Strategic alliances in the high-tech industry

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Foreword

Krzysztof Klincewicz's book is of outstanding interest for business practitioners in the high-tech sector, as well as scholars and policy makers. In recent years, there has been growing pressure on firms to give higher priority to R&D and at the same time to improve their R&D effectiveness. These pressures are associated with the accelerating rate of product innovations, shorter product life-cycles, the growing diversification of the technological portfolio underlying the products and the growing range of applications, functions that a product or a service must provide. For example, a mobile phone, which used to provide only real time voice communication in its early days has additional functionality nowadays to provide including music downloading, Internet access, digital TV and global positioning. We are witnessing transformations of simple products to become complex products. Boundaries between hitherto distinct sectoral segments are becoming blurred as the result of technological change. For management, all this implies that the traditional focus on the management of projects must be extended to include greater emphasis on the strategically more important issue of the management of technology. It is universally known today that information and communication technology (ICT) has now become the dominant technology in the world economy. This field is characterized by its turbulent nature of changes taking place in the market as well as technologies. No firm can realistically hope to exist on its own in isolation. It has to form linkages with its competitors as well as other firms, institutions in the same or different field. At the same time, it has to manage these linkages efficiently and also creatively. This is where Dr Klincewicz has made a significant contribution.

Firstly, the author has been able to analyze accurately the processes of radical change in the high tech industry, characterized by strategic partnerships. He develops an analytical framework to analyze the structure of the high-tech industry, based on the concept of high-tech value chain, which is different from platform leadership. The analytical framework and the typology offers new ways of interpreting a company's own position in the industry and how one can make strategic moves vis-à-vis other players in the value chain, to maximize one's competitiveness. He classifies three types of players in the value chain: value chain leader, complementors and contractors, and then discusses the roles and strategies of each of them. The book offers a comprehensive review of existing literature, concerning strategic alliances, management of technology and high-tech markets. Although the book greatly benefits from existing literature, the author avoided excessive quotations or full discussions of concepts already published elsewhere, instead, the book focuses on comparisons between existing and proposed models and their empirical evaluation using novel research techniques.

Secondly, the theoretical framework is complemented by in-depth case studies. Since the companies analyzed are leading firms in the field, including Microsoft, NTT DoCoMo, Cisco, Indian software companies and Taiwanese electronics manufacturers, the comparison of their performances and strategies provides an excellent opportunity to assess some of the characteristics of technology management styles in different countries. The author extends his analysis to the community-driven development scenario of open source software and the role of government.

Thirdly, as the author shows, strategic partnership can be managed with foresight, systematically and he proposes multiple useful techniques such as partnership network mapping, managing close and distant value segments, transformation from partner intimacy towards independent innovation.

Fourthly, the author uses novel techniques in his analysis to analyze the dynamically changing high-tech industry using qualitative and quantitative techniques such as partnership network mapping and data mining. This too is of great interest to those working in the field of science and technology policy, as well as those in industry, consulting and business schools.

Dr Klincewicz spent 2 years in my laboratory at Tokyo Institute of Technology. In April 2005, a new Graduate School of Innovation Management was established. It is timely that Dr Klincewicz has carried out this research. In my lab, I and my students have been studying sectoral systems of innovation, competence building in firms, high-tech diffusion and technology strategies of high-tech firms using a combination of qualitative and quantitative data and techniques such as bibliometric analysis and data mining. I think Krzysztof Klincewicz's previous experiences working in the software industry as well as academia, as well as his linguistics skills (being able to learn Japanese in a short while) has helped him to carry out this research. He considerably deepens our understanding of the importance of management of the high-tech value chain for this major industry of the twenty first century. For all these reasons, I recommend this book most strongly.

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Professor
Graduate School of Innovation Management, Tokyo Institute of Technology
December 2005

Preface

The book presents results of a research project, concerning the strategies of high-tech companies, funded by the government of Japan and conducted at Tokyo Institute of Technology. I had an opportunity to confront the established theoretical frameworks, experiences from my previous work for software companies in several European countries, as well as recent trends and developments in the global technology sector. In spite of the abundance of (overwhelmingly quantitative) studies concerning computer, telecommunications and media sectors, there are only few publications attempting to offer integrated frameworks and models for the converging domains. To make things worse, there are not many empirically grounded publications about strategies of high-tech companies, what remains in a striking contrast to numerous to-become bestsellers for managers, often containing unconvincing, normative statements.

Managers working in the high-tech industry discover early in their careers the limited relevance of general theories and models related to management and marketing. They cannot explain many important phenomena and tendencies, not capturing some critical dimensions of the market activity. The present book will hopefully help better understand the underlying logic of the high-tech industry, with the specificity of corporate strategies and interorganizational relations. In the following chapters, you will have an opportunity to read about the high-tech value chain, resulting from the nature of new technologies, but constituting the industry structure and impacting strategies of all high-tech companies. In the last 15 years, strategic alliances became the main driving force for the industry development – nowadays, it is easy to think of "standalone" strategies and complete independence, due to the proliferation of technology standards, long- or short-term linkages, and the complementary nature of advanced products. The present underlying logic of the high-tech industry, described by the high-tech value chain model, turns alliances into a strategic necessity. The

tech value chain model, turns alliances into a strategic necessity. The following chapters will introduce the relevant concepts and identify three generic partnership strategies in technology markets: value chain leader, complementor and contractor. They will also discuss the relevance of proposed frameworks for alternative industry settings, including the open source software community, apparently revolutionary different from the ways commercial companies tend to cooperate.

The book is rooted in multiple theoretical perspectives, coming from the domains of strategic management (including Porter's and Treacy and Wiersema's work on corporate strategies, resource-based perspective and the model of co-opetition), technology management (with the concepts of industry convergence, supplier-driven innovation, technology lifecycle and complementors) and organizational theory (particularly the heritage of social embeddedness and organizational politics frameworks). First two chapters of the book will introduce some of these concepts, attempting to integrate them and point to their relevance for technology companies.

The research project involved a mixture of qualitative and quantitative methods, used to analyze the relatively unexplored phenomena. I particularly benefited from in-depth qualitative case studies of the Japanese mobile telecom operator NTT DoCoMo, software giant Microsoft and their partners, as well as Taiwanese electronics and Indian IT services companies. Different technologies and diverse cultural settings helped propose and test theoretical concepts, which would not be relevant only to Silicon Valley start-ups, taking into account the recent industry developments and the increasing importance of Asian companies. The case studies were based on multiple data sources, including industry press and analysts, interviews, other forms of corporate communication and government materials – the strenuous task of coding and analyzing was greatly facilitated by a qualitative data analysis software *nVivo*. To cast some light on the scale of the effort: I derived my understanding of NTT DoCoMo's business from an analysis of over 1,300 documentary sources, while Microsoft case study was based on over 1,600 documents – the analysis, theory modeling and testing would not be possible without computer support, which additionally

helped me follow the methodological recommendations of the grounded theory approach while analyzing the data. The adopted approach differs significantly from past, predominantly quantitative studies – early in the course of the project, I discovered the limited usefulness of the dominant alliance research paradigm, recommending to count alliance agreements from specialist databases and use econometric modeling and statistical inference to test hypotheses. As the book will explain, alliances are not discrete events, but processes – for strategy makers, more important is their dynamics than initial agreements. Moreover, many strategically important types of cooperation are not formalized and could only be discovered through detailed case study analysis. Nevertheless, triangulation of multiple data sources and perspective helps better understand complex phenomena and verify conclusions, so the qualitative case studies were supplemented by quantitative research techniques, including financial analysis, partnership network mapping (using dedicated *Ucinet* and *NetDraw* software packages) and bibliometric analyses (facilitated by scientific data mining solution *VantagePoint*).

Managers of high-tech companies will hopefully find here useful recommendations helping them define corporate strategies. The integrated partnership model, described in the following chapters, suggests when, how and with whom to ally in order to stimulate innovation and diffusion of technological products. The three strategic alternatives include options for market penetration without substantial financial investment, opening doors to young start-up companies and helping them gradually grow their businesses. Plural governance model and portfolio of incentives and deterrents help in turn established firms align the strategies of their partners and boost their innovativeness.

I would like to express my gratitude to the Japanese government for the generous financial support, which enabled me to conduct this project, and to professor Kumiko Miyazaki from the Graduate School of Innovation Management, Tokyo Institute of Technology, who offered me a warm welcome and an excellent working and research environment in her laboratory, helping me with advice and encouragement. I would also like to thank numerous other people, who offered their comments and suggestions concerning my research and early drafts of this book, as well as my family for understanding and patience during my two years spell in Japan.

Krzysztof Klincewicz
Tokyo, June 2005

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1 Introduction

1.1 Evolving corporate strategies

1.1.1 Challenges for established models

The main task of any business organization is to create value in the economy – but classical strategic management frameworks may not adequately capture the complexity of the turbulent technological environment, with frequent breakthrough innovations and radical structural changes. The present book suggests extensions of popular models such as value chain (Porter 1985) and industry competitive forces analysis (Porter 1998: 3), adopting them to the 21st century high-tech industry. Corporate value chains of advanced technology companies are nowadays increasingly disintegrated, each chain segment may even form the core of business of a separate company, while linkages between the segments are not always defined by explicit, formalized supply contracts. Value creation processes are no longer based on vertical links among divisions of one company, and the entire industry structure turns into a multiplicity of interrelated partnership networks, blurring the roles of suppliers, customers and competitors.

