Rethinking the Dutch Innovation Agenda:

Management and Organization Matter Most

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ERIM REPORT SERIES *RESEARCH IN MANAGEMENT*	
ERIM Report Series reference number	ERS-2004-009-STR
Publication	January 2004
Number of pages	38
Email address corresponding author	h.volberda@fbk.eur.nl
Address	Erasmus Research Institute of Management (ERIM) Rotterdam School of Management / Rotterdam School of Economics Erasmus Universiteit Rotterdam P.O.Box 1738 3000 DR Rotterdam, The Netherlands Phone: + 31 10 408 1182 Fax: + 31 10 408 9640 Email: info@erim.eur.nl Internet: www.erim.eur.nl

Bibliographic data and classifications of all the ERIM reports are also available on the ERIM website:
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REPORT SERIES
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BIBLIOGRAPHIC DATA AND CLASSIFICATIONS		
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Library of Congress Classification (LCC)	5001-6182	Business
	5546-5548.6	Office Organization and Management
	HD 45	Innovation
Journal of Economic Literature (JEL)	M	Business Administration and Business Economics
	L 20	Firm Objectives, Organization and Behavior: general
	O 32	Management of technological innovation and R&D
European Business Schools Library Group (EBSLG)	85 A	Business General
	270 A 100 G	Strategic Management Organizational Growth
	90 G	Management, creativity
Gemeenschappelijke Onderwerpsontsluiting (GOO)		
Classification GOO	85.00	Bedrijfskunde, Organisatiekunde: algemeen
	85.10	Strategisch beleid
	85.15	Innovatie
Keywords GOO	Bedrijfskunde / Bedrijfseconomie	
	Strategisch management, organisatievernieuwing	
	Innovatie, management development, kennisoverdracht, attituden, verkenningsgedrag, exploratief gedrag, proefondervindelijke methoden	
Free keywords	Strategy Innovation, Dynamic Capabilities, Organizing Principles, Strategic Regulation, Management, Knowledge transfer, Mindsets, Exploration, Exploitation	

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Rotterdam, January 13, 2004

Abstract

In this essay, we challenge the present dominant emphasis in the Dutch Innovation Debate on the creation of technological innovations, the focus on a few core technologies, and the allocation of more financial resources. We argue that managerial capabilities and organizing principles for innovation should have a higher priority on the Dutch Innovation Agenda. Managerial capabilities for innovation deal with cognitive elements such as the capacity to absorb knowledge, create entrepreneurial mindsets, and facilitate managerial experimentation and higher-order learning abilities. These capacities can only be developed by distinctive managerial roles that enhance hierarchy, teaming and shared norms. Utilizing these unique managerial capabilities requires novel organizing principles, such as managing internal rates of change, nurturing self-organization and balancing high levels of exploration and exploitation. These managerial capabilities and organizing principles of innovation create new sources of productivity growth and competitive advantage.

The dramatic fall back of the Netherlands in the league of innovative and high productivity countries of the World Economic Forum-Report can be mainly attributed to the present lack in the Netherlands of these key managerial and organizational enablers of innovation and productivity growth. We provide various levers for building unique managerial capabilities and novel organizing principles of innovation. Moreover, we describe the necessary roles that different actors have to play in this innovation arena. In particular, we focus on the often neglected but important role of strategic regulations that speed up innovation and productivity growth. They are the least expensive way to boost innovation in organizations in both the Dutch private and public sector.

Finally, we discuss the implications for the Dutch Innovation Agenda. It should start with setting a challenging ambition, namely the return of The Netherlands within the WEF- league of the top-ten most innovative and productive countries of the world. Considering the under-utilization of available knowledge stemming from technological innovations, managerial and organizational determinants of innovation should receive first priority. These determinants have a high strategic relevance and should receive more public recognition. We suggest to organize an annual innovation ranking of the most outstanding Dutch firms, to develop an innovation audit that measures firms' non-technological innovation capacity, and to create an overall innovation policy for fast diffusion of new managerial capabilities and adequate organizing principles throughout the Dutch private and public sector.

In conclusion, we add five new items to the Dutch Innovation Agenda:

1. *Prioritize administrative innovations*
   Investments in management and organization determinants of absorption of knowledge and its successful application (*administrative innovation*) should have a higher priority than investments in technological innovations.
2. *Build new managerial capabilities and develop novel organizing principles*
   For these administrative innovations to succeed, firms have to build managerial capabilities (broad knowledge-base, absorptive capacity, managerial experimentation, higher-order learning) and various management roles (hierarchy, teaming, shared norms) to increase the assimilation of external knowledge and the utilization for innovation. Moreover, they have to develop novel organizing principles that increase internal rates of change, nurture self-organization and synchronize high levels of exploration and exploitation.
3. *Set levers of innovation by creating selection environments that favor innovation and by redefining the roles of key actors*
   Management has to create a proper organizational context to foster entrepreneurship and innovation (internal selection environment). Governmental agencies have to focus on innovation and productivity enabling strategic regulations (external selection environment). Moreover, research institutes, business schools, and consulting firms should not only focus on technological knowledge, but also on managerial and organizational knowledge for innovation. In the end, private small and large firms and public institutions have to recognize that they all must contribute to the national goal of increasing innovation and productivity growth.
4. *Create a new challenging national ambition: return of the Netherlands within the top-10*
   The Netherlands has to return to the top-ten most innovative and productive countries in the world as reflected in international rankings such as the World Economic Forum's Global Competitiveness Index.
5. *Proliferate an awareness and passion for innovation*:
   Create public awareness and recognition of the societal relevance of outstanding managerial capabilities and organizing principles to innovation and productivity growth:
   - Initiate a Dutch innovation ranking in terms of management and organization;

- Develop proper assessment tools for innovations in management and organization;
- Enhance reporting on the progress on managerial and organizational innovation as part of modern corporate governance and as part of outstanding annual reports.

These issues may contribute to rethinking the fundamental sources of innovation, productivity growth and sustainable competitive advantage of the Dutch economy.

Rethinking the Dutch Innovation Agenda:
Management and Organization Matter Most

1. Introduction

The theme of the Innovation Lecture 2004 is "Fertile grounds". Many consider innovation to be the primary driving force of progress and prosperity, both at the level of the individual firm and the economy in general (Schumpeter, 1934; Nelson and Winter, 1982; Tushman and Nadler, 1986). Notwithstanding Europe's Lisbon summit 2000 to become the world's most dynamic knowledge economy, or the even more ambitious Dutch aim to belong to the European frontrunners innovation group, and the Barcelona 2002 priority to spend approximately 3% of the GDP on investment in R&D, the Dutch innovation performance and productivity growth is falling behind. At the moment, the Dutch economy is not considered to be a dynamic and competitive knowledge-based economy (see recent Global Competitiveness Reports, the Dutch Knowledge Economy Monitor 2003, and IMD reports) for several reasons:

- Business: Dutch firms are focusing on restructuring, cost reductions and short-term performance (*efficiency focus and herd behavior*), while largely ignoring long-term performance and innovation (*passion for innovation*);
- Politics: Dutch Politicians have been too much concerned with short-term government expenditures and government deficits instead of investing in activities aimed at long-term growth like education and research (*efficiency and bureaucracy focus*);
- Universities: Research at Universities does not fuel our knowledge-economy because it is too much isolated from real business needs (*ivory tower focus*).

