold employees with different skills coming from development, marketing and the production units. Project managers were free to manage the project, as he or she preferred, “management” being understood more in terms of playing the role of facilitator and coordinator than that of a directing principal. The project team was required to undertake all the tasks connected with product development until the product was successfully introduced in all markets.

To make it possible for project teams to rapidly combine the right skills, the new organization was founded on four fundamental ideas. First, as already noted, the traditional functional department structure was eliminated. Instead, all activities were now supposed to be organized by projects. The philosophy behind this was not only to make it easier to combine complementary skills on projects, but also to eliminate department-specific group-think, a problem that had plagued the old

¹⁵ As Kolind explained to Gould (1994: 465): “We quickly agreed that all employees would have a portfolio of jobs, and we were tough; we said at least three jobs, with the main one in their profession or using their greatest competence, and the other two in outside areas. This concept really expands an organization’s resources: engineers are doing marketing, marketing people manage development projects, and financial people help with product development.”

organization. Second, new information technology systems were designed and implemented to make it possible to coordinate plans and actions in such a decentralized organization. The aim was to create a firm-wide information flow, increasing employee understanding of company activities and making it easier for project teams to form. Moreover, the information-dissemination policy also helped to break knowledge-monopolies left over from the old organization, although this does not appear to have been an explicit aim.¹⁶ Everybody was supposed to have full access to the same information. Third, in a move called the “breakdown of the palace,” the traditional office was abandoned. No one would have private offices or fixed desks; instead, all employees were located in one large office. At each desk there was a workstation, including a cellular phone and a computer with access to all information on the Oticon network. The employees’ physical locations changed according to the projects they worked on. Coffee bars were strategically located around the building to stimulate and encourage discussion, and a central spiral staircase that was wide enough to permit chance encounters and dialogue, replaced the elevators in the building. Finally, Kolind worked hard to increase intrinsic motivation by developing a corporate value base that strongly stressed responsibility, personal development, and freedom.¹⁷

These fundamental organizing principles were backed up by other measures. For example, Kolind introduced an employee stock program, which was motivated by the need to raise needed additional money for the transformation. He invested 26 millions DKK of his own funds in Oticon. Project managers throughout the organization received a considerable amount of decision making power. Wage negotiations were decentralized. The project managers — that is, those managers

¹⁶ One of the means towards the end of creating a truly knowledge-based company was Kolind’s dictate of a “no paper” policy. In principle, every document had to be scanned into a computer, filed there, and then being maculated, the goal being an elimination of 95% of all paper in the organization.

¹⁷ Although the variance on the distribution of salaries was increased as a result of the new reward schemes that characterized the spaghetti organization, average salaries do not appear to have changed. In fact, average Oticon salaries have been, and still are, comparatively low, particularly for software developers. Arguably, intrinsic motivation is a key aspect of Oticon motivation policies. On intrinsic and extrinsic motivation, and its implications for organization, see Frey (1997) and Osterloh and Frey (2000).

who were supposed to possess the most intimate knowledge of employee skills and efforts — received the right to negotiate salaries. Finally, although project teams were self-organizing and basically left to mind their own business once their projects were ratified, they were still to meet with a "Project and Product Committee" once every three months for ongoing project evaluation.

One of the things soon to be realized when the spaghetti organization became a reality was that Oticon actually already had embarked upon a development project for the in-the-ear hearing aid back in 1979.¹⁸ A result of the spaghetti organization was that work on this old project was resumed. Yet another positive outcome of the spaghetti organization was that the development time of new products became half of what it used to be. Thus, typical time-to-market was reduced to three years. Customer orientation, another explicit aim of the spaghetti, also dramatically improved. In 1993, half of Oticon's sales stemmed from products introduced in 1993, 1992 and 1991. A total of 15 new products had been introduced since the implementation of the new organization. Moreover, the ambition to broaden the business areas of Oticon was successful; it was characteristic of the new products that they were not just hearing-aid hardware, but complete integrated hearing solutions, many of them drawing upon recent advances in digital signaling processing technology and embodying sophisticated software. The two major innovations that are usually directly ascribed to the increase in innovative capability that the spaghetti organization fostered are MultiFocus from 1991 and DigiFocus from 1996.¹⁹ Both represented strong technological discontinuities, the former by being the first hearing aid that adjusted tonal balance and amplification in a fully automatic way, the latter by being the very first fully digital hearing aid ever. The technological trajectories

¹⁸ As one employee said: "We had created a good structure with five people – each with their own area of responsibility I was responsible for the ear plug. But at that time the organization simply wasn't functioning. No-one really believed in it and there was no support" (Foss and Hertz 2000).

¹⁹ Today, MultiFocus is described by Oticon insiders as the product that saved the company from the bankruptcy that would have been threatening in the somewhat longer run. MultiFocus was the world's first fully automatic hearing aid with no user controls. The device exceeded sales expectations by more than 100 % (Gould 1994).

defined by these two major product innovations yielded a number of more incremental products in the following years.

A recurring theme in academic treatments of the Oticon spaghetti organization (Morsing 1995, 1998; Verona and Ravasi 1999; Ravasi and Verona 2000) is that an important reason for the observed increase in Oticon's innovativeness was ultimately rooted in imposing a condition of loose coupling (Weick 1976) on that organization. For example, Morsing (1998) argues that the project-based organization allowed for fruitful conflicts that challenged established mindsets, broke old routines, and in general fostered more new knowledge than in more quiet environments. Ravasi and Verona (2000) argue that loose coupling was achieved by introducing structural ambiguity. Thus, the breaking down of authority and roles accomplished by means of introducing a radical project-organization amounts to a condition of structural ambiguity. In turn, this condition facilitated efficient and speedy integration and production of knowledge, leading to "... the undisputed ability for continuous innovation displayed by Oticon" (Ravasi and Verona 2000: 31). While not disagreeing with this interpretation *per se*, the following section presents an alternative interpretation, based on organizational economics. This interpretation directs attention to other aspects of the spaghetti organization. Moreover, it may help to understand why the spaghetti organization was later modified.