High-tech firms look at their environment through different lenses, not adequately represented by these frameworks. Similarly, academic critics representing resource-based perspective in strategic management, point to various limitations of the models, as failing to capture the complexity of relations in modern industries. While Porter's framework focuses on stable industries with incidental entrants, most markets experience turbulent changes, disrupting the growth of incumbents' businesses (Slater and Olson 2002), blurring boundaries between new entrants and innovative substitutes. Commercial success of technologically advanced products depends usually on companies offering complementary products and services, adding value to the core product while not being its suppliers (Nalebuff and Brandenburger 1997). The roles of suppliers, customers and competitors

are often blurred, with companies launching ad hoc or strategic cooperation with competitors (Nalebuff and Brandenburger 1997), liaising with customers (or even investing in them to induce loyalty), and pursuing alliances. Moreover, value chain as a sequential mode of value creation and delivery is not the only alternative in structuring business operations. Other options include "value shops": service organizations focused on one selected set of activities only (Stabell and Fjeldstad 1998: 414), e.g. solving specific customer problems as consultants, researchers, designers or outsourcers, and "value networks": firms using "mediating technologies" to link different groups of customers (Stabell and Fjeldstad 1998: 427). Value networks, exemplified by financial services, telecommunications or Internet companies, provide underlying platforms for communication and exchange between various parties like depositors and borrowers in the case of banks, or content providers and users in digital business, where all may act as customers and suppliers at the same time, and the addition of one new customer increases value to all others network participants[1]. The conclusion of the criticism is a need for an alternative approach to industry analysis, important particularly for technology-based industries with the most turbulent high-tech industry – a framework focusing on complicated networks of relations and taking into account multiple possible configurations of value creation and delivery, not only the typical supplier-customer scenario. The present book intends to introduce this new way of looking at the high-tech industry, revising established analytical frameworks and proposing new ones. It incorporates theories from the diverse domains of technology, management science and social theory and tests their relevance using cases of market leaders in several industry sectors.

1.1.2 Modularization

Supply chains in various industries are increasingly modularized - processes and operations are rearranged by connecting "components", coming from various companies (Veryard 2002). Companies internationalize their

[1] For a detailed typology of possible value networks as alternatives to the established frameworks for industry analysis, comp. (Tapscott et al. 2000)

operations by subcontracting manufacturing tasks and outsourcing administrative processes to third parties, focusing instead on intangible assets (including brand and intellectual property).

In the 1990s, observers witnesses a stunning popularity of outsourcing as a new governance form, promising the reduction of fixed costs, particularly for technology-intensive processes such as the management of I.C.T. infrastructure. The diffusion of outsourcing can partly be attributed to bandwagon effects (Loh and Venkatraman 1992), with firms thoughtlessly imitating decisions of their peers, perceived as established industry practices.

Recent decisions of major organizations may reverse the trend – in 2004, JPMorgan Chase prematurely terminated a $5 billion contract with IBM, one of the largest outsourcing contracts in the history, and decided to *insource* the concerned activities, focusing on operational efficiency to gain substantial cost benefits compared with the contractual terms and conditions. The upcoming outsourcing-insourcing debate will most likely demonstrate the usefulness of both approaches, depending on multiple situational factors.

Modularization means that every value chain segment can be subject to a make-or-buy decision. Particularly organizations dealing with advanced technologies are prone to the trend: not surprisingly, the largest technology companies actively pursue innovative approaches to operations management, shifting production to Electronic Manufacturing Services (EMS) firms and using offshore software developers.

1.1.3 Co-opetition and horizontal partnerships

Another global business tendency is *co-opetition*. The term was coined by Barry Nalebuff and Adam Brandenburger (1997), who applied the principles of game theory to strategic management, demonstrating the blurring boundary between cooperation and competition. Successful innovative strategies often involve partnering with own competitors in specific areas, while still competing in others. Empirical research confirms the omnipresence of such horizontal alliances – already in the 1980s, rivals in the semiconductor sector were actively forming partnerships (Stuart 1998: 671-

672), and recent years brought even more cases when direct competitors were joining forces.

For technology companies, partnering with competitors helps establish standards, develop technologies and boost their diffusion, as well as innovate with high risk projects, where investments and competences are contributed by both partners. Working with own competitors could also be used as a political measure to block their activities and restrict strategies – the technique was used by Microsoft, acquiring minority stakes in financially troubled rivals Apple Computer, Corel and Inprise to keep their products in the market, while aligning the product development plans with own strategy. Finally, in cases when competing firms lack differentiation, while developing comparable products, they may benefit from joining forces, as in the case of a successful alliance between Japanese semiconductor units of Hitachi and Mitsubishi Electric, which later transformed into a joint-venture company Renesas Technology.

1.1.4 Complementary vertical partnerships

Resources available to an organization define its strategic opportunities, but these resources and competencies do not necessarily need to be developed internally. Creative strategies use existing resources as a leverage to gain other needed assets, owned by third-parties (Hammel and Prahalad 1993). A company may pursue vertical alliances to develop products beyond its existing expertise, pooling resources through a combination of own skills with the inputs from partners (Hammel and Prahalad 1990a). A prominent example is the entry of computer software giant Microsoft into new markets, including Internet content delivery, interactive television, business systems and gaming consoles, enabled by appropriate specialist partners, ranging from semiconductor and hardware manufacturers to software developers, content and service providers. Instead of simple supplier-customer relationships, Microsoft created a complex networks of companies, working together to develop and promote technologies. Some of key Microsoft partners were never its suppliers: Intel was developing microprocessors, used by Microsoft partners to produce computer hardware, but the symbiotic relationship between the two *complementors* - companies of-

fering complementary products and services, while not being mutual suppliers and customers - made Windows system work better on specific Intel chips, and offered customers incentives to upgrade to new chip generations, when new Windows features were released (Nalebuff and Brandenburger 1997: 30). Financial results of software companies are linked to the diffusion of dedicated hardware, and the business of IT services companies depends on the availability, cost and functionality of software solutions. It should therefore be no surprise that companies not only appreciate the importance of complementors, but also actively manage them to improve the concerned offering and stimulate demand. In many cases, it is difficult to distinguish suppliers and complementors, as components coming from all these parties may be critical for a company's success.

1.1.5 Community-driven innovation networks

The popularity of horizontal and vertical partnerships turns many markets into complex networks of interrelated companies, partnering in some areas and competing in others, functioning as an ecosystem, which maintains a short-term balance while undergoing dynamic changes. Traditional, one-dimensional analyses of industry structure, e.g. Porter's (1985) five forces model, fail to address this complexity, as companies operate in multiple markets, their positions in one field influence strategies adopted in other areas, and labels of suppliers, customers and competitors become too simplistic, failing to capture the actual roles of companies. Moreover, these roles are dynamically changing - a company could develop an own in-house alternative to a solution, which so far was offered by its complementor, while the complementor, anticipating such a scenario, would want to maintain good relations with its upcoming competitor, and try to innovate and find a new niche to continue benefiting from his installed base.

Industry network analysts propose alternative frameworks which could be used to understand the observed industry developments, including the dichotomies of cooperation and free-riding (Gulati 1995: 622-623), monogamy and polygamy (with monogamy referring to the exclusivity of partnerships and lock-in effects, making partners "blind" to new alliance opportunities) (Powell et al. 2002; Duysters and Lemmens 2003: 54), over-

embeddedness (where a company sacrifices its own justified interests to please an alliance partner and maintain good relations) (Granovetter 1992: 7) and path-dependency (describing cases when new strategic options are restricted by existing partnerships and technological commitments) (Duysters and Lemmens 2003: 53-55).

Innovation is often generated through collaborative efforts of multiple parties, combining resources to jointly develop and promote new products – managers need therefore a novel perspective and relevant frameworks, capturing the complexity of modern markets and dominant partnership patterns.

1.2 High-tech industry

1.2.1 Definition

The definition of the high-tech industry is a subject of an ongoing debate among academic and public institutions, understanding the industry in different ways and thus offering incompatible statistical measures. The alternative approaches focus respectively on the composition of workforce (human capital-based measure, assuming that a relatively high share of scientists and engineers represents the innovative potential of a sector), R&D intensity (relation of R&D expenditures to overall sales), or the nature of used technology (“high”, advanced, involving digitalization). The human capital-based approach leads to counter-intuitive results, for example the inclusion of services - architecture, life insurance, banking and consulting - as well as heavy industry sectors - petroleum exploration, chemical engineering, utilities and cigarettes production (Markusen et al. 2001: 29). OECD and Eurostat define high-tech industries based on the R&D intensity, using the high-tech label for aerospace, computer and office equipment, electronics, telecommunications, scientific instruments, pharmaceuticals, chemicals and electrical machinery (Hatzichronoglou 1997; Eurostat 2005). Some researchers propose to define the high-tech industry as composed of both sectors using advanced technology, as well as those purchas-

ing goods and services of the former ones as inputs to their own production processes (Hecker 1999: 18).

The present book adopts a more restrictive definition, popularized by the American Electronics Association: high-tech industry consists of companies in the broad categories of advanced technology manufacturing, communication services, software and computer-related services (AeA 2002). The definition excludes biotechnology, engineering and research services sectors, as well as wholesale and retail of high-tech goods – these sectors are essentially different in their adoption of technologies, cost structures and demand characteristics.

High-tech industry described in the following chapters includes companies, developing and selling digital technologies, based on advanced technical knowledge (characterized by high R&D intensity), and is synonymous with a broad understanding of Information and Communication Technologies (I.C.T.), including software, hardware, telecommunications and Internet industries. The proposed high-tech definition encompasses also the category of information goods (Shapiro and Varian 1999: 3), information-based products with high production costs and low marginal cost of subsequent reproduction, such as software programs, knowledge or multimedia encoded in digital form. These unique characteristics determine the industry structure with high fixed costs requiring substantial initial investments, problems with assessing the value of information before it is actually consumed, and needs to prevent product copying by means of an effective intellectual property protection. High-tech industry includes nevertheless also hardware and services, not sharing some of these characteristics, but strategically and technologically related to the information goods.