The innovation gap

According to the Dutch Cabinet Balkenende II Agreement, this recent economic decline of the Dutch economy cannot be attributed to temporary cyclical economic influences, but primarily to a lack of innovation capacity of the Dutch economy. To bridge the innovation gap, similar to the Finnish success model, the Innovation Platform was created based on a consensus model and representation of stakeholders (government, employees, employers, research institutes). The

argument is that the Dutch economy is weak in generating new knowledge and creating technological inventions.

The Dutch Innovation Debate so far has concentrated on technology-related macro-variables, like the below average private investments in R&D or the low percentage of available scientist and engineers. However, one of the causes for private R&D-activities to lag behind might be the natural trend in Europe to rationalize existing, overlapping R&D activities as a result of a conscious strive for efficiency of large multinational R&D-intensive companies in the new, integrated Europe (Soete, 2002). The net effects of these migrations of R&D activities for the Netherlands have not been clear so far (Erken, Gilzing, and Roelandt, 2003). In addition to signaling the weaknesses in technological innovation, the Innovation Debate is dominated by selecting the most promising technologies for the future. The central thought is that for a small country to innovate it should invest in only a few core technologies, such as nanotechnology or biotechnology.

What is striking in this Dutch Innovation Debate is the strong bias towards technological innovation and the total ignorance of what Daft (1978) called administrative innovation. Also, the Dutch Innovation Platform has not taken these non-technological capacities of innovation into account.

Managerial and organizational innovations

In this essay we do not want to limit our focus to purely technological and scientific factors. Although we realize the importance of the fundamental generation of new technological knowledge (technological innovations), we think that an often neglected determinant of innovation is the managerial and organization capacity to recognize this knowledge, assimilate it, and apply it to commercial ends (Cohen and Levinthal, 1990). We agree with Tushman and Nadler (1986: 74) who pointed out that: “In today’s business environment, there is no executive task more vital and demanding than the sustained management of innovation and change”

We define these managerial and organizational innovations as novel managerial capabilities and new organizing principles for using the existing knowledge-base to carry out combinations that are new to the firm and the industry. Managerial and organizational innovations are thus innovations that have a more significant impact on the relationships between the constituting technologies and knowledge components, than on the technologies themselves (Henderson and

Clark, 1990). Many strategy scholars applying an evolutionary perspective (Grant, 1996; Kogut and Zander, 1992; Nelson and Winter, 1982) argue that these managerial innovations are limited to deploying and extending existing capabilities rather than constantly recreating new capabilities. However, firms such as Microsoft, McDonald's, Honda, and Benetton were able to continuously recreate new managerial capabilities and novel organizational forms in various competitive rounds resulting from their management's extensive absorptive capacity and learning ability. These managerial capabilities and organizing principles opened up new sources of competitive advantage.

One can think of Richard Branson's superior visioning ability, which was concerned with understanding the future evolution of markets and technology that will proactively create new opportunities to serve current and new customers (Virgin). Other examples are the superior 'industry foresight' of Dell computer (direct delivery without intermediaries in the PC-market), Ikea (direct delivery and self-assembly by the client in the furniture market), Xerox (paperless office) and Southwest Airlines (cost-efficiency and focusing on a particular value chain configuration in airline-business). They all highlight an ability of (top)management to synthesize the collective impact of competitive forces that involves imagining the future and developing sufficient capabilities and an adequate organization design (Hamel and Prahalad, 1994). Other illustrations of building managerial capabilities are the incredible learning capacity of Honda (discouraging hierarchy, granting responsibility to young employees, and supporting confrontation) and the extremely innovative culture of 3M ('Thou shalt not kill new ideas for new products').

Hyper competition and industry transformation

There is great unanimity among strategy scholars that the need for these new managerial capabilities and organizing principles in hyper competitive environments is even greater than ever. Expanding worldwide competition, fragmenting markets, and emerging technologies force established firms to renew themselves continuously by transforming stagnant businesses and creating new sources of wealth through new combinations of resources (Guth and Ginsburg, 1990). According to Porter (1996), downsizing, restructuring, reengineering, and benchmarking often only improve operational effectiveness, but do not provide strategic advantage. Likewise, Hamel and Prahalad (1994) contended that instead of `more of the same' or `try harder' approaches ("How to be better"), firms should fundamentally reconsider their core activities ("How to be different"). Not a static strategy,

but strategy innovation and industry transformation are much more important (Volberda, 2003). Elsewhere, Hamel (2000) preaches strategy as revolution; creating new industries and breaking the existing rules of the industry.

The Netherlands out of the top-10

The managerial capabilities and underlying organizing principles of successful firms in hyper competitive environments (D'Aveni, 1994) have not received much attention in the Dutch Innovation Debate. The position of the Netherlands in the Global Competitiveness Index of the World Economic Forum is disappointing. The Dutch degraded from the top-10. This could have serious consequences for our welfare state. According to Castells and Himanen (2002), the central feature of the successful Finnish innovation model is its attempt to combine an innovation focus with the continuation of the welfare state. Innovative and productive countries like Finland and the Netherlands in the recent past, enable in this way the financial resources necessary for the welfare state, while in turn, the welfare state may generate knowledge workers and a proper social and institutional context to sustain innovative organizations.

However, the primary focus of government and business in the Netherlands on efficiency and exploitation instead of innovation and strategic renewal will not result in a fundamental improvement of our innovation capacity (Van den Bosch and Volberda, 2003). Our once so successful 'Polder model' is mainly based on an industrial economy, traditional organizational forms and mainly low-educated production workers in order to increase productivity. Nonetheless, we have to realize that low labor costs is a sustainable competitive advantage of low wage countries that outperform in efficient production of mass products on the basis of imported technologies. This is not an attractive position for well-developed economies such as the Netherlands: emphasis should rather be on creating added value through difficult to imitate managerial capabilities and smart organizing principles.

Research questions: subject, context and benchmark.

In this essay we address the central question of the Innovation Lecture 2004: Which non-technological capabilities of innovation have to be developed in the Netherlands and by the Dutch firms in order to become one of the most dynamic and competitive knowledge economies

in Europe? This central question highlights the subject (non-technological capabilities of innovation), the context (the Netherlands and Dutch firms) and the benchmark (ranking of the Netherlands in Europe in terms of a dynamic competitive knowledge economy). In this essay we will operationalize the *subject* of non-technological capabilities of innovation as managerial capabilities and organizing principles. In this connection, we will focus on those innovations that contribute to a sustainable competitive advantage. Furthermore, we do not limit innovation to R&D intensive firms in the private sector ('the big seven'). Our analysis applies to all organizations, irrespective size and whether active in the private sector in the public sector.