The Spaghetti Organization: An Organizational Economics Interpretation

From an organizational economics point of view, the immediately noticeable aspect of the spaghetti organization is the importance of the market metaphor in the design of the new administrative structure.²⁰ A sort of market it seemingly was. Employees (particularly project leaders) were given many and quite far-reaching decision-making rights. Development projects could be initiated by, in principle, any employee just like entrepreneurs in a market setting, although these projects had to pass, not the market test, but the test of receiving approval from the Project and Product Committee. Project groups were self-organizing in much the same way that,

²⁰ It was used quite explicitly by Oticon insiders (e.g., Lyregaard 1993).

for example, partnerships are self-organizing. The setting of salaries was decentralized to project leaders (Business Intelligence 1993). Most hierarchical levels were eliminated and formal titles done away with, etc. Thus, the intention was that the organization should mimic the market in such dimensions as flexibility, autonomy, flatness, etc.

Kolind's explicit aim was to build an administrative system that was superior to any other conceivable system with respect to discovering, building and combining knowledge (Kolind 1994). In a number of ways, the spaghetti organization did fulfill this aim, and it was certainly much superior to the old hierarchical organization in this respect. A major problem that besets centralized decision-making systems — in large firms as well as in centralized economies — is that they have difficulties efficiently mobilizing and utilizing important local knowledge, such as the precise characteristics of specific processes, employees, machines, or customer preferences. As Hayek (1945) explained, the main problem is that much of this knowledge is transitory, fleeting and/or tacit, and therefore costly to articulate and transfer to a (corporate) center.²¹ Markets are not plagued by these type problems to the same extent. Rather than involving the transfer of costly-to-transfer knowledge to those with decision rights (as in a command economy or a centralized firm), markets tend to economize on the costs of transferring knowledge by instead allocating decision rights to those who possess the relevant knowledge (Hayek 1945; Jensen and Meckling 1992; Jensen and Wruck 1994). In the process, markets ensure that, at least as a broad tendency, rights to make use of resources will move towards those who put the highest valuation on these rights. Moreover, because people interacting under market conditions are residual claimants on their own actions, effective use will be made of rights.

XXXXXXXXX *Insert Table 1 here* XXXXXXXXXXXX

²¹ Group think may exacerbate these problems, that is, make it even more costly to transfer knowledge to those who are supposed to make decisions based on this knowledge (Janis 1983).

The Oticon spaghetti organization was very much an attempt to mimic the market in these dimensions (see Table 1).²² Thus, a basic problem in the old organization had been that commercially important knowledge simply didn't reach the relevant decision-makers. A reflection of this is the example, mentioned earlier, of Oticon already having started an in-the-ear hearing aid development, but shelving and forgetting that until the spaghetti organization recovered it. By giving project teams extensive decision rights, making ideas for projects public and requiring that teams/project groups possessed the necessary complementary skills for a particular marketing, research or development task, the spaghetti organization stimulated a co-location of decision rights with local knowledge. Those who held the relevant knowledge should also have the authority to decide over the use of company resources, at least within limits.

It is, of course, much the same co-location that takes place in a well-functioning market. However, the analogy is far from complete: Oticon remained a firm, not just because of its continued legal status as such, but more fundamentally because the pattern of income and decision rights that characterized even the strongly decentralized spaghetti organization was one characteristic of a firm, not of a market. Its use of "free market forces" (Lyregaard 1993) was fundamentally a simulation, for the full decentralization of decision rights that characterizes market organization never took place in Oticon (and neither could it). The decentralized market is made coherent — that is, individual decisions and plans are coordinated — by means of the price mechanism, various contractual institutions and norms and mores that regulate the definition, exchange, and protection of property (decision) rights (Barzel 1997). In lieu of a distinct price mechanism, the market-like spaghetti organization

²² In terms of the distinction between external and internal corporate disaggregation (Zenger and Hesterly 1997), Oticon relied mostly on internal disaggregation. The possibility of strengthening incentives by relying on the *real* market (rather than the simulated internal one) by spinning off functions and departments does not appear to have been seen as a serious alternative to internal disaggregation. The production of some "discount" (i.e., inexpensive, low-tech) hearing aids were in fact spun-off (with Oticon maintaining financial control over the spin-off), but this was clearly an exception to the rule, and the company remains strongly vertically integrated to this day. For example, many of the machines used in the production plant in Thisted, DK, are actually produced in a special department in the headquarters in Hellerup. Although a number of potential suppliers are available, management questions their ability to deliver the right quality.

was to be kept together by a shared set of values (Kolind 1994), advanced information technology, the charismatic leadership of Lars Kolind himself, and, last but certainly not least, by a committee, staffed by Kolind and three other managers, the primary purpose of which was to approve of or reject proposed projects (the Projects and Products Committee). This committee, as well as the strongly overlapping top management committee, were the real holders of power — they possessed ultimate decision rights — and no secret was made of this. The allocation of rights that thus characterized Oticon — that is, strong delegation of rights to initiate and manage development projects combined with strong ultimate decision rights that were controlled by the Projects and Products Committee — may be seen as a response to certain incentive problems. However, ultimately that allocation of rights fostered other incentive problems.

In general, firms confront a problem that markets confront to a smaller degree, namely that of making sure that decision rights are utilized efficiently, in other words, the problem of moral hazard. There was no *a priori* guarantee that project leaders and other employees would act in the interest of Oticon (and Oticon's owners). Several of the components of the spaghetti organization may be seen as responses to this fundamental agency problem. It is convenient to break the right to allocate resources to a particular project down into groups of decision-making rights, namely rights to 1) initiate a project, 2) ratify projects, 3) implement projects, and 4) monitor and evaluate projects (cf. Fama and Jensen 1983). Decision-making processes in project-based firms rest on the allocation and exercise of such rights. Thus, how these rights are allocated and exercised have profound implications for the efficiency with which decision-making processes take place and for the outcomes of these processes. For reasons of efficiency, firms usually don't concentrate these rights in the same hands; rather initiation and implementation rights may be

controlled by one person (or team) while ratification and monitoring rights are controlled by other persons, usually hierarchical superiors.²³

As noted above, this sort of allocation of control rights corresponds to that of the Oticon spaghetti organization. Thus, anybody could make initiate a project, in the sense of sketching, making preliminary plans, doing the required calculations, making contacts, etc. However, projects had to be evaluated by the Products and Projects Committee that was staffed by Kolind, the development manager, the marketing manager and the support manager. The Project and Products Committee either rejected or approved of the project. Although the *ex ante* criteria for getting a project accepted by the Committee were not that harsh or encompassing — projects basically only had to somehow relate to the business areas of Oticon and to yield a positive return over a three years period and with a discount rate of 30 % — the Project and Products Committee was the real holder of power in Oticon. Frequent intervention on the part of the Committee *ex post* made that clear to everybody. Thus, projects were required to report to the Committee on a three months basis, and the Committee could at any time halt or close down projects (something which happened quite frequently). Thus, decision *management* (i.e., initiation and daily project management) was very strongly separated from decision *control* (i.e., project evaluation and monitoring). In other words, the internal market was, in actuality, very much a managed one. Although a considerable amount of variety was indeed allowed to evolve, the selection over this variety was very much guided by the visible hand of the Products and Projects Committee.