Technology in organizations used to be interpreted as an objective, external force, determining other organizational variables (Orlikowski 1992: 399), in line with early understanding of technology as "hardware", physical machines and tools used in production processes. Recently, researchers tend to present technology (in particular Information and Communication Technologies) as socially constructed (Bijker et al. 1987), "interacting" with its designers and users (Orlikowski 1992), being a product of human

action, adjusted to requirements and customizable in various ways. The early deterministic character of I.C.T. vanished over time - centralized solutions, requiring specific data processing structures and procedures, were replaced by distributed architectures, offering easy access to technology from every desk, supporting various uses and functioning as underlying workplace environment, a platform for building dedicated business applications. New technologies are thus "open-ended" (Orlikowski and Hoffman 1997), their implementations require explanation and appropriation, with features and functions gradually emerging during implementation projects and further everyday use, characterized therefore as "technologies-in-practice" (Orlikowski 2000: 407), or ambiguous "equivoques" (Weick 2000).

1.2.2 Technology fusion and industry convergence

The social construction of I.C.T. is the source of flexibility of the high-tech industry, cyclically establishing and destroying specialized technology niches. In parallel, changes in technological environment are an equally important force driving the industry development: the high-tech field is the most frequently quoted example of *technology fusion*, combination of existing technologies into hybrid solutions with new features and benefits, demonstrating synergies between the previously distinct fields, and undermining the traditional maxim "one technology – one industry" (Kodama 1992: 70). The historical cases of technology fusion were driven by substantial, long-term investment in competence building - e.g. in-house development of competences in the emerging domain of optoelectronics lasted for almost two decades (Miyazaki 1999: 45) - but the recent dynamics of global economies require faster time-to-market, stimulating the formation of R&D partnerships among organizations from potentially complementing industries, cross-industry mergers and acquisitions. Time-based strategies, focused on being first to market with new products to benefit from monopoly premium, form the basis of current innovation management strategies, motivating companies to establish partnership networks, and design own products with greater flexibility and adaptability to allow future re-use of technological components in other solutions (Rothwell 1994).

Apart from the fusion of underlying technologies and the gradual digitalization of all domains of everyday life, there is also a growing convergence among industries and business models (the term "fusion" refers to physical aspects of technologies, while "convergence" tackles also intangible dimensions of business, when distinctive industry sectors and business models become interrelated and increasingly similar). Three industries with different historical roots, focused on computing, communications and media, converged in the 1990s to form the "digital economy" (Tapscott 1997). Companies traditionally operating in one of these fields had to extend their competence bases to keep up with the developments and maintain their strategic positions. Important players driving the current development of mobile telecommunications include companies as diverse in core business models and technologies as: NTT DoCoMo (telecom operator), Qualcomm (semiconductor company), Nokia and Motorola (telecommunications equipment and mobile phone makers) and Microsoft (software vendor). In spite of different roots and competences, their focus areas and strategies gradually converge, making them all compete for the leadership in mobile data services area. Similarly, the digital music distribution domain is equally attractive to hardware companies (like Apple, maintaining iTunes shop, driving the sales of the portable music player iPod, or Nokia, hoping to increase its mobile phone sales by improving the handset multimedia capabilities), software developers (including RealNetworks and Microsoft, promoting alternative multimedia streaming technologies through own online music outlets and distribution partnerships), Internet firms (such as Sharman Networks, managing the infamous peer-to-peer network Kazaa or Napster, offering not only paid music downloads but also a monthly media subscription system), telecom operators (including Japan's AU-KDDI, offering music downloads to mobile phones), and finally record companies (exemplified by Label Mobile, a digital music distribution joint-venture between the largest record labels in Japan).

An interesting example of a strategy anticipating and driving the convergence is the consumer electronics giant Sony. Holding a strong share in its core market, Sony embarked on a diversification in the late 1980s by acquiring the American record label CBS Records and movie studios Colum-

bia Pictures Entertainment. In the 1990s, the company launched game console PlayStation, attracting key game developers who enjoyed the rights to use characters and motives from popular Columbia Pictures movies. Later Sony introduced multiple lines of products focused on multimedia capabilities, integrated with its home electronics portfolio: personal computers VAIO, Clié PDAs, television channel servers Cocoon and mobile phones. The sensitivity to convergence enabled the company to benefit from cross-selling opportunities, even though it was a latecomer in many of the discussed domains. Sony implemented also an integrated marketing communications strategy, coordinating promotion of group's companies, so that e.g. movies produced by Sony (including the blockbuster "Spider Man") feature also Sony's product placements (Luh 2003: 156-157). In 2004, Sony acquired the troubled Hollywood studio Metro-Goldwyn-Mayer – analysts criticized the decision due to MGM's poor financial performance, but the real motives for acquiring a competitor of its own studios were again related to the convergence opportunities: Sony was able to establish the single largest film library with over 8,000 titles, using this content to increase its share in various media-related markets by balancing intellectual assets and new technologies, including the Internet on-demand-movies market (where Sony is present through Movielink, a partnership with other movie studios) and the battle over next-generation DVD standards (Sony supports Blue-Ray format, which competes with HD-DVD alternative, backed by Toshiba and four Hollywood studios, and the success will certainly depend on how much content is available in a given format). The latter is an interesting example of non-technological influences in the converged industry: consumers will not choose a standard due to its superior technical features, but merely because of the larger number of available disks (complementary products), so the major influence on technology market comes in fact from content providers.

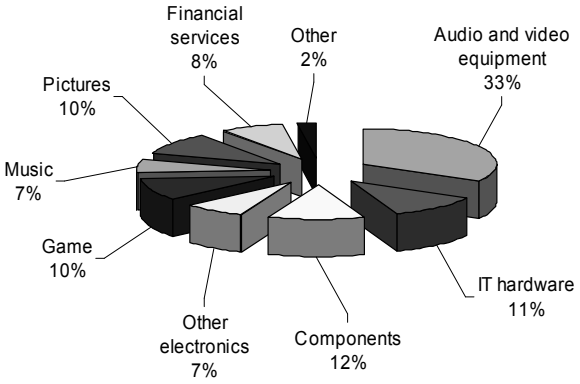

Fig. 1. Sony Group's revenue structure, 2004. Data source: corporate annual report

The convergence of information, communication and media sectors does not mean that firms can easily transfer their skills to other, previously unrelated markets. Specialist technical knowledge may not be applicable to new domains, and failing companies usually lack the ability to reengineer their products in systematic ways, sticking instead to established designs of technological components, as in the seminal cases of Xerox (pioneer of photo-copiers, missing the commercial opportunity of small personal photocopiers) or RCA (former leader in the radio transceiver market, later not able to compete with Sony in the portable radio segment) (Henderson and Clark 1990: 10). Individual segments and customer groups tend to require different marketing approaches – the same computing technology may be used for business purposes, gaming and digital media, each calling for distinctive marketing strategies to "package" the underlying technology. Companies successfully exploiting opportunities created by the industry convergence, balance their existing competencies and supplement them with resources from partners or acquired businesses – NTT DoCoMo entering the mobile data services market needed digital content partners, Microsoft liaised with television network NBC to create MSN Internet portal, and later recruited or acquired a large number of specialist software developer firms to supports the launch of its Xbox game console.

1.2.3 Innovations and market dynamics

Convergence is not the only factor contributing to dramatic changes in the high-tech industry –innovation is source of market disruption, either enhancing or destroying corporate competences (Tushman and Anderson 1986), so that leading companies may lose their positions when markets change and their core technologies are substituted. Particularly important are disruptive innovations, which may initially be not meeting performance requirements of mainstream customers, thus remaining unnoticed by incumbents for some time, but improve over time, offering additional significant benefits compared with their predecessor products (such as lower cost, smaller size, portability), combined with performance improvement potential (Christensen 2000).

The success of an innovation depends on the availability of compatible, complementary goods - software for personal computers, content for Internet, interactive digital television, or new generation DVD disks), offering customers an integrated solution to their problems (Moore 1999: 104-106). Successful innovations are thus generated by networks of partners, not just by single companies – a seminal example is the personal computer, developed by IBM jointly with Intel and Microsoft, but multiple other cases of innovative products, created thanks to strategic alliances with complementors, will later be presented in this book. Moreover, as technologies are socially constructed and can have various uses, their success depends heavily on the existence of *value propositions*, compelling reasons to purchase the products, with a non-technological, marketing nature.

Historical development of the high-tech industry indicates that technology fusion, convergence and market disruptions swift the focus of corporate strategies as the sources of added value are changing. The high-tech industry was surprised by the risky decision of IBM to dispose of its computing hardware manufacturing operations in 2004. In fact, the decision was only one element in a series of strategic adjustments: IBM sold its hard drive unit to Hitachi, personal computers to Lenovo, Asian server manufacturing operations to Great Wall Computer Group (in two latter cases forming joint-ventures with the buyers to benefit from possible synergies), handed over the costly maintenance and development of numerous underly-

ing software technologies to the open source community, while acquiring high-end software and services businesses, among others the business consulting division of PriceWaterhouse Coopers, and taking over thousands of technical support specialists from their outsourcing customers. The margins in hardware market are shrinking, with manufacturing operations shifting to China and South-East Asia. Personal computers, hard drives, monitors and other devices are becoming commoditized – they are based on standardized designs, perceived by customers as not highly differentiated. At the same time, combination of software, technical services and other information goods is required to successfully compete in the growing market segments, such as digital media and business solutions. Historical analyses demonstrate that analogous trends were prevalent in the past (Attewell 1992): years ago, semiconductors were important sources of added value, later the focus switched to computer hardware, which nowadays is merely a commoditized infrastructure (Carr 2003). This does not mean that hardware is no longer needed – it is an important complementor for software applications, and a necessary element of integrated solutions, but could be manufactured and sold to customers by specialized partners, not necessarily the software or services company itself (as in the cases of IBM's strategic partnerships with Lenovo and Great Wall Computer Group). Figure 2 demonstrates the changing focus of IBM in the years 1992-2004: the company increased the share of software and services in its global revenues, keeping only high-end hardware sales such as enterprise mainframes at the end of the period.