Considering the dependence of the Netherlands on trade and knowledge flows beyond Europe (e.g. North-America, Japan and China), we believe a more globally oriented *benchmark* might be more appropriate than a European one. As the World Economic Form-Report (WEF-Report) provides a well-know and well-respected methodology for assessing the international ranking of countries in terms of competitiveness and productivity growth – both directly related to innovation – we suggest to choose the WEF global ranking of The Netherlands within the group of most-innovative countries as the proper benchmark.

Exhibit 1.1. **Questions to be addressed**

1. How do managerial capabilities and organizing principles of innovation contribute to sustained competitive advantage?
2. How to build managerial capabilities and to develop organizing principles of innovative organizations?
3. Which actors (e.g. firms, governments, and regulatory agencies) are involved in developing these capabilities and organizing principles and what levers for innovation can be used?
4. Is there empirical evidence about the present strengths and weaknesses regarding these managerial capabilities and organizing principles in Dutch organizations?

In this essay we will pay attention to four questions as illustrated in Exhibit 1.1. We will first consider the required managerial capabilities and organizing principles for sustained innovation. Subsequently, we describe the roles that key actors have to play in the innovation arena. Finally, we provide relevant management and organization items for the Dutch Innovation Agenda.

2. Building Capacities for Innovation: Managerial Capabilities

These days it may seem impossible for any manager to ignore change in markets, products, and technologies. Yet the popular business press has been full of successful companies that focused too much on past routines, such as DAF, DEC, Fokker, Wang Computers, and Sears. In other companies such as IBM, Kodak, and Philips that are currently undergoing massive changes, existing or new managers are working on developing new innovation capabilities. But how can firms build capacities for innovation? What are the proper management capabilities? In this section, we first consider dynamic managerial capabilities for innovation. We clearly delineate these dynamic capabilities from specialized routines and explicitly discuss specific managerial requirements of these capabilities. Moreover, we consider various managerial roles in creating these capabilities, ranging from cross-hierarchical and cross-functional to cross-cultural capability development.

2.1 Mobilizing Dynamic Capabilities for Innovation

Dynamic capabilities denote the managerial ability to respond reactively or proactively to various demands from changing competitive environments. They are based on dynamic models of competition that suggest the capacity to change is an important source of competitive advantage (cf. Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000). These capabilities permit rapid response (speed) to a variety of unpredictable contingencies and demand changes (Ittner and Kogut, 1995). Many of them are developed in functional areas like manufacturing, supplier relationships or human resource management. However, the more complex ones are more broadly based (Stalk, Evans and Shulman, 1992), encompassing the entire value chain such as short product development capabilities or fast product and process innovation capabilities. Dynamic capabilities must be clearly

distinguished from specialized routines (see Table 1).

Broad knowledge-base / variety of managerial expertise. Instead of limited expertise, dynamic capabilities require a broad and deep knowledge-base (technological, market, product, distribution knowledge) and a variety of managerial expertise in order to devise appropriate responses. For instance, new products today are more likely than not to emerge through innovation at the interface of different specialties (Grant, 1996). The managerial ability to combine knowledge bases housed in different core technologies often distinguishes innovative companies. For example, when 3M consumer research showed that customers complained about rusting steelwool pads, experts from 3M's adhesives, abrasives, coatings, and nonwoven technologies divisions got together to create Never Rust plastic soap pads (Leonard-Barton, 1995). Similarly, Corning views its knowledge about glass and ceramic processes as a strategic resource and continuously invests in its enhancement. By managing a broad knowledge base emerging from a variety of expertise, Corning is able to develop dynamic capabilities such as rapid product innovation and customization in order to exploit rapid, unpredictable product opportunities (Boynton and Victor, 1991). Finally, the credit card industry discovered how an outsider firm's broad knowledge-base can result in a formidable new competitor when AT&T used its marketing and distribution knowledge to enter the credit card market. These examples illustrate that the depth of a knowledge-base is necessary to solve complex problems, but that the breadth of knowledge base is especially important for creating new dynamic capabilities.

TABLE 1 Managerial requirements of dynamic capabilities

Specialised routines	Dynamic capabilities
• limited expertise • low absorptive capacity • fixed managerial mindsets and no experimentation • lower-level learning	• broad and deep knowledge-base • high absorptive capacity • broad managerial mindsets and much experimentation • higher-level learning

Source: Volberda, 1998, 2004

Absorptive capacity. Related to a broad knowledge base, dynamic capabilities require a high absorptive capacity of management (Cohen and Levinthal, 1990) for recognizing the need to change. Successfully absorbing signals beyond the periphery of the firm is essential for developing capabilities. The ability of management to recognize the value of new, external knowledge, assimilate, and apply it to commercial ends is critical to its dynamic capabilities. Absorptive capacity requires porous boundaries, scanning broadly for new soft information, and identifying and effectively using those employees who serve as gatekeepers and boundary spanners (Leonard-Barton, 1995). Liebeskind et al. (1996) show that successful new biotechnology firms were able to develop dynamic capabilities in new product development because their management developed high levels of absorptive capacity through social networks and boundary spanning. This absorptive capacity helped them to quickly source new knowledge from various universities and research institutes.

Managerial experimentation and broad managerial mindsets. Management must have an ability to identify and support new ideas rather than to maximally exploit existing routines. Experimentation is limited when knowledge extension is based on routines, which work like well-worn grooves to channel managerial activities. By relying on these routines, management concentrates on its own specialized areas and avoids the need to construct its notion of the whole for new activities. As a consequence, routines exacerbate the separation of functional areas, impede learning processes, and further restrict the development of new capabilities by imposing old understandings. However, experimentation and broad mindsets can contribute to an increasing variety of dynamic capabilities.

In this connection, the experiences of firms such as NCR and GM are illustrative. Because of their reluctance to experiment and continued focus on established lines of business (respectively electromechanical cash registers and big-car business) these firms were temporarily outperformed by others. Likewise, Sharp was able to develop dynamic capabilities in the electronic calculator industry while TI was not because of TI's limited managerial mindsets that were narrowly focused on the semiconductor market. Also, Honda's success in the US motorcycle market was based primarily on managerial latitude for experimentation and complementary managerial mindsets. While Sochiro Honda, the inventive founder of the company with a large ego and mercurial temperament, had a strong bias towards motor technology, his partner Takeo Fujisawa's primary

focus was on market, distribution, and financial knowledge.

Development time and higher-order learning. Dynamic capabilities like flexible manufacturing or fast product development cannot be purchased off the shelf but require strategic vision, development time, and sustained investment (Amit and Schoemaker, 1993). They take time to identify, nurture, and leverage and tend not to be the kind of assets that management can turn on or off with the exercise of an option. Firms simply lack the capacity to develop new capabilities quickly (Teece et al., 1997). That is, dynamic capabilities cannot be easily bought, but they must be built; skill acquisition and learning become fundamental issues. While routines also require learning and take time to develop, they can often be built on an extrapolation of trends, imitation of others, or past experience. These modes of single-loop learning are all based on repetitive reinforcement in which no cognitive change takes place in the organization. By contrast, dynamic capabilities require higher-order learning such as double-loop learning, which hinges on the ability to fundamentally challenge operating assumptions.