From an organizational economics perspective, another notable (though hitherto unnoticed) feature of the spaghetti organization is the extent to which it was characterized by *complementary* elements, that is, organizational practices that formed an interlocking system, feeding on each other (Milgrom and Roberts 1990; Zenger 1997; Baron and Kreps 1999). Thus, widespread delegation of rights was

²³ Exceptions may occur when giving subordinates more extensive rights (e.g., a package of initiation, ratification and implementation rights) strengthens employee incentives (see Aghion and Tirole 1997; Baker, Gibbons and Murphy 1999; and Foss and Foss 2000 for analyses of this).

accompanied by making incentive systems and employee monitoring much more fine-grained than they had been under pre-spaghetti administrative system. Much wider dispersal of wages than in the old organization were allowed for, employee stock ownership was strongly encouraged, and employees were monitored by an elaborate system of evaluation, where their performance in 3-8 different dimensions (depending on the type of employee) was examined (Poulsen 1993). Another check on behavior was supplied by the open office landscape and the strategically placed coffee bars and staircases, which not only fostered knowledge exchange, but also helped to build reputational effects (Esgerod 1997, 1998).

The fact that these organizational practices constituted a complementary system also helps accounting for the speed and toughness with which Kolind managed the transition from the old organization (also made up of complementary, yet different organizational practices) to the new system. It may be argued that transition had to be accomplished in a "big bang" manner (cf. Dewatripont and Roland 1995); complementary systems are very hard to change efficiently in an incremental manner (Milgrom and Roberts 1990). In particular, vested interests, the efforts of rent-seekers who try to defend established privileges, etc. may make transition hard. In the context of the implementation of the spaghetti organization, Kolind implemented it in a big-bang manner so as to effectively break old commitments, make life hard for those who had held power positions in the old organization, and create new organizational expectations. The change was clearly assisted by the symbolic acts undertaken by Kolind. More precisely, these helped to signal his commitment to the change. For example, Kolind's 26 million Dkr investment was such an act of commitment (Hermalin 1998). His attempt to infuse the organization with a strong set of shared values may also be seen as an attempt to assist the coordination of multiple efforts in a decentralized setting while simultaneously keeping agency problems at bay (Miller 1992; Kreps 1990).

Not only was the implementation of the spaghetti organization consistent with basic organizational economics principles, the organization itself in many ways conform to what would be prescribed by these principles. Thus, Kolind rightly

separated decision-management (the project teams) from project control (the Product and Project Committee) (Fama and Jensen 1983), worked hard on developing a corporate value base, and made employees residual claimants through the employee stock schemes, all of which may be seen as responses to latent agency problems introduced by the strong delegation of decision rights that characterized the spaghetti organization. In other words, apparently Kolind did exactly what basic organizational economics reasoning would instruct him to do. However, the spaghetti organization as described above is no longer an accurate description of the administrative systems characterizing Oticon. Although Oticon headquarters is still by any reasonable standard an organization characterized by much delegation of decision rights, there has decidedly been a retreat from the spaghetti organization to more structured administrative systems.

Spaghetti and Beyond: Some Costs of Internal Hybrids

A Puzzle

In an account of the spaghetti experiment, Gould (1994: 470) noted that "... Lars Kolind's vision was the right one for Oticon. In any case, one thing was certain: there could be no turning back." Kolind's vision may indeed have been the right one for Oticon at the particular time in which it was implemented, but beginning in 1996, a considerable "turning back" actually began: Oticon embarked upon a partial abandonment of the spaghetti organization. What happened, and why? This is a puzzle because we have just noted that Kolind apparently got it right with respect to organizational design. The puzzle is aggravated by the fact that it does not appear plausible to ascribe this organizational change to outside contingencies, such as new technological discontinuities, changes in regulations and in the competition, or to dramatic changes in strategic intent; nothing of the sort has happened. The argument in the following is that just as organizational economics provides an interpretation of hitherto neglected aspects of the spaghetti organization, this body of theory is also helpful for developing a highly plausible perspective on recent changes

in Oticon organizational structures. In the light of this, it turns that a number of design mistakes were in fact made when the spaghetti organization was initially implemented.

Retreating From Spaghetti

The retreat from the radical spaghetti organization that Kolind had implemented in 1991 began long before he resigned as CEO in 1998. In 1996, Oticon headquarters has been divided into three “business teams,” called “Team Advanced,” “Team Technology,” and “Team High Volume.” These serve as a new administrative layer relative to the original spaghetti organization, and function as overall administrative units around projects. Each business team is managed by two team leaders, namely a technician and a person with marketing or human resource skills. These teams refer directly to Niels Jakobsen, the new CEO.

In addition to the business teams, a “Competence Center” has been defined. The unit is in charge of all projects and their financing and of an operational group controlling administration, IT, logistics, sales and exports. The Competence Center is led by the chief HRM manager, Henrik Holck and comprises nine managers. It is one of the successors to the abandoned Project and Products Committee, but its style of managing the projects is very different. In particular, the utmost care is taken to avoid the erratic behavior with respect to intervening in already approved of projects that characterized the Products and Projects Committee. The team leaders and the head of the Competence Center comprise, together with the CEO, the “Development Group,” which may be seen as the second successor to the Products and Projects Committee of the original spaghetti organization. The Development Group, which essentially is the senior executive group, is in charge of overall strategy making.