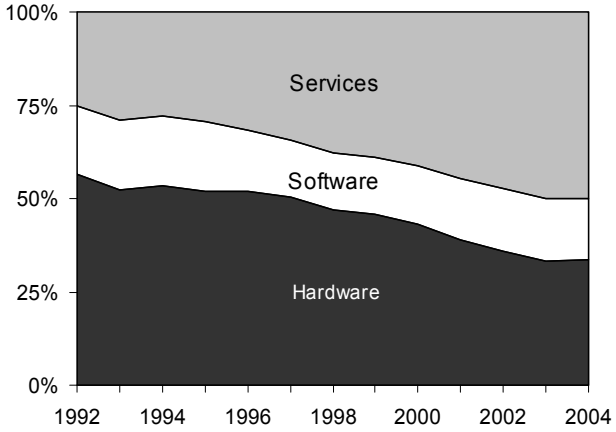

Fig. 2. IBM revenues from hardware, software and services, 1992-2004. Data sources: corporate annual reports

An opposite commoditization scenario is also possible - Sun Microsystems, maker of Unix servers and dedicated Solaris operating system, already in 1999 made publicly available technical designs of its microprocessor architectures, later releasing also the operating system Solaris to the open source community to focus on high-end servers and enterprise services. Both cases reveal a common theme, related to industry changes and growing interdependence of businesses, which no longer could be satisfied by proprietary solutions built by only one company, repeating itself in the long history of computing in the recent 50 years (Attewell 1992).

1.3 Underlying business logic

1.3.1 Building blocks for corporate strategies

Companies have multiple ways of attaining their purposes – while certain business rules may be taken for granted, there is always a possibility that innovative strategies question them, as it happened with Toyota's kanban

production model, co-opetitive alliances, or the open source software movement.

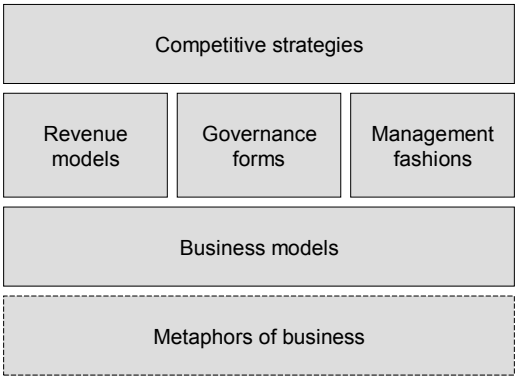

Fig. 3. Building blocks for corporate strategies

Figure 3 suggests that corporate strategies can be decomposed into several linked elements – starting with the most evident competitive strategies, revenue models, forms of governance and fashionable management techniques, moving down to levels of which managers are not always aware: business models and metaphors of business, culturally conditioned ways of thinking about the world. Every level offers multiple incommensurable alternatives, and creative managers could probably pursue any desired combination, if they reflect on the taken-for-granted rules and implicitly accepted strategic scripts within their industry and culture.

The multiplicity of available scenarios starts with alternative revenue models. The most obvious scenario is the traditional, sequential value chain, where a company receives itemized payments following every shipment of goods and services (either directly from end customers, or through distributors and other intermediaries, including banks and leasing companies). Companies may also pursue subscription models, receiving bulk payments from customers, who in return are allowed to consume goods or use services over a certain period of time - as in the cases of buffet lunches in hotels, monthly bills for non-metered Internet connection, or software

subscription schemes, first introduced in 2001 by Computer Associates to replace the traditional software licensing, reducing risk and upfront investments for customers. Wide-spread are also hybrid models, where companies offer what some observers may interpret as free products and services, in fact focusing however on clear financial objectives. Glynn (1999) summarized the possible ways of making money from free services – first of the scenarios is *loss-leadership*, where free offering induces payment for related goods and services, e.g. mobile phone companies may offer free phones in return for contractual commitments from customers, software companies bundle components, so far available at high price from third parties, to improve own sales, and vendors of game consoles intentionally sell them below unit cost to boost their popularity, expecting to earn money from the sales of dedicated game software and peripherals. Another option is *media model*, with free offering intended to establish a customer community, which could be targeted by advertising, research or cross-selling – the users of the company's products or services receive them for free, while other parties pay for accessing this user base, with the prominent examples of commercial television and Internet portals. Finally, offering a free service may be a way to cut costs of own operations, as it happens in the case of Internet banking, reducing the needs for face-to-face customer interactions in physical bank branches. One should also mention another, more questionable revenue model, widely observed among start-up companies during the Internet boom of the late 1990s: they were intentionally refraining from collecting any revenues, focusing instead on the creation of a loyal community, intending to sell this intangible asset to another company. Some of its adopters made small fortunes from the disposals, but the acquiring companies subsequently had to select appropriate revenue-generating alternatives.

Governance forms are rooted in culture, legal system and other institutional conditions – the book offers an extensive discussion of this issue in the following chapters, but it worthwhile summarizing multiple available options already at this stage. The multidivisional corporation (M-form), proposed in the 1960s as an ideal structure for large organizations and supported by transaction costs economists, was later challenged by both theo-

rists and business practice for restricting the development of corporate competencies within the confines of individual business units (Hammel and Prahalad 1990b). Leibenstein's X-inefficiency theory suggested that employment contracts are incomplete and employees have more discretion in carrying out their jobs than external contractors, whose performance is precisely controlled (Martin 2002: 392), providing first economic arguments in favor of partnership formation. Examples of alternative forms include business groupings and alliance networks, linkages with financial institutions (in some countries strictly prohibited by local laws – while widely-spread in others, e.g. in Japan), and component-based value chains (with contracted manufacturing and business process outsourcing). The recent diffusion of Internet technologies facilitates the virtualization of companies, which can easily outsource entire processes, implement remote telework, and liaise with partners from other parts of the globe, never meeting their representatives face-to-face.

Management fashions are prescriptions for internal organization and strategic change, resulting from usually short-lasting fascinations with concepts and techniques, promoted by management bestsellers, slogans, consulting services and even enterprise software systems (Klincewicz 2005). Fashions offer recommended models of organizing, best practices accompanied by relevant ideologies under the buzzwords of Total Quality Management, Business Process Reengineering, knowledge management, Balanced Scorecard or Six Sigma. Although frequently criticized, management fashions remain an important source of inspiration for managers, turning into "management tools and techniques" (Rigby 2001), accompanying the broad portfolios of revenue models and governance forms available in various strategic configurations.

Revenue models, governance forms and management fashions are rooted in more comprehensive business models, defining the purpose of business and accepted means of strategy implementation. Although Western financial management literature emphasizes the need for creating long-term ownership value (Brealey et al. 2001: 19), public companies are often more oriented towards daily company share prices and engineering quarterly profits, while small private firms are in turn inclined to focus on the short-

term perspective to assure their survival and gradual growth. Japanese *kaisha* can afford to be less shareholder-driven thanks to the supply of capital by banks and partners in corporate networks, looking for stable growth and reliable suppliers rather than for maximization of profits or return on investment in financial terms. Many companies are founded to realize certain missions regardless of profits, for example some R&D joint-ventures (focused on costly activities, leading to potential profits in the future, more likely generated however by parent companies, which by that time would have dissolved the joint-venture), or standard consortia formed as commercial organizations. Recent years proved the existence of another, highly unconventional model: the cases of Enron, WorldCom or Ahold demonstrated that top management may interpret "value creation" in radically different ways by using "creative accounting" to create value merely in corporate books, transferring costs to linked parties and artificially boosting profits. Such practices are certainly not recommended by literature and severely punished by law, but their wide-spread presence suggests the existence of implicit prescriptions, values and beliefs among some financial directors, regarding companies instrumentally as opportunities for brilliant careers, stages for quasi-theatrical performances (Boje and Rosile 2003). Finally, the concepts of national innovation systems and postulated involvement of governments in industry clusters (Porter 1990) exemplify cases when national (or regional) solidarity may outweigh other orientations, encouraging companies to work together in order to improve cluster competitiveness, not only pursuing individualist value creation objectives.

The explanation for differences between Japanese *keiretsu*, Korean *chaebol* models, German *Unternehmen*, and the prevalent American corporate governance form is their embeddedness in local culture, tradition and laws (Granovetter 1992), expressing themselves through implicitly adopted metaphors of business. Metaphors are widely used in business world as effective means of communicating ideas (Bower 1991: 190), or tools for analyzing organizations, rooted in the rhetorical aspects of management science (Morgan 1980) and economics (McCloskey 1983). They represent natural ways of thinking about abstract phenomena, as people willingly (but unconsciously) refer to other domains of their lives. Metaphors bring

along hidden assumptions, influencing the ways of thinking and looking at the outside world. The terminology used in strategic management is highly metaphorical (Arndt 1985) with many terms loaned from other spheres of social life, e.g. the term "strategy" coming from the military domain and "competition" from the ancient horse racing (McCloskey 1983: 503). Business may thus be interpreted as warfare, blurring the distinctions between military tactics and actions targeting competitors (Porter (1985), as game, because the economic game theory inspired the concept of co-opetition (Nalebuff and Brandenburger 1997), as theater, where impression management becomes the principle of everyday life (Goffman 1959), family, turning firms into "relief organizations" (Granovetter 1992: 7), or as another reflection of the "Confucian dynamism", involving hierarchy, obedience and perseverance as the constituting principles of society and economy (Hofstede and Bond 1998).

The prevalent metaphors may change in response to the transforming competitive environment, innovation and culture – as the present book will argue, firms in the high-tech industry drift towards a mixture of cooperative and competitive orientations, appreciating the importance of reliable, trusted partners, while not forgetting about the threats posed by rivals.