To conclude, the development of dynamic managerial capabilities requires

- managers' absorptive capacity to quickly recognize the need to change;
- managers' knowledge base, expertise or ability to devise appropriate responses;
- managerial experimentation and broad mindsets to increase the variety of dynamic capabilities;
- higher-order managerial learning abilities to sustain an adequate repertoire of dynamic capabilities.

Considering the dimensions above, the evidence from the Global Competitiveness Report 2003 indicates that Dutch firms do not outperform on these dynamic capabilities. The Dutch ranking on firm-level technology absorption (44^{th} position), firm-level innovation (69^{th} position), and technological sophistication (21^{st} position) is extremely low for an innovation driven country.

2.2 Managerial Roles in Capability Development

Of course, we have to realize that developing dynamic capabilities is not exclusively the role of the manager. While in many situations managers do indeed dominate this process, in principle every organization member participates in it. That is, capabilities grow through the actions of employees

at all organizational levels (Leonard-Barton, 1995).

Vertical Management: Cross-Hierarchical Capabilities

Traditionally, identifying and building capabilities is viewed as a hierarchical process with the CEO and top management playing a central role (cf. Chandler, 1962; Schumpeter, 1934). In particular, capability development is considered a *top-down managerial process*, where the exploration of capabilities created by heuristics, skill development, and fundamentally new insights takes place at the corporate management level, while the exploitation of these capabilities takes place at the business-unit or lower levels. This perspective was supported by Prahalad and Hamel (1990) and Stalk et al. (1992), who argued that the development of adequate capabilities depends on the strategic intent (Hamel and Prahalad, 1989) of the CEO or corporate management based on superior industry foresight.

Examples of such a predominantly top-down capability development processes include GE's corporate revitalization guided by its CEO Jack Welch and Philips' corporate change initiated by Jan Timmer and further accelerated by Cor Boonstra. What is unique about these companies is the fact that their CEOs drove the entire process of capability development, starting by introducing new concepts, communicating them in an understandable manner through the use of metaphors and analogies, and reiterating them repeatedly. Consequently, new capabilities such as speed, simplicity, and market responsiveness were passed down the organization almost as an order or instruction to be followed (cf. Nonaka and Takeuchi, 1995). However, not every firm can simply copy this top-down approach, given the fact that strategy in large complex firms is often less centralized in top management, more multifaceted, and generally less integrated.

In contrast, building on Bower's work (1970) on the management of the resource allocation process, a rich body of literature has suggested that perhaps the most effective process of capability development is through originating, developing, and promoting strategic initiatives from the front-line managers (cf. Kimberly, 1979; Burgelman, 1983; Quinn, 1985). This research finds that capabilities typically emerge from the autonomous strategic behavior of individuals or small groups in lower levels of the organization. Front-line managers typically have the most current knowledge and expertise and are closer to the sources of customer-information critical to new capabilities. Prahalad and Ramaswamy (2003) refer to these kinds of innovation as co-creation.

An example of a more *bottom-up process* of capability development can be found in 3M. In this highly innovative firm, the role of top management is limited to sponsor, coach or mentor; dynamic capabilities as innovation and speed of innovation clearly derive from initiatives at the bottom. Not surprisingly, the names of successive CEOs at 3M are relatively unknown, while the inventors and intrapreneurs of the lower levels of the company have received the most attention (e.g. Scotch tape invented by Dick Drew or Post-It Notes by Art Fry).

Vertical capability development can thus arise from lower as well as middle and upper levels. Essential for both top-down and bottom-up cross hierarchy perspectives on capability development is that management must guarantee that in the end all levels are involved. If not, the firm will not be able to create corporate-wide innovative capabilities but instead suffer from the tyranny of the business unit or the tyranny of top management and the resulting fragmentation of capabilities. Within Philips the strong separation between divisions with individual profit responsibility did indeed result in a clear structure ("from spaghetti to meatballs"), but these Chinese walls created strong hurdles for developing capabilities on the intersection of two divisions, such as Components and Consumer Electronics. Kleisterlee has therefore invested heavily in horizontal management by means of Tiger Teams to develop synergistic capabilities between divisions. The successful launching of the DVD player is just one example of the new "One Philips" program.

Horizontal Management: Cross-Functional Capabilities

In contrast with vertical capability development, horizontal capability development refers to more democratic and more participative forms of capability development in organizations, which may be explicitly designed (e.g. teams, projects or task forces) but may also emerge out of a process of interaction. As an illustration of the difference between horizontal and vertical capability development, one could argue that the Taylorist principles of incentives and staff organization are cross-hierarchical capabilities for accomplishing standardized production at lower costs. On the other hand, we could classify Toyota's principles of decentralized authority and lateral communication across functions, buyers, and suppliers as cross-functional capabilities to generate speed and flexibility.

In many contemporary firms, the role of management has shifted from vertical coordination through a hierarchical command and control structure to providing appropriate organizational

support for horizontal exchange of knowledge. Within internal network organizations such as the Rabobank (Van Wijk, 2003; Van Wijk and Van den Bosch, 2000) or the R&D-site of Shell, horizontal or self-coordination among experts is more efficient than vertical coordination by managers (Janssen, Volberda and Asselbergs, 2003). For instance, Shell's R&D site in Amsterdam has been transformed from a closed hierarchical organization with strong vertical control and clearly separated knowledge bases towards a flat and open network based on self-organizing teams with overlapping knowledge bases and horizontal knowledge exchange between internal, external clients and expertise areas (Van den Bosch, Volberda, and Heinhuis, 2003). However, self-coordination across functional and organizational boundaries cannot take place without managerial permission or active managerial support (Liebeskind et al., 1996). The major restructurings of the Shell R&D site in Amsterdam were essential in order to facilitate horizontal knowledge exchange. Also Kleisterlee's active support of the Tiger Teams between divisions was a necessary condition for eliminating the Chinese walls within Philips. Nonetheless, horizontal or cross-functional capability development is in many cases disrupted by managerial meddling (Weick, 1979). Management intervenes in the mistaken belief that single individuals develop capabilities, denying that capabilities may be developed implicitly in causal circuits and interpersonal influence processes. Failure to acknowledge these forms of self-control, coupled with interventions that actively disrupt these self-regulating activities, are the occasions for much mismanagement in organizations.

Ideological Management: Cross-Cultural Capabilities

In addition to vertical capability development by means of hierarchy and horizontal capability development by means of teams, we can distinguish an ideological type of capability development. A shared ideology may facilitate capability development among various parts or subcultures of the company by specifying broad, tacitly understood rules for appropriate action under unspecified contingencies (De Leeuw and Volberda, 1996; Camerer and Vepsalainen, 1988). These cross-cultural capabilities refer to the ability of the firm to produce a shared ideology that offers members an attractive identity as well as convincing interpretations of reality. The infusion of beliefs and values into an organization takes place over time, and produces a distinct identity for its participants, coloring as it does all aspects of organizational life, and giving it a social integration that goes far beyond the vertical cross-hierarchical and horizontal cross-functional capabilities discussed above.