Most of the initiative with respect to starting new projects is taken by the Development Group, although the need for employees to provide inputs in the form of new project ideas is still stressed. Many of the decision-making rights held earlier by project leaders have now been concentrated in the hands of the Competence Center, or the managers of the business teams. For example, project leaders’ rights to

negotiate salaries have been constrained. Project leaders are appointed by the Competence Center; the right to be a project leader is not something that one grabs, as under the spaghetti organization. Although multi-jobs/multi-tasking are still allowed, they are not directly encouraged, and their prevalence has been much reduced. The electronic job *bourse* where anybody in the old spaghetti organization could advertise projects and seek co-workers, but which never worked satisfactorily, has been finally dropped.

To sum up, recent changes of administrative systems at Oticon, beginning around 1996 and after the major innovations of MultiFocus and DigiFocus, have amounted to a break with the almost complete bottom-up approach that characterized the original spaghetti structure. Much of the initiative with respect to product development efforts now comes from particularly the Competence Center. More hierarchical layers have been introduced, and a number of the decision rights that were decentralized under the spaghetti organization have now been concentrated in the Development Group and the Competence Center. Thus, although Oticon is still characterized by considerable decentralization and delegation of rights, many of the crucial elements of the spaghetti organization have been left. What happened?

Some Likely Causes of the Partial Failure of the Spaghetti Experiment

An organizational economics perspective suggests that although the spaghetti organization was characterized by substantial coherence obtaining between its constitutive elements, it was still beset by a number of problems that may arguably have been among the causes of its partial abandonment about five years later. Some of these are rather obvious, while some are more subtle. It is convenient to group them into problems of assigning the right people to the jobs, managerial competence, multi-tasking, coordination, knowledge sharing, and influence activities.²⁴

²⁴ A further cause of the retreat from the spaghetti has to do with the fact Lars Kolind became increasingly involved in managing acquired subsidiary companies. He had to increasingly delegate control over the headquarters to other members of the management team. Much of the "glue" of the

With respect to *assignment*, the spaghetti organization was still populated by a number of employees whose mindset and competencies were characteristic of, and therefore made them sympathetic towards, the old way of doing things, that is, Oticon prior to the implementation of the spaghetti organization. Aligning tasks with such people in the new organization was inherently difficult, and some of these people were basically idle or engaged in political fights that essentially destroyed value. These problems may have been aggravated by the fact that the spaghetti organization had done away with most hierarchical levels, leading to a problem of the allocation of *managerial competence*. Competent and less competent people were placed on the same level, having the same basic right to initiate projects and getting a hearing before the Projects and Products Committee. Thus, hierarchy couldn't be used anymore as a sorting mechanism for allocating skills so that those with more decisive knowledge would obtain authority over those with less decisive knowledge (Casson 1994). In fact, the very notion that hierarchy may reflect this kind of ordering of knowledge ran very much counter to the fundamental bottom-up philosophy that animated the spaghetti organization (Kolind 1990). The spaghetti organization sorted knowledge in a completely different — horizontal rather than vertical — way. From an incentive perspective, the extremely flat spaghetti organization implied sacrificing an incentive instrument: Hierarchical job ladders could not any longer function as incentive mechanisms in their own rights, since the spaghetti organization essentially abolished conventional tournaments between managers.

As mentioned earlier, a key ingredient of the spaghetti organization was the notion of multi-jobs where each employee was encouraged to not only engage in a broader set of tasks than he had under the old organization, but also to develop skills that were outside his present skill portfolio and apply these — in other words, to engage in *multi-tasking* (Holmström and Milgrom 1991). Much work on Oticon has treated the multi-job principle as a strong stimulus to knowledge exchange and

spaghetti organization may have consisted in the unique communicative and leadership skills of Kolind.

integration, for example, because it encouraged employees to participate in more than one project at a time (e.g. Verona and Ravasi 1999; Ravasi and Verona 2000). However, there is strong evidence that the principle also had its significant costs.²⁵ Under the spaghetti organization, one could in principle join any number of projects one wanted to. There were no regulations relating to this, and nobody kept track of the total time spent on the projects one had joined.²⁶ Moreover, project leaders were free to try to attract those who worked on competing projects, and in many cases they succeeded in doing so. This was a consequence of the explicit aim to emulate the market, but the effect was that it hard to commit people to projects. This led to severe *coordination* problems, because project leaders had very little guarantee that they could actually carry a project to its end, given that anybody at the project could leave at will, if noticing a superior opportunity in the internal job market. Moreover, many joined more projects than their time resources possibly allowed for, creating problems of coordinating schedules and work hours. Apparently, reputation mechanisms were not sufficient to cope with these problems.

The key idea behind the spaghetti organization was to foster an administrative system that was far superior to the old one (and to any other conceivable system) in discovering, building and utilizing knowledge. Although this may have been partly achieved, the cost side of relying on a simulated market for accomplishing these goals was the stated intentions of making Oticon a knowledge-*sharing* environment were frustrated. Rather than freely exchanging knowledge with everybody else, knowledge tended to be held back within projects, because of the widespread, and correct, perception that projects were essentially in competition over resources. Thus, by stressing so strongly a market-like competitive ethos and by making

²⁵ Eskerod (1997, 1998) in particular documents this. My later interview with the chief HRM officer strongly confirmed Eskerod's finding that the multi-job principle had rather severe costs in terms of problems of coordination and frustrating employees.

²⁶ And neither would this have been possible, as nobody in Oticon, not even the Projects and Product Committee, kept track of the total number of development projects. In the spaghetti organization, records were only kept of the 10-20 major projects. An estimate is that under the spaghetti organization, an average of 70 projects were continuously running (Eskerod 1998: 80). This also helps explaining why the initial objective performance measurement systems were left: Because nobody

incentive systems more “high-powered” (Williamson 1996) than they had been under the old organization, the spaghetti organization to some extent worked against its stated purposes. Monitoring systems apparently couldn’t cope satisfactorily with these problems.²⁷

Finally, *influence activities* seems to have been important under the spaghetti organization. These denote those activities inside an organization that aim at influencing hierarchical superiors to make decisions that are in one’s interest rather than in the organization’s (Milgrom 1988; Schaefer 1998; Argyres and Mui 2000). Resources expended on influence activities are, from the point of view of the organization, waste. The spaghetti organization which amounted to creating competition between project groups for the approval of the only relevant “hierarchical superior” left, namely the Projects and Products Committee, arguably produced such influence activities. Personal relations to those who staffed the Committee became paramount for having a project ratified by the Committee. As Eskerod (1998: 80) observed:

Part of being a project group may be lobbying in the PPC trying to obtain a high priority status by influencing the PPC members. The reason for doing this is that a high priority project is regarded as a very attractive place for the employees, because the management sees this project as important.