1.3.2 Institutional, industry and management logics

Revenue models, governance forms, management fashions and metaphors of business offer building blocks for corporate strategies, but the actual process of strategy setting is influenced by three "lenses", defining standards and norms, shaping beliefs and attitudes, and offering repertoires of accepted actions. The lenses (themselves metaphorical) filter data about the environment and contain categories and interpretation patterns, helping make sense of information (von Krogh et al. 2000: 84). The lenses for the strategy setting process are:

- institutional logic – comprising of institutional forces such as culture, legal or educational system;
- industry logic – taken-for-granted collection of best practices of an industry;
- management logic – linked to cognitive processes of decision makers, who interpret events in an organization and its environment.

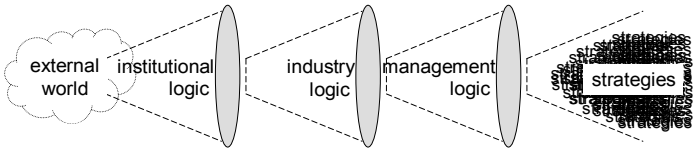

Fig. 4. Three lenses in strategy setting process

Even though the high-tech industry is regarded as globalized, a recent study proved that strategies and structures of international high-tech companies preserve regional diversity (Duysters and Hagedoorn 2001: 354). This is coherent with the sociological concept of institutional embeddedness, stating that economic action is embedded in social structure (Uzzi 1997: 35). Economic institutions arise from cultural beliefs (Granovetter 1992: 5), and the effectiveness of strategies depends on broader social institutions, which may also be characterized as the institutional logic. The influences and inherent limitations of institutional logic can be evidenced by the fact that e.g. strategies successful e.g. in one cultural business setting cannot easily be transplanted to other environments (Kenney and Florida 1995). Managers acquire their "frames of reference" from business schools, books or training institutions, internalize the communicated norms and principles (DiMaggio and Powell 1983: 150), and institutionalize the recommended practices as part of the valid institutional logic.

Industry itself offers a distinctive portfolio of strategic concepts (Huff 1982: 126). Neoinstitutionalists in organization theory propose that organizations tend to comply with standards observed in their immediate environment (organizational field) by imitating strategies of other players (DiMaggio and Powell 1983: 148). Management techniques such as

benchmarking or strategic analyses of strengths and weaknesses are based on comparisons between own organization and competitors or analogous firms from other industries, and facilitate copying relevant practices to improve organizational effectiveness. The common elements in corporate strategies can also be interpreted as archetypes (Greenwood and Hinings 1993), subconscious interpretative schemes shared across an industry. Every industry will also have its own distinctive "strategic language", helping express strategic concepts and articulate tacit knowledge (Schwarz and Nandhakumar 2002: 77), difficult to understand for outsiders, as well as unique characteristics of applied technologies and innovation systems (Carlsson et al. 2002).

On a personal level, top managers establish interpretations of business and environment, which they impose on their organizations through strategies, structures, or cultural artifacts. These interpretations are referred to as dominant general management logic (Prahalad and Bettis 1986), maps, frames of reference, mindsets, schemata (Calori et al. 1994: 438-439), and once successfully shared with others, functioning as a "collective mind" in organizations (Weick and Roberts 1993). As every industry consists of companies pursuing independent strategies, defined by their management, these mindsets feed back into the industry structures and dominant strategies. Leading firms may outperform other players through the pursuit of creative strategies, better strategic insights and different interpretations of the market – an industry foresight, allowing them to revise the underlying assumptions of the institutional and industry logics. On the other hand, the dominant management logic may also be a source of failure, as the "filter", through which management looks at relevant industry data, distorts the reality (Bettis and Prahalad 1995: 7), and potential emerging strategic opportunities are ignored if decision makers cannot grasp them using the available categories and interpretation patterns (von Krogh et al. 2000: 84). These three lenses can also transform the reality, as members of organizations constantly change (enact) the perceived environment through interpretations, sense-making and subsequent actions (Weick 1995).

The metaphor of lenses explains also why the high-tech industry differs from other industries by having its own underlying logic. The logic is con-

ditioned by the characteristics of Information and Communication Technologies such as: network externalities (with disproportionate payoffs for technologies with large user bases, motivating vendors to create customer lock-ins), need for complementary solutions (stimulating the pursuit of partnerships), unique cost structures of information goods (allowing companies to flexibly set their unit prices), disruption caused by innovations (radically changing market structure and successful strategies – as in the cases of personal computing, Windows, Internet, mobile telephony and as digital multimedia) and constant convergence with non-technological domains. The rules change over time - within last ten years, the high-tech industry went through such a significant transformation that many companies, products and technologies from the early 1990s are no longer remembered, and possibly also future readers of this book may regard it merely as an account of certain historical developments, in spite of the author's intention to analyze general underlying mechanisms in the industry.

2 Strategic alliances and high-tech value chain

2.1 Perspectives on strategic alliances

2.1.1 Importance of alliances

Strategic alliances are wide-spread in the high-tech industry as an important element of the underlying industry logic. Alliances are defined as institutional arrangements, which combine resources and governance forms of several partnering organizations, making them mutually interdependent (Inkpen 2001: 402-403). The importance of alliances for high-tech companies is strengthened by the need for complementors, trusted long-term suppliers, as well as reference customers, who could become partners in diffusing new technologies. Particularly important are vertical arrangements among organizations with different competence bases – due to the convergence of technologies and markets, required knowledge and technologies cannot usually be developed internally in a satisfactorily short time, and partnerships offer the opportunity to combine resources in generating and diffusing innovations. Alliances are often formed to develop products, which would success commercially only if they were adopted as industry standards (Stuart 1998: 696), what in turn can also explain horizontal alliances among competitors, uniting their forces to penetrate yet undiscovered, high risk areas. The alliance formation is thus motivated by asymmetry in resources – particularly in the high-tech sectors, many alliances link established large companies and small entrepreneurial firms, offering them mutual benefits of access to market and unique technologies.

Alliances can take many organizational forms, ranging from equity-based joint ventures, through cooperative R&D agreements, technology licensing, marketing and distribution partnerships, and supply chain relations, to technical partnerships, specialist trainings to develop products for a specific technological platform, and industry consortia, formed to introduce and

manage standards (Inkpen 2001: 404). Researchers usually exclude mergers, acquisitions and market-based transactions from the list of alliances, sometimes doing the same with distribution and technology purchase agreements (Gulati 1995: 620-621) - but in the technology sector, these arrangements often include also non-contractual commitments, like knowledge acquisition, or integration of own products, forming bases for long-lasting relationships. The traditional, arm's-length relations with suppliers, who may easily be replaced, transformed into embedded, long-term ties - especially as technology-intensive alliances often create lock-in effects, cementing the interorganizational linkages. The literature offers several explanations of motives for alliance formation – the alternative approaches include: neoinstitutionalism, transaction cost economics, resource-based and social embeddedness perspectives.

2.1.2 Neoinstitutionalism

Neoinstitutionalism focuses on industry pressures to follow the footsteps of leading companies (DiMaggio and Powell 1983), which turned alliances in high-tech markets into "a routine strategic initiative" (Stuart 1998: 669). The popularity of outsourcing increased for example after a visible contract between IBM and Kodak in 1989 set the "best industry practice" (Loh and Venkatraman 1992: 335-336). Researchers observed a dramatic increase in the alliance formation rate since the 1980s, which could be attributed to both increasingly competitive business climate, as well as the faddish popularity of partnership strategies (Eisenhardt and Schoonhoven 1996: 146; Gomes-Casseres 2001). The social position of a company depends among others on its contacts and reputation – alliances can therefore function as a form of endorsement, signaling the quality of a company to other potential partners, investors or customers (Eisenhardt and Schoonhoven 1996: 140; Gulati and Higgins 2003: 128-129), but they can also be interpreted as risky by investors: if a small firm forms an alliance with one of market leaders, it is assumed that the low-prestige member has offered generous financial terms to its to-become partner (Stuart 1998: 675).

Imitation cannot however be the only motivation for forming alliances, especially as empirical evidence suggest indifferent reactions of the capital

market to alliance announcements, which have no significant impact on company valuation (Das et al. 1998: 37), or on the IPO success (Gulati and Higgins 2003: 137). Moreover, short-lasting commitments lead to fast alliance dissolutions by firms entering alliances only to imitate other players, as opposed to those driven by strategic motivations (Koza and Lewin 1998: 258). The underlying logic of the high-tech industry is certainly an important factor stimulating partnership initiatives, but its role is linked to the nature of technological products and complementary relations among firms, not addressed by the neoinstitutional perspective.

2.1.3 Transaction cost economics

Transaction cost theory resorts to economic arguments to explain why alliances are preferred to other governance forms: market-based contracts and internalization of concerned activities by an organization (Inkpen 2001: 406)[2]. These intermediate hybrids between markets and organizational hierarchies are implemented when transaction costs are too high for arm's length relations with suppliers, but still lower than these of a complete integration (Gulati 1995: 619) – for example, subcontracting requires a costly and time-consuming transfer of knowledge and control, so a firm would choose more reliable arrangements than open bidding, refraining also from doing the concerned work internally due to the required investments and opportunity costs, not outset by potential revenues. This is especially the case for small numbers conditions, which the partners can overcome by working with many parties to achieve the economies of specialization, scale, scope and experience (Grandori and Soda 1995: 185-186).

The neoclassical interpretation of corporate governance suggests that hierarchically organized firms replace market for transactions in cases of market inefficiency: when there is uncertainty about the outcome or value of a transaction (e.g. high asset specificity), or appropriate performance incentives for each party cannot easily be created (Inkpen 2001: 406). Asset specificity increases when partners make relation-specific investments, pre-

[2] An extensive review of existing empirical studies adopting this perspective, relevant for marketing and strategic management, can be found in (Rindfleisch and Heide 1997).

senting no value outside of the partnership (Blumberg 2001: 832) – a firm may adjust its operations and technologies, invest in dedicated training, or even build its factory close to the partner's plant. In software sector, a seminal example of such partner-specific investments were "conversions" of leading software makers to Microsoft Windows platform in the mid-1990s, requiring training and substantial development work, not useful for other platforms, and thus cementing their relations with Microsoft. Transaction cost theorists propose that in such cases, companies use contractual commitments to reduce their risk and mitigate partner's opportunism (Blumberg 2001) – indeed, major commitments from partners were accompanied by additional formalized incentives from Microsoft.