These cross-cultural capabilities determine what kinds of knowledge are sought and nurtured, and what kind of capability-building activities are tolerated and encouraged. They serve as capability-screening and control mechanisms. Japanese companies like Canon and Honda try to enhance cross-cultural capabilities by facilitating dialogue, camp sessions or brainstorming seminars held outside the workplace, and even drinking sessions (Nonaka and Takeuchi, 1995).

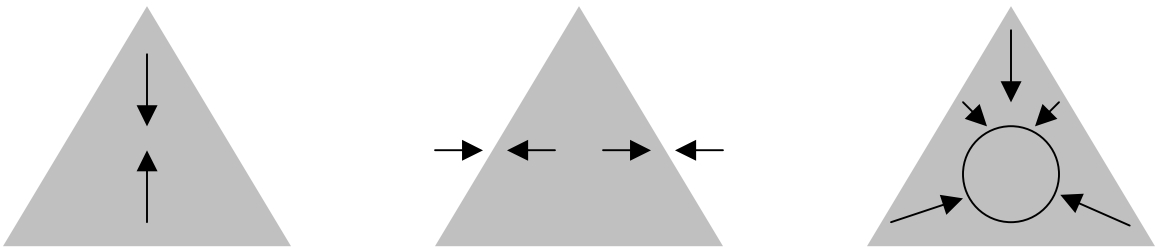
Mintzberg connected cross-cultural capabilities to his concept of the missionary form and the ideological strategy (cf. Mintzberg, 1979; Mintzberg and Waters, 1985). In addition, Ouchi's (1980) concept of clan control shows that shared norms and values facilitate exchange of tacit knowledge without resort to market pricing, contracts or managerial authority. In a similar vein, Bradach and Eccles (1989) defined trust as the alternative mode of knowledge exchange, where trust is engendered by shared norms. Furthermore, the study of Liebeskind et al. (1996) on new biotechnology firms illustrates that the sourcing of tacit external knowledge is possible only through shared social norms.

Ideological capability development rests in firms with a core identity, in which one can find a coherent set of beliefs, shared values, and common language. Through it, every member identifies strongly with, and professes loyalty to, the goal of preserving, extending, or perfecting the organization's mission, and so can be trusted to make decisions in the organization's interests. Hewlett-Packard's corporate values like trust and respect for individuals, uncompromising integrity, and teamwork (the HP Way) or 3M's tolerance for failure, and bias for action culture helped these firms to easily develop capabilities for innovation.

Of course, capability development can take place vertically, horizontally, and ideologically sequentially or even at the same time (see Figure 1). For instance, Leonard-Barton (1995) discussed T-shaped capabilities, which are cross-functional as well as cross-hierarchical and essential for successful innovations. These capabilities imply deep know-how and expertise within a functional area (the stem) completed with more superficial knowledge about the interaction with other functional areas (the crossbar). Moreover, Nonaka (1994) describes middle-up-down management in Japanese firms such as Honda, Canon, and Toyota in which all members of the organization work together horizontally and vertically. Teams play a central role in this kind of dual organization, with middle managers serving as team leaders who are at the intersection of the vertical and horizontal

flows of information. In a study on strategic innovation in large multiunit firms located in the Netherlands (Ericsson, KLM, TPG, Vopak) we found that these firms mainly focused on cross-hierarchical capabilities, but largely ignored cross-functional and especially cross-cultural capabilities (Volberda, 2004; Wielemaker, 2003). Also, the outcomes of the international research project on Innovative Forms of Organizing indicate that Dutch firms lag behind in their cross-cultural and socialization capabilities (Pettigrew et al., 2003).

Figure 1 ***Various managerial roles in capability development***



• cross-hierarchy: top-down/bottom-up	• cross-function: teaming	• cross-value: core culture
• Command-and-control structure/flat hierarchy	• self-control	• ideological control
• extrinsic management: enforcing capability development by distinct leadership tasks at various levels varying from Executive Champion, Product Champion, or Intrapreneur	• intrinsic management: supporting capability development by horizontal linking	• intrinsic management: facilitating capability development by creating a vision, shared ideology, or identity

Source: Volberda, 1998, 2004

3. Higher-level Organizing Principles of Innovative Organizations

So far, we have considered the required managerial capabilities for innovation. Besides these managerial capabilities, we investigate the underlying organizing principles for innovation. The strategy and organization theory literature proposes various organizational forms for managing specific aspects or elements of self-renewing and innovative organizations (Volberda, 2004). For example, the multi-dimensional organization in which units can be easily added or subtracted (Ackoff, 1977), the platform or shapeless organization that keeps generating new forms through frequent recombination (Ciborra, 1996), the network or flexible cluster of firms or specialized units coordinated by market mechanisms instead of a vertical chain of command (Miles and Snow, 1986), or the hollow corporation or virtual corporation (Davidow and Malone, 1982). We wish to depart from partial and idiosyncratic solutions and focus on the key higher order organizing principles that must underlie any innovative organization. Our distillation of the latest ideas and academic writings on complexity theory (Anderson, 1999a,b; Kauffman, 1995; Gell-Mann, 1995; Holland, 1998; Brown and Eisenhardt, 1998) and practitioner-oriented writings (e.g. Clippinger, 1999) lead us to identify three overarching principles (Volberda and Lewin, 2003):

(1) Innovative organizations focus on managing requisite variety by regulating internal rates of change to equal or exceed relevant external rates of change (e.g. competitors, technology, customers, etc) (McKelvey, 2003);
(2) Innovative organizations optimize self-organizing (Anderson, 1999a; Nonaka, 1988);
(3) Innovative organizations synchronize concurrent exploitation and exploration (Lewin and Volberda, 1999; March, 1991).

3.1 The principle of managing internal rates of change

The principle that the internal rate of change must equal or exceed the external rate of change recognizes the need for organizations to match the rate of coevolution of the systems (institutional configuration, industries, social movement, etc) within which the firm is embedded. It implies a keen awareness that coexisting rivals trigger each other's adaptations along a coevolutionary path. Thus, organizations that have historically been exposed to more competition are likely to have developed greater capabilities regulating their internal rate of change. Regulating the internal rate of

change to equal or exceed the external rate of change is consistent with idea that organizations must maintain requisite variety (Ashby, 1964). The implications were that internal variety of firm routines and capabilities had to match the variety of the external selection environment on which the firm was prospecting. In short, innovative organizations develop routines, capabilities and measures which monitor and track rates of change in all aspects of their selection environment (e.g. rate of new product improvements made by competitors, changes in customer expectations, etc) and adjust the applicable internal processes to match or exceed these rates.

Examples are firms that can build to order, leapfrog their competitors in new product introductions or improvements, detect and exploit emerging trends ahead of their competitors, etc. In this connection, 3M continually reassesses the barriers to innovation that tend to develop over time. In order to overcome core rigidities, 3M has a formal goal of having 30 per cent of its sales derived from products that are new or have been substantially modified in the past four years. HP and Motorola are also pursuing structures and cultures that are more focused on building new competences. Like 3M, these companies decentralize decision-making at the team and divisional level, and encourage spin-off projects. In addition, they constantly seek ways of making their current technology obsolete in order to push the innovation envelope of their assets. For example, 70 per cent of HP's sales are represented by products introduced or substantially modified in the past two years. Similarly, the development of the Motorola Integrated Radio Services is projected to effectively supplant Motorola's lucrative cellular handset business.