It is, however, not clear from the empirical studies on the spaghetti organization that this was perceived as a serious problem in the organization, for example, whether it resulted in obviously unimportant projects being approved of by the Committee. Rather, it was taken as a unavoidable, and relatively small, cost of the spaghetti organization.²⁸ There is, however, another incentive problem that was

(except the employee himself) kept track of an employee’s total time allocation across projects, many of the relevant measures simply were not available to monitoring managers.

²⁷ Possibly as a reflection of these problems, the most crucial variable with respect to determining salary changes in the *present* organization is the degree to which an employee contributes to knowledge-sharing.

²⁸ Interview with HRM manager Henrik Holck.

fostered by the spaghetti organization, and which arguably was an important cause of the partial demise of that organizational design.

The Inherent Difficulties of "Playing Market"

As Mises (1949: 709) explained, there are inherent problems involved in "playing market," that is, infusing hierarchies with coordination mechanisms characteristic of market organization.²⁹ With reference to various socialist schemes of his day that tried to preserve some market relations while eliminating capital and financial markets, Mises argued that these schemes would be unworkable. Importantly, the concentration of ultimate decision-making rights and responsibilities, and therefore ownership, in the hands of a central planning board would dilute the incentives of managers. Thus, while planning authorities could (and according to the schemes of the day, should) delegate rights to make production and investment decisions to managers, these rights were likely to be used inefficiently. First, because managers could always be overruled by the planning authorities, they were not likely to take a long view, notably in their investment decisions. Moreover, because managers were not the ultimate owners, they were not the full residual claimants of their decisions and, hence, wouldn't make efficient decisions. Therefore, Mises declared, the attempt to "play market" under socialism would only lead to inefficiencies.

As later research has clarified, the problem may be handled if the planning authorities can credibly commit to a non-interference policy. However, doing so will typically be very hard, since reneging on a promise to delegate will in many cases be extremely tempting and those to whom rights are delegated will anticipate this. Transaction cost economist, Oliver Williamson (1996) refers to these kinds of problems in terms the "impossibility of (efficient) selective intervention." He describes it as

²⁹ Relatedly, the literature on internal transfer prices has revealed the existence of various incentive problems that may beset this organizational practice (Eccles 1986; Holmström and Tirole 1991).

... a variant on the theme, “Why aren’t more degrees of freedom always better than less?.” In the context of firm and market organization, the puzzle is, “Why can’t a large firm do everything that a collection of small firms can and more.” By merely replicating the market the firm can do no worse than the market. And if the firm can intervene selectively (namely, intervene always but only when expected net gains can be projected), then the firm will sometimes do better. Taken together, the firm will do at least as well as, and will sometimes do better than, the market (1996:150).

Williamson flatly argues that selection intervention is “impossible.” Incentives are diluted, because the option to intervene “... can be exercised both for good cause (to support expected net gains) and for bad (to support the subgoals of the intervenor)” (Williamson 1996: 150-151). Promises to only intervene for good cause can never be credible, because they are unenforceable. However, the conclusion that “selective intervention” is strictly impossible may not be correct. It is in fact conceivable that the intervenor may credibly commit to not intervene in such a way that the “subgoals of the intervenor” are promoted.

The logic may be stated in the following way (cf. Baker, Gibbons and Murphy 1999). Assume that a subordinate initiates a project.³⁰ Assume further that the manager has information that is necessary to perform an assessment of the project, but that he decides upfront to ratify *any* project that the subordinate proposes. Effectively, this amounts to full informal delegation of the rights to initiate and ratify projects — “informal,” because the formal right to ratify is still in the hands of the manager and because that right cannot be allocated to the subordinate through a court-enforceable contract (cf. Williamson 1996). Because the subordinate values being given freedom, this will induce more effort in searching for new projects (Aghion and Tirole 1997; Foss and Foss 2000). The expected benefits of these increased efforts may overwhelm the expected costs from bad projects that the manager has to ratify. However, the problem is that because the manager has

³⁰ This should be understood in a broad sense: A “project” may refer to many different types of decisions or clusters of decisions.

information about the state of a project ("bad" or "good"), he may be tempted to renege on a promise to delegate decision authority, that is, intervene in a "selective" manner. But if he overrules the subordinate, the latter will lose trust in him, holding back on effort. Clearly, in this game a number of equilibria are feasible. What determines the particular equilibrium that will emerge is the discount rate of the manager, the specific trigger strategy followed by the sub-ordinate (e.g., will he lose trust in the manager for all future periods if he is overruled?), and how much the manager values his reputation for not renegeing relative to the benefits of renegeing on a bad project (for details and extensions, see Baker, Gibbons, and Murphy 1999).

Selective Intervention in Oticon

It is arguable that one of the reasons why the spaghetti organization was changed into a more hierarchical, but still essentially project-based, organization has to do with the sort of problems described by notions of selective intervention and the related problems. Thus, the official rhetoric of a flexible market-based structure, with substantial autonomy and the management team (i.e., the Projects and Products Committee) as little more than facilitator and coordinator (Kolind 1990; Lyregaard 1993), was increasingly at odds with the frequent selective intervention on the part of the Projects and Products Committee. Selective intervention was partly motivated by the fact that the

...PPC does not make general written plans, which are accessible to the rest of the organization ... if this were done, plans would have to be adjusted or remade in an ever-continuing process, because the old plans had become outdated (Eskerod 1998: 80).

Thus, instead of drafting and continuously revise plans under the impact of changing contingencies, the PPC preferred to intervene directly in projects. In fact, this was taken by the PPC to be a quite natural feature of a flexible, project-oriented organization (Eskerod 1998: 89). However, this *modus operandi* led to diluted incentives and strongly harmed intrinsic motivation (as documented at length by Eskerod 1997, 1998).