The argumentation does not however apply to many known partnering situations. Transaction cost economics emphasizes cost efficiency as motivation for forming alliances, but often the transaction costs of alliances as a governance form are relatively higher than for other scenarios (Eisenhardt and Schoonhoven 1996: 136). A seminal study of semiconductor sector proved that in highly uncertain situations, firms tend to form alliances contradictory to the transaction cost economics recommendations, certainly focusing on other strategic factors, which outweigh the cost inefficiencies (Eisenhardt, Schoonhoven 1996: 147). Similarly, exchange relations between two partners are embedded in the history of prior relationships and the wider industry context, so individual transactions can not be interpreted as discrete events as the approach implicitly suggests (Gulati 1995: 619-620). Alliances may continue even when the intended goals cannot be knowingly accomplished, as managerial decisions are influenced by psychological factors, concerns about their company's prestige (Inkpen and Ross 2001) and the image of a reliable partner in future projects with other companies (Gulati 1995: 622-623). Some researchers accuse transaction cost economics of displaying "a bias toward describing opportunistic rather than cooperative relations" (Uzzi 1997: 37), therefore simplifying the nature of industry practices, where trust helps reduce uncertainty, supplementing or even substituting formalized contracts, which could not cover all possible aspects of a relationship (Blumberg 2001: 843). Finally, the initial contract merely initiates the alliance (Lei et al. 1997: 208), which may

dynamically change over time, involving communication and mutual learning, conflicts, problem solving processes and even competitive tensions.

2.1.4 Resource-based approach

The resource-based view emphasizes the importance of strategic objectives, and the logic of needs and opportunities, as opposed to solely cost-driven interpretations. This perspective, viewing firms as bundles of resources, with strengths resulting from their assets, which can be tangible (like technology and capital) or intangible (like reputation and managerial skills), has already been introduced earlier in this book, and will be guiding the further analysis of the high-tech industry. Firms try to exploit opportunities in the environment, especially the presence of potential partners - empirical research proves correlations between high competition and alliance formation, as well as confirms the strategic use of alliances to improve own position or visibility, or to meet other strategic objectives related to knowledge acquisition, legitimacy or market entry opportunities (Eisenhardt and Schoonhoven 1996: 137). Interestingly, a partnership networks itself is regarded as an intangible resource, exploited by corporate strategies (Hall 1993: 618).

The complementary nature of high-tech products makes firms dependent on other players, susceptible to their influences and bargaining power – firms find themselves in vulnerable strategic positions (Eisenhardt and Schoonhoven 1996: 137), trapped by the strategic interdependence, as one organization has resources useful for, but not owned by the other (Gulati 1995: 621). Strategic management literature offers comprehensive lists of possible motivations for pursuing strategic alliances (Borys and Jemison 1989: 237; Eisenhardt and Schoonhoven 1996: 139; Inkpen 2001: 405) – some of them are summarized below:

- reducing risk of operations and promoting stability, important both for innovative, risky projects, as well as for everyday operations through the integration of supply chains;
- providing legitimacy for the company by capitalizing on a partner's reputation, or his presence in local markets;

- legitimizing an emerging market or technology by getting resource commitments from multiple parties;
- gaining access to partner's knowledge, and thus increasing a company's flexibility and speed-to-market in launching new products, which benefit from shortened development cycles and specialist expertise of a partner.

The knowledge asymmetry and organizational learning are major themes in resource-based literature on alliances: an alliance can become "a platform for learning" (Inkpen 2001: 408), where the strategic objective of any partner is the access to the other party's knowledge and skills, or even turn into an opportunistic "learning race", in which the partner who learns the fastest dominates the relationship and possibly terminates it in the future (Inkpen and Beamish 1997: 177). Incompatible strategic objectives of partners may concern e.g. respective intentions to establish long-term presence in a certain market, as opposed to a mere access to a technology, which could later be used for own purposes (Lei et al. 1997: 207). A widely cited example is NEC, which managed to build its internal competencies at low cost by internalizing skills of various technology partners (Hamel and Prahalad 1990b: 80). The concept of organizational absorptive capacity explains differences in the ability to learn and apply the effects of these learning processes to own practices (Cohen and Levinthal 1990). Firms investing in in-house R&D or experimental small-scale manufacturing operations can better understand the nature of specific technologies and processes, which are subsequently contracted to partners (Cohen and Levinthal 1990: 128). This approach is typical for Japanese companies, investing heavily in knowledge acquisition from various domains, which may never be commercially internalized, but helps coordinate the work of partners. In the resource-based perspective, organizations can effectively use alliances as "learning vehicles" if they possess an appropriate absorptive capacity and organizational slack, enabling the learning processes (Larsson and Bengtsson 1998: 291), if the cooperation with alliance partners is open, corporate management is committed to the continuous improvement (Lei et al. 1997: 209), and last

but not least if the particular domain is important for their strategies (Inkpen and Dinur 1998: 462)[3].

The dynamic character of learning alliances involves shifts in bargaining power of specific partners, who acquire the desired intangible resources and can eliminate the dependency on other parties (Inkpen and Beamish 1997: 179). This reveals two paradoxes: first of all, firms must have resources to get other resources, being subject to the "irony of alliancing" (Eisenhardt and Schoonhoven 1996: 137), which suggests that alliances can only be used by some firms, while the characteristics of others (e.g. low prestige, lack of specialist knowledge or limited access to market) limit their abilities to successfully implement cooperative strategies (Stuart 1998: 694). Secondly, while a good partnership has to be based on the openness and mutual contributions by both parties, this attitude may also be self-destructive, as firms make themselves vulnerable to partners, who may capture the needed resources and abandon them – this establishes the "interorganizational learning dilemma" (Doz 1988: 39; Larsson and Bengtsson 1998: 285).

These two paradoxes lead to the conclusion that partnering firms tend to have incompatible strategic positions and motivations – anecdotal examples of asymmetrical alliances show that large technology partners are usually focused on fast product development and commercialization, while small firms seek relations with powerful players to be able to continue research to improve their technologies (Doz 1988: 47). Interestingly, as the cases of NTT DoCoMo and Microsoft, presented in this book, will demonstrate, decisions of stronger partners are not always guided by obvious strategic principles: even though they learn, acquire the desired resources from their alliances and become able to internalize the concerned activities, they decide to continue working with the same partners, who seemingly cannot any longer offer considerable benefits. While offering important insights into the mechanisms of alliances, the resource-based view cannot yet provide satisfactory explanation for many situations encountered in the high-

[3] Alliances involving core businesses of companies offer the greatest opportunities to learn, but also the greatest potential of transforming a partner into a new competitor (Lei et al. 1997: 214).

tech industry. The simplistic view of knowledge transfer from one company to another can also be criticized, as learning involves processes of knowledge generation (Nonaka and Takeuchi 1995), not just imitation of partners (Inkpen and Beamish 1997: 192) Empirical findings show also that alliances are widely used by firms of all types, not only by second-tier competitors trying to catch-up (Hagedoorn 1995: 248), as it would be expected if "learning races" were the primary motivation for partnering.

2.1.5 Social embeddedness perspective

Social embeddedness or social network approach is a common name for a group of concepts, sharing assumptions about the nature of knowledge, innovation and interfirm relations. The embeddedness hypothesis, formulated by Schumpeter, Polanyi and Granovetter, states that actions of economic actors are embedded in a network of relationships, influencing these actions and their outcomes – for example the sense of harmony, inherent to the Japanese culture, contributed to the specific industrial organization of Japanese companies (Granovetter 1992: 5). Consequently, being part of a relationship network is not a subject to corporate decision, but the nature of economic life – while the literature often quotes Japanese automobile and Italian knitwear manufacturing as examples of embedded industries with close, trusting and often non-contractual relationships, recent studies prove the significance of embedded ties even in highly competitive industries, like female apparel market in New York (Uzzi 1997) and financial community in Chicago (Uzzi 1999). Transaction cost and resource-based perspectives suggest that alliances are used because they do not require permanent commitments from partners (Borys and Jemison 1989: 242), but the examples of embedded relations demonstrate that partnerships can last longer than capital investments, and offer more benefits to the involved parties. The embeddedness of various industries increases in response to the environmental uncertainty just like any open system increases its internal complexity to match the complexity of its environment. Example include: the fierce competition in the automobile sector, the complicatedness of the DNA-related scientific discoveries among biotechnology companies,

and the convergence of computers, telecommunications and media businesses in the high-tech market (Gulati et al. 2000: 210).

Geographical proximity may also play an important role in alliance formation – without any high-level coordination mechanisms, firms tend to form clusters, such as the Silicon Valley and the Route 128 in Massachusetts (Castilla et al. 2000). These networks of relations differ from intentional, formalized consortia, dubbed "network alliances", including e.g. code-sharing agreements in the airline industry or ATM networks maintained by banks and credit card organizations (Koza and Lewin 1998).

The role of networks in creating knowledge and innovation cannot be underestimated. The "locus of innovation" resides not in individual firms but within "networks of learning" (Powell et al. 1996: 116), including universities, research laboratories, suppliers and customers, state agencies, unions, trade associations and other bodies, which actively promote the formation of industry clusters and stimulate knowledge exchange and generation through intensive reciprocal ties (Ebers and Jarillo 1997: 3).

Application of this perspective to the level of an individual firm allows one to easily understand the limitations of the "learning race" concept. Knowledge, which is essentially tacit, is generated through interactions and exists in a wide interorganizational field, shared by many agents and practically impossible to be entirely internalized. Partnering cannot therefore be reduced to a zero-sum game, as there is no real dichotomy between cooperation and competition (Larsson and Bengtsson 1998). Strategic alliances usually involve mutual learning, not only learning from the other partner, as they create synergy and new value, such as knowledge and innovation (Larsson and Bengtsson 1998: 286), while opportunistic attitudes can become self-destructive by restricting the innovative potential of a company. The "learning race" fallacy results also from adopting dyads as the unit of analysis, while taking a broader look at the industry enables one to discover the existence of complex networks and various non-contractual relations, critical for the relations between a company and its environment.