Differences in the pace and direction of coevolution arise directly from the combinations of strategies, structures and processes that affect the regulation of internal rates of change. In this connection, innovative firms move away from having profits targets and market share as being the sole objectives for measurement, and take a more balanced internal-external perspective adding factors such as frequency of new product and service introduction, and the operation of goals, such as the share of revenues from new ideas. From our studies of strategic renewal in the financial service sector (Volberda et al., 2001a, 2001b), it appeared that Dutch financials in general believe that they should follow the market and amplify market forces and signals for the benefit of unit managers. Top managers set targets based on profits rather than internal processes such as speed of new product development. But what to do when following the market is not enough or top management is not in control? Such more hyper competitive landscapes require a

more active stance, in which frontline and middle management challenge the market and orchestrate knowledge integration.

3.2 The principle of optimizing self-organization

Self-organization is the process by which organizations always find order no matter how complex the structure of the organization. In self-renewing organizations guided self-organization is the primary process by which organizations find fitness in a hyper competitive environment. Self-organization, however, does not mean that individuals or units can pull in all directions at will or break all the rules. It does not mean that managers are not necessary or that they have diminished roles. It means that no central controller is necessary and it requires a fundamental departure from the command and control philosophy of traditional hierarchical bureaucratic organizations. Self-organization requires a belief in the local rationality of individuals and units (e.g. those closest to the customer know the customer best, etc,), is consistent with the often espoused idea of delegating decision making to the lowest possible level and it implies maximizing capabilities of scope at every level of the organization (Prahalad and Ramaswamy, 2003). Self-organization also implies that managers function as stewards of the evolutionary process and focus their managerial role on devising the critical values and establishing the boundary conditions that enable and guide decision making at lower levels of the organization. It also implies that managers coach and teach the critical values and their operational use as well as understand and accept the operational meaning of equifinality for ideas that emerge through bottom up processes (subject to being consistent with the critical values). Guiding and enabling lower level decision-making and action also requires substituting process controls (i.e. devising processes that produce desired and acceptable outcomes) for outcome controls.

Dutch firms seem to do quite well on self-organization. The findings of the Innovative Forms of Organizing project seem to suggest that traditional hierarchical structures, with clear boundaries between the firm and environment, are more and more replaced by flexible hybrid structures such as networks, virtual organizations and alliances with much more permeable boundaries between firm and environment (Pettigrew et al., 2003). This is also reinforced by the high ranking of Dutch firms in the Global Competitiveness Report on the indicators Willingness to Delegate Authority (4^{th} position) and Reliance on Professional management (6^{th} position).

3.3 The principle of synchronizing concurrent exploration and exploitation

The third higher-order principle involves balancing concurrent innovation and knowledge creation (exploration) with improvements in productivity, process improvements, efficiency and product extensions and enhancements (exploitation). Levinthal and March (1993) contend that the long-term survival of an organization depends on its ability to "engage in enough exploitation to ensure the organization's current viability and engage in enough exploration to ensure its future viability".

Most firms seem to exhibit an asymmetric preference for short-term exploitation improvements. Studies show that in highly competitive environments over exploitation can result in a *competence trap* (Levitt and March, 1988; Levinthal and March, 1993). The consequence of asymmetric preference for exploitation results in the development of core rigidities and highly specialized resources that enhance short-term performance at the expense of reduced flexibility (Volberda, 1996). Corporate icons such as GM, IBM, Xerox and DEC have encountered these traps. They became 'prisoners' of their deeply ingrained routines and seemingly irreversible, fixed assets, turning their formerly distinctive competencies (big cars, mainframe computers, copiers, minicomputers) into obstacles to changing direction. Exploration can also have dysfunctional effects. 3M, a company with a superior track record in emergent exploration for new opportunities, has discovered the limit to overemphasizing a single approach to emergent innovation (exploration): the 3M way (*Fortune*, 1996). The overemphasis on a single exploration strategy creates instability as the organization exaggerates the importance of its emergent innovation strategy. The resulting chaotic organization cannot retain a sense of identity and continuity over time (Weick, 1979). Random and chronic exploration creates a vicious circle that results in a *renewal trap* characterized by conflict about authority, unclear responsibilities, inadequate controls, lack of direction and shared ideology.

Thus over exploitation of existing opportunities as well as over exploration of new opportunities are dysfunctional for the firm and lead to a competence trap or a renewal trap (Volberda, 1998). The innovative organization synchronizes and balances exploration for new opportunities and exploitation of existing routines. Studies of the Erasmus Strategic Renewal Centre in the European Financial Services sector (e.g. Dijksterhuis, 2003; Flier, 2003) show that most Dutch firms are focusing on restructuring, cost reductions and short-term performance (*exploitation*

herd behavior), while ignoring long-term performance and innovation (*passion for exploration*).

In conclusion, managing rates of change, nurturing and maintaining self-organization and sustaining a synchronous passion for exploration and exploitation are *three complementary principles for enabling innovation*. They do require continuous attention. It is exactly this feature of continuous attention or managerial intentionality that distinguishes successful long-lived organizations that are permanently able to innovate from the non-innovating organizations with a short-term exploitation focus. In Appendix I we systemize various practitioner-oriented heuristics that managers can use as guide to evolve their organizations into innovative organizations. It shows the higher order principles that must underlie any innovative organization and the associated range of enabling design variables involving strategy, structures, processes and leadership.

4. Levers of Innovative Organizations and Key Actors Involved

How to enhance these managerial capabilities and organizing principles of innovation within Dutch private and public firms? In this section we will discuss the main levers for triggering managerial capabilities and organizing principles of innovative organizations, in particular the creation of a demanding internal and external selection environments for innovation, the design of strategic regulations conducive to innovation, and the development of rankings of Dutch innovative organizations to facilitate the diffusion of managerial capabilities and organizing principles throughout the Dutch economy (see Exhibit 4.1). Moreover, we also elaborate on the various roles that the key actors have to play in this innovation arena.

Selection environments create the context in which innovations are assessed on their viability and their expected contribution to competitive advantage. Prevailing benchmarks regarding profitability, incentives structures, and power relations determine which innovative processes, products, and services are selected. External selection environments consist of various actors, such as (a) customers, distributors, and users, (b) suppliers for materials, labor, capital, equipment, (c) competitors for both markets and resources and (d) regulating groups, including governmental agencies, unions and interfirm associations. In the end these actors select

successful innovations. For instance, new entrants from other industries, brand new entrants or new regulations and extensions of the level playing field by internationalization processes determine the external rate of change in the external selection environment. Internal selection environments are located within the boundary of organizations and determine to a large extent the variety of new innovations within the firm. The dominant logic of management (Bettis and Prahalad, 1995) has an important imprint on the nature of internal selection environments. Demanding selection environments, both internal and external, are important enablers of innovation and productivity growth.