Thus, the frequent intervention and changing priorities of Kolind and the Products and Projects Committee caused mounting frustration among employees. This frustration finally resulted in a major office meeting in 1995, announced as “Shoot at top management!” This meeting marks the beginning of the retreat from the pure spaghetti organization. On that meeting employees dramatically expressed their concerns about the gap between the Oticon value base and the delegation rhetorics on the one hand, and the way in which the company was actually run on the other hand. To some extent, wage issues appears to have been involved: Many employees apparently felt that the emphasis of Oticon remuneration schemes was too much on intrinsic motivation and too little on extrinsic (pecuniary) motivation. But it was also a matter of frustration that projects were interrupted in seemingly arbitrary ways and that the organization was far better at generating projects than at completing them.

The present Oticon organization is characterized by a much more consistent approach towards projects on the part of the Competence Center (one of the descendants of the Products and Projects Committee). Organizational expectations appear to be that priorities do not change in the rapid and erratic manner that characterized the original spaghetti organization, and that employees can be much more sure that the projects they are working on are taken all the way to the end. In the new organization, projects are rarely stopped or abandoned, and there is a stated policy of sticking to ratified projects. Two reasons are given for this: First, projects now rest on generally more secure ground, having been more carefully researched beforehand. An aspect of this is that the Competence Center now much more actively puts forward projects ideas, contact potential project leaders, etc., rather than relying on the bottom-up approach that characterized the original spaghetti organization. Second, the wish to avoid harming motivation (i.e., diluting incentives) by overruling going projects is strongly stressed. Apparently, present Oticon management has realized the need to credibly commit to a policy of non-interference with going projects. If the present analysis is correct, one of the main problems of the old spaghetti organization was that Kolind and the Products and

Projects Committee never committed in this way; neither, apparently, did they intend to do so. Kolind's view appears to have been that in important respects and in many situations, they were likely to possess decisive knowledge, and that efficient utilization of resources dictated intervening in, and sometimes closing down, projects. However, that view clashed on a basic level with the rhetoric of widespread delegation of decision rights.

Discussion: Implications for Economic Organization

The purpose of the present section is to tease out some possible implications and wider ramifications for the understanding of economic organization from the Oticon spaghetti organization and from those theoretical insights that have been applied to the interpretation of that administrative system. Particular emphasis is on the limits to applying principles that are characteristic of markets inside of firms, that is, the crafting and implementation of internal hybrids.

Remediable Design Mistakes?

In order to discuss possible implications of the spaghetti experiment, some other possible interpretations must first be treated. The story that has been told in the preceding pages essentially is that the original, almost completely flat spaghetti structure foundered on, first, its market-like character working against its stated purpose of building, integrating and sharing knowledge, and, second, the contradiction involved in combining widespread delegation of decision-rights with a frequently intervening top-management team in the form of the Products and Projects Committee. A possible implication is that Oticon adopted a too market-like mode of internal organization. However, a counter-argument is that although Oticon may have made mistakes in the design of the spaghetti organization, these mistakes were essentially *remediable*. And if that is the case, one cannot necessarily infer that

Oticon adopted a too market-like mode of internal organization. The reverse may in fact be true: The spaghetti organization wasn't *sufficiently* market-like.³¹

It should be granted that many of the problems that beset the spaghetti organization were, in principle, remediable design mistakes. The problem, however, is whether they were truly remediable in the practical context of the spaghetti organization. For example, the problems of multi-tasking/multi-jobs may have been reduced by simply prohibiting employees from working on more than, say, two projects that could not add up to more than 100 % of the employee's total work hours. In fact, the more structured project organization gradually implemented from 1996 has established controls that secure that the coordination and time-allocation problems that beset the original spaghetti organization are kept at bay. Establishing such controls in the original spaghetti organization would, however, have run against the official rhetoric of autonomy and delegation. Monitoring systems might have been refined to control more dimensions of employee behavior; etc. However, the very elaborate monitoring system that was implemented together with the spaghetti organization and involved the construction of objective measures on half a dozen aspects of employee behavior (Poulsen 1993) appears to have been quickly and tacitly shelved and substituted with a simpler system that relied much more on subjective performance assessment (Business Intelligence 1993). This suggests that the problem with monitoring systems under the original spaghetti organization was that *they were already too complex*.

Since behavior was apparently difficult to measure, a more output-based system could have been tried (Prendergast 1999). For example, one may imagine a system of contracts that specified rewards for specific accomplishments (e.g., a system that rewarded according to milestones in a development project). In fact, this would have made the spaghetti organization even more market-like. However, it is doubtful whether such a contract could actually be made court-enforceable. Because

³¹ Thanks to Anna Grandori for suggesting this possibility.

of the resulting commitment problem, the contract system would have to rely on reputation effects.³²

Even if the spaghetti organization might conceivably have dealt with such problems, other problems may have been harder to fight under this organization. For example, it is inherently difficult under an organization such as the spaghetti organization to protect against influence activities. A comparative advantage of the traditional, hierarchical and rule-governed organization is exactly that it may be better at protecting itself against influence activities. This because what each employee is allowed to do, and perhaps say (Argyres and Mui 2000), is simply much more narrowly circumscribed than in an loose-coupled organization such as the Oticon spaghetti organization (Milgrom 1988).³³ In such an organization, trying to handle influence activities by means of managerial discretion (i.e., exercise of ultimate decision rights) is inherently problematic.

Finally, provided the above problems could have been dealt with, the original spaghetti organization might conceivably have been a viable discrete organizational form *if* Kolind and the Products and Projects Committee could in fact have committed to a non-interference policy from the outset. However, in the specific case of the spaghetti organization, this was hardly an option, given that the emphasis on organizational flexibility was explicitly taken to imply that projects could be closed based on the *fiat* of the Projects and Products Committee.

New Organizational Forms

The concept of "new organizational forms" has been increasingly utilized lately as a label for various changes in organizational forms towards external and internal corporate disaggregation (Bowman and Singh 1993; Zenger and Hesterly 1997). It

³² And let us not forget that one of the advantages of internal organization is the savings on the costs of using the price mechanism (Coase 1937).