The social embeddedness of a company has a significant impact on decision making and strategy development processes. For example, partners in embedded networks tend to "sacrifice rather than maximize on price, and

shift their focus from the narrow economically rational goal of wining immediate gain and exploiting dependency to cultivating long-term, cooperative ties" (Uzzi 1997: 37). In practical situations, this means both sacrifices for the sake of partner (incidental deliveries below cost, or willingness to make relation-specific investments), as well as openness towards competitors to pursue co-opetitive strategies when considered appropriate. The mutual willingness to sacrifices does not however mean that organizations forget about their own strategic objectives and turn into "relief organizations", surrendering to excessive, economically unjustified claims from partners (Granovetter 1992: 7). Both under-socialized (atomistic) and over-socialized views of the economic reality are potentially dangerous – in the former case, represented by the transaction cost economics, one may overlook important aspects of interorganizational linkages, assuming opportunistic calculations, while the latter scenario gives a risky prominence of interpersonal relations, social institutions and values over strategic motives of companies (Granovetter 1992): if all firms in an industry were linked by such over-embedded ties, there would be no incentives to offer value for money, let alone innovate. Over-embeddedness would limit the scope of search for new partnership ties, making firms "blind" to many opportunities, and encouraging them to merely replicate the existing ones in new contexts (Duysters and Lemmens 2003: 53-55) to stay locked-in in a network (Gulati et al. 2000: 210-211). In reality, linkages between firms are based on combinations of both embedded and arm's-length ties (Uzzi 1997: 58), with many companies adopting creative strategies to increase the innovative potential of their networks. The value of embeddedness is contingent: pursuing embedded ties is not an imperative, in some cases it may even turn out to be counter-effective (Gulati and Higgins 2003: 127), so managers need to understand the industry logic to know which ties matter to their companies.

An embedded network may turn into a social capital for organizations knowing how to benefit from the relations and involved resources (Duysters and Lemmens 2003: 52), at the same time facilitating the formation of new alliances by offering information about a company's reliability and competences (Gulati 1995: 620). Research on biotechnology firms con-

firmed that increase in the number of R&D partnerships drives also other forms of collaboration (Powell et al. 1996: 121), for example in marketing, as companies acquire the relation management skills necessary to interact, induce trust and openness. Personal networking of company employees, acting as boundary-spanning individuals between the organization and its environment (Tushman 1977) may lead to the emergence of institutionalized collaboration forms (Ebers and Jarillo 1997: 12), with the particular importance of top managers, who signal the firm's quality and most likely already possess the appropriate skills, needed to establish and maintain successful alliances (Eisenhardt and Schoonhoven 1996: 140-141). Particularly in advanced technology sectors, firms are embedded in networks of informal collaborations – as Powell et al. (1996) report, an interviewed CEO of a biotechnology company, presented with a list of his firm's formal partnership agreements, described it as "the tip of the iceberg – it excludes dozens of handshake deals and informal collaborations, as well as probably hundreds of collaborations by our company's scientists with colleagues elsewhere" (Powell et al. 1996: 120). Extensive networks limit opportunism due to the impact of possible free-riding behaviors on firm's reputation (Gulati 1995: 622-623), but at the same time make companies aware of "exit networks", alternative partners who may be approached if an existing relationship is terminated (Blumberg 2001: 833).

Companies intentionally stimulate network creation and internal dynamics – for example, dominant firms organize partner events to create a "bazaar", facilitating contacts and third-party alliances (Gulati 1995: 627), intended to strengthen the existing ties and increase the network's overall innovativeness. As a result, the entire industry becomes structured based on the network ties, with competitive rivalry occurring between "strategic blocks" not individual players (Gomes-Casseres 1996; Gulati et al. 2000: 205-207).

2.2 High-tech value chain

2.2.1 Model of the high-tech value chain

Most research studies concerning alliances focus on dyadic relations of partner pairs, overlooking the multiplicity of possible hybrid arrangements among firms, particularly important in the high-tech industry. On the other hand, analyses of alliance networks encounter methodological problems of setting the network boundaries (Inkpen 2001: 420). The present book proposes an alternative unit of analysis, introduced as *high-tech value chain*: a network of relations, focused on a specific technology-driven value proposition, and structured based on the nature of the Information and Communication Technologies. The underlying logic of the high-tech industry establishes a distinctive pattern of alliance formation with suppliers, complementors and competitors, repeated for any new class of product innovations.

Industries with interdependent processes of value creation, including the high-tech industry, generate innovations through partnerships and vertical coordination. Delivering high-tech products and services involves interdependent elements, which jointly constitute a "value chain", establishing value for the final user. These relations can be explained using the model of high-tech value chain, demonstrating that only complex, end-to-end solutions, involving hardware, software, services and content, can adequately address requirements of customers. The term "value chain" resembles the terminology used by Porter (1985) and the notion of value network (Stabell and Fjeldstad 1998; Christensen 2000), while emphasizing the sequential nature of value delivery. The structure of this chain is defined by the nature of the underlying digital technologies, of which high-tech products are composed.

The model is inspired by previous, analogous attempts in the literature: Eselius et al. (2002: 80) discussed the specific value chain for wireless telecommunications, while Cho and Ku (2004) proposed "SER-M approach" to map product lines of leading high-tech companies.

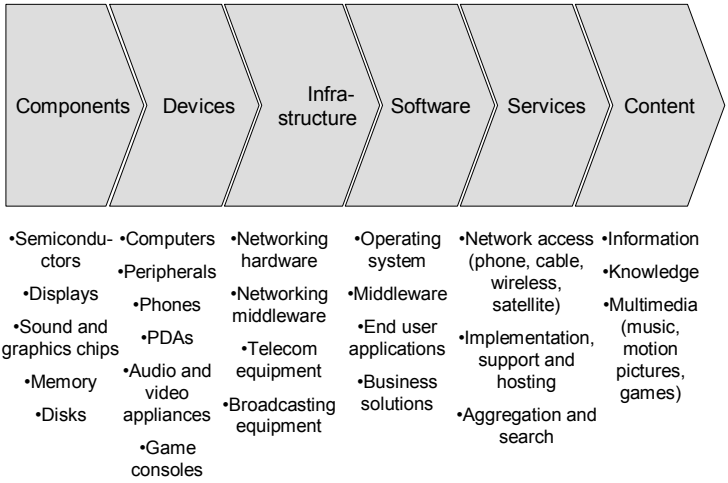

Fig. 5. High-tech value chain

Individual elements of the chain can be delivered separately or embedded in the higher-level elements – for example, components such as semiconductors or displays are included in laptops and mobile phones. The difference between value and supply chains is related to the possible product and financial flows – in the latter case, elements from specific suppliers are bundled and sold together, while in a value chain, solutions from various parties may be offered independently as complementary goods, but only their combination will deliver value. The interdependencies drive the formation of alliances, and the framework visualizes the reasons, why alliances are important for corporate strategies in the sector, including both vertical partnerships across different segments and horizontal cooperation, which helps generate value within one segment. Individual corporate strategies, strategic groups and specific products may change over time, but the model is based on wide technology categories, not business models, so it should remain valid as a general analytical framework regardless of the development of technologies and markets. While this book will further present the application of the high-tech value chain to the modern high-tech

industry, it could also be successfully applied to historical developments, for example the mainframe computers with proprietary, custom-built solutions (Attewell 1992), or the early television industry, where in the 1930s, television sets were the main sources of added value, and later the value generation shifted to service providing broadcasters and more recently, to content producers (Funke et al. 2003: 93).

The chain is intended to describe one specific end-to-end solution, not a solution class – it is thus linked to certain companies, representing one "constellation" (Gomes-Casseres 1996), competing against another comparable value chain, for example Microsoft-driven solution for digital media, competing with an alternative value proposition from Apple.

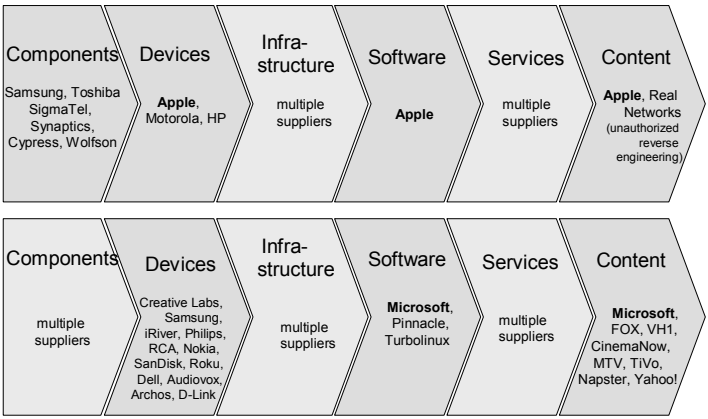

Fig. 6. Competing value chains of Apple and Microsoft in the digital media market

The model of high-tech value chain differs from Porter's value chain – in spite of possible naming confusions, the model is not generic, but specific to high-tech industry, where standard supply chain relations may be supplemented by other forms of co-operation. The historical development of the high-tech industry led to decomposition of all-encompassing platforms into networks of multi-vendor products (Ceruzzi 2003). Certain high-tech value chain segments may function as customers for other companies – for example Microsoft, implementing its vision for digital media, had to supply

its software platforms to telecom providers, cable television networks and Internet Services Providers, because of their critical gate-keeping roles in technology diffusion among end-users. The company decided to focus on long-term penetration of the digital media market, and regarded relations with these intermediaries as partnerships, not only sales opportunities: in many cases, it invested in the companies, or formed other types of alliances, reducing own short-term revenues, but aligning the firms in its own value chain, which finally materialized in 2004 with the release of dedicated portable media players and launches of online music shops. Analyzing the industry with the high-tech value chain framework helps identify critical relations, which otherwise could be misinterpreted as simple supply dependencies, thus ignoring potential for future value creation and for stimulation of the diffusion of new technologies.