Exhibit 4.1 **Levers for Triggering Innovative Organizations and the key actors involved**

Levers	Key Actors involved
• Creating a demanding external selection environment	Governments and other regulatory agencies; but also international competitors and clients
• Creating a demanding internal selection environment	Top management in particular, but also middle and frontline management
• Strategic regulations	Governments and other regulatory agencies
• Communication, methods for assessment and increasing public awareness by rankings	Top management; share-and other stake holders like clients; business schools, research institutes, and consulting firms.

External selection environment

Research on innovative organizations and co-evolutionary research in particular points out the key role of the selection environment on adaptive and innovative organizational behavior. Actors like governments and other regulatory agencies can influence the “rules of the game” of the external selection environment of firms. They play a key role in enhancing or, more commonly, inhibiting managerial capabilities and organizing principles of innovation in both the private and

the public sector. In designing, implementing and controlling these regulations, the purpose of creating a demanding selection environment for innovation and productivity growth is simply not taken into account. Current Dutch examples of regulations hampering innovative behavior are regulations in the building and construction industry and in the health care sector; these regulations do not provide clear incentives to innovation.

Data from the WEF-Report 2002-2003 shows that the inhibiting influence of existing regulations in the Netherlands is a more generic problem. The international ranking of the Netherlands regarding several indicators dealing with the impact of regulations is very low. The indicator “Regulatory obstacles to business” ranks 69 while the indicator “Extent of bureaucratic red tape” ranks 50 out of 80 countries! Besides governmental agencies other important actors are international competitors entering the national business environment (e.g. energy market, telecom market), new industry regulators (e.g. financial services) and demanding clients requiring innovative solutions and thereby enabling or even forcing organizations to co-create interfirm managerial capabilities and organizing principles (Prahalad and Ramaswamy, 2003).

Internal selection environment

Besides a challenging external selection environment created by various external actors, firms themselves should develop an innovation demanding internal selection environment. Top management’s role is to create a strategic context for generating, nurturing, and selecting promising innovations by insuring the maximum incentives for front-line initiative.

To develop such an internal selection environment conducive to innovation, management can choose for variety generators in different degrees, ranging from the creation of skunk works (Peters and Waterman, 1982), corporate ventures (Fast, 1979, Burgelman, 1983) to even completely new venture departments. At the simplest level, we can think of isolating a flexible unit from a rigid operating core. This principle was applied at IBM when the IBM PC was developed, as the mainframe logic was strongly preserved in IBM's culture and prevented entry into the new PC market. While at first IBM was very successful with this isolation strategy, it found that transferring these new capabilities from the flexible mode to the rigid operating core was very difficult. IBM could not exploit these capabilities in its operating core because it lacked communication channels and common mental frames. Similarly, Eastman Kodak, Philips, and Xerox have had only modest

success from their internal venturing and new business development programs.

Stronger variety generators involve the continuous splitting off of groups into separate units. Johnson & Johnson is an example of a corporation that has developed mechanisms to set up new units. This encourages entrepreneurs to pursue their ideas in new separate divisions, while the older, more established divisions provide continuity and stability (Mintzberg and Westley, 1992). This process is best described as a regular cell fission, characterised by ongoing entrepreneurial revitalization. Their internal selection rules bring costs, such as the difficulty of integrating the new ideas back into the old organization. But they also bring important benefits, as new ideas are typically insulated from the inertia of the centre, and have the possibility to flourish without being suffocated. Innovation in such firms is more likely to show a balanced portfolio of units in terms of exploitation units and exploration units.

A well-documented example of a strong internal selection environment where top management encourages selecting out and lower management handles new unit creation can be found in Burgelman's study (1994) of the reshaping of Intel's business in the 1980s. He shows that it was not the corporate strategy but the 'internal selection environment' that caused a shift from memory chips towards microprocessor business. The higher the correspondence between the internal selection criteria (that is set by top management) and external selection pressures (how the industry segments are evolving and how technology is changing), the better the selection mechanisms guarantee the co-evolution of the firm with the sources of competitive advantage of the industry.

Strategic regulations

As is revealed in the low ranking of the Netherlands in the WEF-Report regarding the regulatory impact indicators, the great majority of the existing regulations do not enable innovation and productivity growth. In contrast to operational regulations, strategic regulations are based on the central thought of "when less is more". The design of these regulations enables innovations because of their strategic focus on productivity growth. Furthermore, these regulations aim at creating a demanding competitive context leading to sustainable competitive advantage for those firms that are able to comply. The long-term outcomes of these strategic regulations are at least as important for the stakeholders involved as the more traditional elements in existing

regulations, such as reducing uncertainty by standardizing processes, minimizing the short-run effects on employment, and avoiding environmental effects.

In this connection, Porter and Van der Linde (1995) point out that the view that environmental regulations and competitiveness is a matter of fixed trade-off, i.e." ecology versus the economy", is based on a "static view of environmental regulation, in which every thing except regulation is held constant". Such a view does not take into account the possibilities of using regulations to foster innovation, productivity growth and strategic renewal of organizations. An interesting example of an innovation and productivity enabling regulation versus an inhibiting one is the case of the regulation in the pulp-and-paper industry. In the USA, the regulation forces firms to install costly end-of-pipe treatment systems. In Scandinavia, however, regulation permitted more flexible approaches enabling firms to focus on the sources of pollution in the production process itself. This latter approach stimulated Scandinavian firms to develop innovative pulping and bleaching technologies that not only met emission standards, but also raised productivity and created first-mover advantages for these firms in the industry.

Another interesting example illustrating how (top) management could be involved in creating innovation and productivity enabling regulations is provided by the Dutch PER+ case of the Royal Dutch Shell Group. Existing regulations inhibited the rejuvenation of Europe's largest oil refinery in Pernis (Rotterdam). By developing new organizing principles (i.e. choosing two parallel managed projects, one focusing on the firm's internal and one on the firm's external stakeholders, discussing the uncertainty about both future technology and future environmental regulations) and building new managerial capabilities (i.e. regarding stakeholder management and in particular the capability to reconcile apparent conflicts between business and societal goals) new types and forms of strategic regulations were created (Van den Bosch, 1996).

According to the WEF-Report 2002 – 2003, Dutch respondents are of the opinion that complying with environmental standard in the Netherlands is not directly associated with long-term competitiveness. Innovation enabling regulations, that is, strategic regulations, focus among others on desired outcomes of regulation processes, and use market incentives to stimulate these outcomes. Designing these regulations presupposes governments implementing regulations slightly ahead of other countries to create export potential and first-mover advantages for innovative firms. Recent research indicates that first-mover countries regarding implementing

EU-regulations in their financial services sector enable firms to strategically renew themselves resulting in first-mover advantages (Flier et al., 2003). Strategic regulations are the least expensive lever of innovation. They deserve far more attention in the debate about the Dutch Innovation Agenda.