³³ This is not to say that "non-traditional" organizational forms are necessarily beset with influence costs. See Argyres and Mui (2000) for an excellent analysis of how organizations may commit to certain rules that regulate what is acceptable discourse. Those rules reflect a trade-off between the benefits of organizational learning stimulated by dissenting opinion and the costs of rent-seeking activities that are pursued in the organizational conversation.

covers both new ways of designing the boundaries of the firm (e.g., novel sourcing arrangements, new types of licensing agreements, virtual corporations, etc.) as well as new ways of designing internal organization (e.g., new ways of structuring the employment relation). As a number of writers have observed, new organizational forms mix in novel ways means of allocating resources that are characteristic of the market with means of allocating resources that are characteristic of the hierarchy (Jensen and Meckling 1992; Hennart 1993; Jensen and Wruck 1994; Zenger and Hesterly 1997; Mendelsson and Pillai 1999; Grandori 2000; Helper, MacDuffie and Sabel 2000). The "swollen middle" (Hennart 1993) seems to have become the dominant mode of organizing transactions, so that the polar modes of elementary organizational of pure hierarchical planning and pure markets are increasingly seen as descriptively irrelevant.

The forces leading to new organizational forms being increasingly adopted are many. Thus, some argue that the increasing reliance on specialist knowledge in production renders the traditional employment contract increasingly obsolete and necessitates organizational structures characterized by a high degree of empowerment (Hodgson 1998). Others argue that the increasing importance in production of knowledge capital (Boisot 1998) implies that ownership-based definitions of the boundaries between firms and markets (as in Hart 1995) become increasingly irrelevant (Zucker 1991). Others point to the increasing importance in knowledge-intensive industries of combining knowledge inputs, sourcing knowledge for this purpose, and keeping knowledge-sourcing options open (Helper, MacDuffie and Sabel 2000). These drivers are also instrumental in fostering internal hybrids, such as the Oticon spaghetti organization.

Implications for Internal Hybrids

There is empirical support for the proposition that, as a broad tendency, there has been an increasing adoption of internal hybrids (Mendelsson and Pillai 1999; Zenger and Hesterly 1997). Proponents of internal hybrids argue that their main advantages lie in the ability to integrate virtues of more established organizational

forms that are particularly crucial under knowledge-intensive conditions. Specifically, internal hybrids combine the ability to achieve efficiencies through specialization that characterizes the functional form with the relative independence that can be granted in a divisional form and the ability to transfer resources and capabilities across division and business unit boundaries that characterize the matrix organization (e.g., Miles and Snow 1992). As Miles et al. (1997: 7) argue:

A number of leading companies today are experimenting with a new way of organizing – the cellular form. Cellular organizations are built on the principles of entrepreneurship, self-organization, and member ownership. In the future, cellular organizations will be used in situations requiring continuous learning and innovation.

These are exactly the kind of arguments that were invoked by the proponents of the Oticon spaghetti organization (Kolind 1990, 1994; Lyregaard 1993). In turn, this suggests that we may learn something from the Oticon experience about the limits to internal hybrids.³⁴

A basic proposition in much of organization theory is that for reasons of efficiency (or, “norms of rationality”), organizational forms are aligned with environmental conditions, strategies and exchange conditions in a systematic and discriminating manner (Thompson 1967; Williamson 1996; Nickerson and Zenger 2000). An implication is that mixing very different coordination mechanisms may lead to efficiency losses. Some proponents of new organizational forms argue that mechanisms for coordinating economic activities are more malleable, and that the set of stable discrete governance structures (i.e., clusters of coordination mechanisms) is larger, than what is conventionally assumed in much of organization theory and in the economics of organization (e.g., Grandori 2000; Helper, MacDuffie and Sabel 2000). In contrast, Zenger (1997: 4) argue that attempts to infuse hierarchies with coordination mechanisms characteristic of market organization often “... violate patterns of complementarity that support traditional hierarchy as an organizational

form.” For example, managers implement new structures without new performance measures and new pay systems, or they implement new pay systems without develop new performance measures (see also Baron and Kreps 1999).

The present paper has illustrated the importance *and* the difficulty of “getting the complementarities right.” Thus, one of the interesting features of the spaghetti experiment was exactly that it seemed to consist of highly complementary organizational elements. For example, delegation of decision rights was accompanied by performance pay and measurement and by making employees residual claimants through stock ownership programs. However, this was not sufficient to secure the viability of the spaghetti organization. The fundamental problem, it has been argued, was that the managerial commitment problem was not recognized, or at least not recognized as a part of the problem of achieving complementarity between organizational elements.

It has not been argued that a radical internal hybrid, such as the spaghetti organization, is impossible to efficiently craft; however, it has been argued that the design problem is a very tough one. The fundamental problem is that decentralizing an organization by means of delegation of rights to carry out certain actions (hiring, training, sourcing, pricing, etc.) amounts to “playing market” (Mises 1949: 709). It can never really *be* market exchange, because, unlike independent agents in markets, corporate employees never possess ultimate decision rights. They are not full owners. This means that those who possess ultimate decision rights can always overrule employees. Thus, credibly committing to a policy of decentralization and delegation is a major problem, for top-management in firms as well as for governments and other rulers.³⁵

Arguably, such insights greatly advance the analysis of the extent to which coordination mechanisms may be efficiently combined, and dispels ill-founded ideas

³⁴ Zenger (1997) addresses the design of internal hybrids. His focus on the need to implement *complementary* organizational elements parallels the approach here.

³⁵ Economic historians put much emphasis on this, seeing credible commitment issues as determinative of long-run growth (Rosenberg and Birdzell 1986; North 1990).

that such mechanisms may be combined more or less at will. The theoretical implication is that although notions of “coherent” organizational forms, characteristic of older organization theory, may appear crude today (Grandori 2000), what may be needed is not discarding the basic idea that there are indeed discrete organizational forms with different efficiency properties for certain environments, but rather a more refined analysis of the limits within which coordination mechanisms may be combined (idem.). A more practical implication is that, if theoretically founded reasoning suggests that a certain organization form may be inefficient, attention may be directed to other modes of economic organization. For example, external disaggregation may be a more viable long-term option than internal disaggregation (Day and Wandler 1998; Baker, Gibbons and Murphy 1999) because its incentive properties are superior.

Finally, it should be noted that although some of the members of the large and expanding set of new organizational forms may indeed be founded on inconsistent combinations of coordination mechanisms, the attendant losses in terms of increased coordination costs, misaligned incentives, etc. may be more than offset by gains in dynamic efficiency.³⁶ If indeed the Oticon spaghetti organization was inefficient with respect to the organization of its administrative systems, it is hard to dispute the proposition that it was also a quite innovative organization. These benefits may likely have overwhelmed the organizational costs.³⁷

³⁶ Also, Nickerson and Zenger (2000) suggest that considerations of efficiency may dictate modulating between discrete organizational forms in response to a *stable* set of environmental conditions. This is because the steady-state functionality delivered by a discrete organizational form may itself be discrete, and the desired functionality may lie in between those delivered by the discrete organizational forms. Efficiency gains may then be obtained by modulating between the forms.

³⁷ At least for some time. It may be noted that the retreat from the spaghetti organization began when the major innovations of Oticon had been introduced, thus suggesting that organizational costs might have begun to overwhelm gains in terms of dynamic efficiency. The organization has not yet come up with something as radical as the 1996 DigiFocus.

Conclusions

To many firms, disaggregation is increasingly seen as imperative (Day and Wendler 1998). However, disaggregation may be accomplished by means of external disaggregation/hybrids, internal disaggregation/hybrids, or some mixture between the two. The present paper has examined a concrete (internal) disaggregation episode in the light of organizational economics. The Oticon spaghetti organization accomplished in a number of ways what it was intended to, notably an increase in innovativeness. However, it has been suggested that a number of inefficiencies were present in that administrative structure, which led to a more hierarchical structure being adopted. In particular, the attempt to “play market” in Oticon foundered on the basic problem of doing so. One of the main rationales of firms is exactly that they may *avoid* the high-powered incentives that characterize markets (Williamson 1985; Holmström and Milgrom 1991), and structure monitoring and reward schemes in ways that are generally not available to markets (Holmström 1999). Arguably, the spaghetti organization was carried too far in its emulation of the market. Moreover, there was a basic problem of credible commitment, one that centered on the apparent inconsistency between a policy and rhetoric of widespread delegation, emphasis on responsibility, etc. on the one hand, and a managerial practice of shifting priorities and intervention and closing down of projects on the other hand. If the interpretation in this paper is correct, these were significant causes of the retreat from the spaghetti organization.

An overall theoretical implication of the story told in the present paper is that it matters whether knowledge-based networks are organized within or across the boundaries of the firm (cf. Baker, Gibbons and Murphy 2000). This is not only a matter of the appropriability of valuable knowledge (Liebeskind 1996). First, incentives differ between markets and firms. Knowledge sharing, one of the main stated aims of the spaghetti organization, is not necessarily best stimulated by market-based project organization. To the extent that knowledge sharing is a hard-to-measure performance variable, employees are likely to put less of an emphasis on

this. Upon realizing this, resort to lower-powered incentives is likely (Holmström 1999). This corresponds to what took place in Oticon, where it was realized that the internal market produced not only benefits with respect to knowledge-integration, but had certain harmful effects on knowledge-sharing.

Second, it remains the case that markets don't rely on resource-allocation by means of authority whereas firms do (Coase 1937). "Authority" is a dangerous word because it is easily invested with a too narrow meaning, for example, detailed direction and supervision. However, authority also means setting boundary conditions for a relation, such as, trivially, deciding that employees of our firm cannot also be employees of another firm (Holmström 1999), or, less trivially, defining what is acceptable discourse within a firm (Argyres and Mui 2000). And ultimately, the meaning of being a boss is that one can restrict the decisions of one's subordinate, overrule him and perhaps fire him. In turn, this means that although decision rights may be delegated, we can still trace the chain of authority in a firm, and we will always realize that ultimate decision-making power resides at the top. In a sense, all subordinates' decision rights "are loaned, not owned" (Baker, Gibbons and Murphy 1999: 56). Fundamentally, it can never be otherwise. This is because ultimate decision-making rights can only be transferred from bosses to subordinates in one way, namely by transferring ownership (Hart 1995). However, transferring ownership amounts to spinning off the person to whom ownership is given. It means creating a new firm.

These insights suggest that there is reason to be skeptical of sweeping claims that economic activity, being knowledge-based and highly dependent on personal relations, will increasingly taking place in networks that cut across the boundaries of the firm, that formal authority will vanish in importance, and that firms will therefore merely be legal shells around knowledge-creating activities. To be sure, formal authority may vanish in importance in an increasingly knowledge-based economy. But if that is the case, this may not be because firms' internal organization becomes increasingly characterized by delegation of rights. Rather, it may be that the number of firms increase, because the only efficient way to cope with the

commitment and other incentive problems caused by increasingly knowledgeable employees may be to spin them off, that is, let them create their own companies.

On the level of research methodology, this paper may be taken as supporting the position that there are fruitful complementarities between organization theory, organization behavior and strategy approaches on the one hand, and organizational economics insights on the other hand (cf. also Argyres and Mui 2000; Mahnke 2001). Thus, the spaghetti organization may indeed be understood in terms of an attempt to foster dynamic capabilities through imposing loose coupling and structural ambiguity on an organization (Ravasi and Verona 2000). But from an organizational economics perspective, that organizational form also represented a matrix of rights and incentives that are helpful for understanding its liabilities, and how these liabilities gave rise to certain organizational dynamics (i.e., the partial abandonment of the spaghetti organization).

Finally, with respect to managerial implications, the implication of organizational economics is to “get the incentives right.” In contrast, the present paper has stressed “get complementarities right,” and particularly “make commitment credible.” A further implication is to not focus in an isolated manner on a particular type of corporate disaggregation. Notably, because internal disaggregation, at least to the extent that it emulates market organization, may be inherently hard to efficiently craft, managers should always consider whether external disaggregation (spin-offs, outsourcing, carve-outs, etc.) may be efficient alternatives to internal disaggregation. And if internal disaggregation is in fact chosen, the present analysis directs attention to the paramount importance of credibly committing to the specific form adopted and not undermine it by erratic selective intervention.

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TABLE 1
Market Organization and the Spaghetti Organization Simulation

Market Organization	The Spaghetti Organization
Freedom of contract.	Approximated by delegating rights to join projects.
High-powered incentives.	Variable pay; initially based on objective input and output measures.
Dispersed residual claimancy.	Employee stock schemes.
Dispersed decision rights.	Very widespread delegation of rights.
Resource allocation decentralized, and strongly influenced by local entrepreneurship.	Local entrepreneurship very strongly encouraged. Relatively easy to get projects approved.
Allocation by means of pricing.	Transfer prices not used.
Legal independence between parties (contract law).	Employment contracts (employment law).