Assessment and recognition

In comparison to technological innovations that are measured by deployment of budgets, number of scientists involved, number of patents or simply by R&D expenses as percentage of turnover, outstanding managerial capabilities and organizing principles of innovation are more difficult to assess and quantify. This is an important issue to overcome. At company level, top management in particular must be involved in prioritizing and continuously assessing these managerial capabilities and organizing principles (Jansen, Van den Bosch and Volberda, 2003). Moreover, progress on these managerial and organizational innovations should be reported in among others Annual Reports. Share- and other stakeholders like clients and competitors have to assess their impact on competitive advantage. Moreover, to improve the scientific underpinning of methods of assessment, research institutions, business schools and consulting firms have to put this issue higher on their agenda. Most innovation tools and test so far primarily focus on the technological knowledge-base and tend to ignore the managerial and organizational determinants of innovation. A recent tool containing the managerial and organizational building blocks of innovation is the Quick Scan that provides firms knowledge on their managerial capabilities, organizational conditions and adequate innovation trajectory (www.Flexibiliteitsaudit.nl; Volberda, 2004).

Public recognition of major innovations is also clearly needed. Instead of narrowing down innovation efforts in business to the 'big seven' R&D intensive companies in the Netherlands, it is much more challenging to publish management and organization rankings on the outstanding innovation performance of organizations in both the private and public sector. Considering the unbalanced exploitation focus of these large well-established firms (Volberda et al., 2001a), largely due to shareholder value approaches, it is most likely that the big seven R&D intensive companies in the Netherlands will not figure prominently on these rankings. In times of economic decline, their most favored response is to restructure the firm by using a slash-and-

burn approach, cutting staff to the bone without thinking about how the work gets done, and rationalizing the portfolio of activities without supporting new lines of business. In the Erasmus Entrepreneurship outlook 2003 (based on a study of 125 SMEs and 250 large firms), we found out that large multi-unit enterprises were very resourceful but failed or were unwilling to innovate and renew in the Netherlands ("when more is less"). On the other hand, SMEs were very innovative and creative, but did not have the resources to implement innovations ("when less is more"). Compared to these large enterprises they had superior managerial capabilities and organizing principles (Mosakowski, 2002). These issues might also be of great concern for the Dutch Innovation Agenda.

5. Rethinking the Dutch Innovation Agenda

To conclude this essay, we provide five agenda items for improvement and diffusion of managerial capabilities and organizing principles of innovation in the Dutch economy. As the development of these managerial capabilities and organizing principles take time to develop, we suggest a time frame for implementation of about four years. These items are summarized in Exhibit 5.1.

Exhibit 5.1 **The Dutch Innovation Agenda for Developing Managerial Capabilities and Organizing Principles of Innovative Organizations**

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1. What to do?

   Given the under utilization of existing knowledge in the Netherlands, *investments in management and organization determinants* of absorption of knowledge and its successful application should have a higher priority than investments in technological innovations.

2 How to do?

- build *managerial capabilities* (broad knowledge-base, absorptive capacity, managerial experimentation, higher-order learning) and *various management roles* (hierarchy, teaming, shared norms) to increase the assimilation of external knowledge and the utilization for innovation;
- develop *novel organizing principles* that increase internal rates of change, nurture self-organization and synchronize high levels of exploration and exploitation within firms.

3 Who is involved?

- *Business*:

  top management has to create a proper organizational context to foster entrepreneurship and innovation (internal selection environment).
- *Governmental agencies*:

  have to focus on innovation and productivity enabling strategic regulations (external selection environment) and create a proper context in public organizations to foster innovation and productivity growth.
- *Research institutes, business schools, and consulting firms*:

  focus not only on technological knowledge, but also on managerial and organizational knowledge for innovation
- *Private small and large firms and public institutions*:

  have to recognize that they all must contribute to the national goal of increasing innovation and productivity growth.

4 For what purpose?

The Netherlands has to return to the *top-ten most innovative and productive countries* in the world as reflected in international rankings such as the World Economic Forum's Global Competitiveness Index.

5 How to build awareness and proliferate a joint passion for innovation?

Create public awareness and recognition of the societal relevance of outstanding

managerial capabilities and organizing principles to innovation and productivity growth:

- Initiate a *Dutch innovation ranking* in terms of management and organization; such a ranking could contribute to a joint passion for innovation among private and public firms.
- Develop *proper assessment tools for innovations* in management and organization; firms in both the private and public sector need proper management and organization audits to help them foster their innovation capacity.
- Enhance *reporting on the progress on managerial and organizational innovation* as part of modern corporate governance and as part of outstanding annual reports; not only financial indicators of short-term performance should be reported on, but also innovation indicators of long-term viability should be taken into account, such as frequency of new product and service introductions, shares of revenues from new ideas, introductions of new organizational forms or investments in new capabilities.

These new issues may contribute to rethinking the fundamental sources of innovation, productivity growth and sustainable competitive advantage of the Dutch economy.

Appendix 1: Higher-order principles and enabling heuristics of innovating organizations

Higher-order principles	Enabling strategies	Enabling structures	Enabling managerial processes	Enabling leadership
Regulate internal rate of change to exceed external rate of change	• Driving momentum; early mover (Eisenhardt) • Escalating competition/leapfrogging; long jumps (Beinhocker)	• Implementing modular structures that maximize external customer interactions and minimize internal customer interactions (Pascale)	• Establishing rhythms for change (Eisenhardt) • Pacing change (Eisenhardt) • Establishing stretch goals (Maira & Thomas) • Structure benchmarking processes • Utilize dynamic selection rules;	• Guiding organization interpretation of environment • Detecting emergence of new dominant logics • Managing adaptive tension (Pascale) • Selecting comparison groups; benchmark
Optimize self-organizing	• Managing rate of internal growth through innovation • Building readiness for change through: probing future; varied low- costs experiments; scenario planning (Eisenhardt; Beinhocker; Pascale)	• Patching/ semi-structures/ breaking large structures into patches/changing charters (Kauffman; Eisenhardt) • Optimizing cross-function interfaces (Maira & Thomas) • Creating permeable boundaries (Maira & Thomas) • Implementing communication-centric structures	• Facilitating emergent processes (nurturing strange attractors) (Pascale) • Balancing density of strong and weak ties • Minimizing number of rules/ simplicity over complexity (Eisenhardt)	• Choosing arenas of competition • Determining performance criteria • Designing selection rules • Accepting equifinality • Managing dysfunctional stress (Kelly) • Managing agency problem • Identifying critical values (Maira & Thomas)
Synchronize concurrent exploration and exploitation	• Allocating slack to exploration; latent potential and redundancies (Maira & Thomas) • Pursuing multiple strategies; parallel exploring (Beinhocker) • Exploring to create real options	• Implementing corporate venturing structure and selection rules, • spinning off autonomous new ventures	• Incorporating venture capital metrics (Beinhocker) • Adjusting rules for scale	• Articulate strategic intent of passion for exploration and exploitation; mindfulness and intention (Pascale) • Avoid oscillating between strategic extremes (Pascale; Kelly)

Source: Lewin and Volberda (2004)

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