The high-tech value chain is a more adequate unit of analysis than dyads, traditionally used in research on strategic alliances, and than broadly defined alliance networks, composed of multiple parties, including non-commercial organizations and competitors. The same alliance network can capture relations is several competing value chains, as certain companies work in parallel with multiple standards – so the network approach proves difficult to operationalize in the high-tech industry, where almost every company is somehow linked with others[4]. The high-tech value chain is based on underlying technical dependencies, so it helps capture the technology-conditioned structure of an industry and look at available configuration possibilities. There are thousands of such value chains, acting as separate ecosystems, with specific standards and different levels of openness.

2.2.2 Importance of content

The last segment of the chain, described as "content" is the most puzzling one, often ignored by high-tech industry analysts. This segment links technology and knowledge from other areas – through content, technology can

[4] For example, an analysis of 129 semiconductor firms founded in Silicon Valley between 1947 and 1986 proved that almost all of them were connected by either direct partnerships or by sharing joint partners or personal linkages among founders (Castilla et al. 2000: 226-228).

invade new domains of social life and deepen the industry convergence. Literature concerning Internet and mobile technologies is based on a definition of content as digitalized information, which is provided to end users of information networks and dedicated devices. The general character of the high-tech value chain model calls however for a broader understanding of this segment – content is a type of information good, which primarily does not have digital character (unlike software), but supplements technological solutions. First of all, it can be information – for example news and documentation made available on the Internet. It comprises also of other multimedia formats, including graphics, music and movies – their combination with underlying technologies helps create new value propositions, such as digital interactive television, online music shops or mobile location services with area maps and guides. Companies promoting these value propositions need to offer complex solutions, covering the entire value chain – otherwise, gadgets like the portable music player iPod from Apple would not be interesting for customers, who could not find appropriate content – reason to use the device.

The content segment of the high-tech value chain goes however beyond the convergence of telecommunications, computing, media and entertainment (Ebert and Weiß 2003: 93; Kenper and Hans 2003), focused on individual customers, and extends the notion of content to business organizations. Content may form a bridge between technology and management knowledge industries, merging specialist business knowledge and technology. For example, enterprise-scale implementations of SAP R/3 required not only technical services, but also business consultancy and business process modeling, which was provided by IDS Scheer, a firm formed by professor August Scheer from the University of Saarbrücken. IDS Scheer developed in 1992 a software package ARIS intended to capture, analyze and optimize organizational processes. While technically relatively simple (and thus imitable), the software embedded also management knowledge, which was not available to SAP or other ERP system vendor at that time: so-called reference models, sets of recommended processes for organizations in specific industries, which could facilitate organizational change projects, acting as benchmarks or reusable templates. The reference models

were rooted in Scheer's academic research concerning business processes, thus documenting the best practices of that time, and were accompanied by a dedicated process mapping methodology, proposed by Scheer in his various books. SAP could have developed its own process modeling tool, but as a primarily technology firm, it did not possess the extensive specialist knowledge concerning process modeling, focusing rather on standardized procedures like resources scheduling for manufacturing purposes, accounting and financial management (which of course required sophisticated management knowledge as well, but from other areas). SAP decided to invest in IDS Scheer in 1997, the toolset was tightly integrated with SAP R/3, and new versions of the SAP platform embedded some elements of ARIS. IDS Scheer's continuous research on business processes, which were transformed by the development of Internet infrastructure and changes in the legal systems, helps maintain synergistic relations between these two companies. Similarly Microsoft, when entering niche markets with dedicated business solutions, had to resort to help from specialist companies in cases such as Internet-based supply chain management, support for enterprise compliance with corporate governance and auditing legislation (Sarbanes-Oxley Act), or solutions for straight-through processing (STP) for financial services organizations. Microsoft contributed own software platforms and technical competencies, at the same time benefiting from complementary technologies and management knowledge of partners.

One could also identify within the high-tech value chain several segments constituting either management knowledge industries (companies working with corporate customers on business problem solving) or digital entertainment industries (formed by the same chain segments, but addressing the entertainment-related needs of individual customers).

The segment of content is the part of the high-tech value chain most resistant to internationalization – information and knowledge is usually specific, contextual, embedded in local relations and thus difficult to transfer. For example, Microsoft had to launch its international versions of MSN portal in partnerships with local media companies (particularly leading newspaper publishers), and NTT DoCoMo's mobile commerce platform i-mode proved difficult to export: its success in the home country was attrib-

uted not only to the technology, but first of all to the content, relevant for customers in Japan.

2.2.3 High-tech value chain versus other concepts

It is worthwhile to summarize differences between the high-tech value chain model and similar approaches, presented in the literature. The most traditional framework comes from the domain of marketing: the concept of product levels (Levitt 1980: 86), for the purposes of high-tech marketing presented as "the whole product" (Moore 1999: 104-110), consists of various elements, including hardware, software and services, making managers aware of the need to work with other parties to guarantee the completeness of their solutions for end-customers. The model is very general, not referring to the industry structure or the deterministic interdependencies between underlying technologies – it was originally proposed as a way of analyzing any, not necessarily technological, product offering. Another influential framework is "value network" (Christensen 2000: 36-47), decomposing high-tech products into separate elements, each of which could undergo breakthrough innovations thus influencing the future of the entire product. The approach was however not intended to describe interorganizational relations, but technical product designs. Gomes-Casseres (1994, 1996) proposed to look at the development and diffusion of new digital technologies through the lenses of alliance networks. As it was discussed earlier in this chapter, such an approach may in turn seem too extensive for strategic management purposes: for example a network of firms involved in launching Personal Digital Assistants includes companies working on competing standards and representing different approaches to the market.

Focusing on individual high-tech value chains enables managers to better shape their strategies by easily identifying partners and competitors. They can also extend their scope of strategic options - a company may want to sacrifice one market (or in other words, its presence in one value chain) to strengthen its competitive position in another, more promising area. For example, in the middle of the 1990s, leading Unix hardware vendors including Unisys, Dell, Compaq and HP spotted the opportunity offered by Microsoft in another value chain, and started long-term strategic divestiture

from the Unix-oriented market, using the involvement in two competing value chains to negotiate additional incentives from Microsoft. One company forms part of multiple chains, and it is important to be aware of their existence. When a key partner in one chain is competitor in another chain, unexpected problems may arise, troubling the relations.

Another relevant model, platform leadership (Cusumano and Gawer 2002), describes how companies attempt to dominate their respective markets by providing underlying technologies and forming partnerships with other vendors, who make their products compatible with these platforms. It is intended to support architectural decisions of the platform leader – a dominant company, which assures the support of third parties to promote own standards. The high-tech value chain approach emphasizes in turn the incompleteness of any technology platform coming from just one vendor – partners are needed not only to boost the platform's diffusion, but also to create the actual platform through complementary product and service offerings. Instead of focusing on ambitious efforts of single companies, it is thus better to analyze entire ecosystems and their dynamics – not forgetting that individual companies, *value chain leaders*, drive the chain development and strive for dominant positions within the networks of partnerships. For example, the success of Windows as an operating system platform was not only due to the technical features and marketing efforts of Microsoft, but was also made possible by supportive partners, who realized that the system may dominate future markets. Windows NT benefited from the support coming from enterprise clustering specialists such as Tandem, Banyan Systems, Digital and AT&T, who decided to port their relevant technologies to the new platform, establishing NT's credibility. Microsoft's competitor Novell decided early on to focus future development on Windows platform, thus sending a signal to customers, and temporarily filling critical gaps in networking capabilities of the environment, while Microsoft needed several years to fill them with own technologies. Backup software, system management solutions, toolkits for porting Unix applications to Windows and terminal technologies were all critical for Windows as a platform – they were not just add-ons, but key technologies, defining the value of Windows for customers and thus stimulating its diffusion. Presenting

Windows as a solely Microsoft-owned platform would not capture the complex dynamics – the framework of high-tech value chain can address this analytical challenge by looking at Microsoft as the company which played the lead role in the chain, but not owned the entire ecosystem, being often restricted in certain technological or commercial decisions.

Finally, it is important to differentiate between the high-tech value chain and a conglomerate. Pursuing a value chain strategy with partnerships, investments and possible backward or forward integration does not necessarily mean diversification of a company's core business. Value chain approach emphasizes synergies in business related to interactions of technological components, not always important for conglomerates with broad portfolios of unrelated high-tech businesses. Japanese Softbank used to be an example of such a conglomerate, with only minimum integration between Softbank-controlled firms. The company resembled a venture capital firm, not trying to assume consistent control over any single high-tech value chain[5].

2.2.4 Tool for strategic decisions

The model of high-tech value chain is presented as a tool for analyzing the business environment, the position of own company and the nature of its technologies, helping make informed decisions about future strategic directions. The framework emphasizes the relational character of successful strategies in the high-tech industry: every company launching new product needs to consciously build an own ecosystem or become part of an existing one, so that its technology could be applied to specific problems. It is unlikely that one company develops internally all necessary competencies due to the technological complexity of every chain, including the need for specific non-technological content (such as information, media or business knowledge). The proprietary scenario is even undesired, as it naturally limits the third-party support for the technology by discouraging potential partners. The success of a value chain depends on interorganizational skills –

[5] Softbank has recently revised the strategy, focusing on integrated operations in selected markets.

– the ability to drive partnerships, prepare compelling value propositions for customers, conceptually integrate the chain and justify the need for each element of the complete solution.

The value chain model helps identify relevant strategic groups within the broad industrial field – traditional approaches to strategic group analysis may be over-simplistic, singling out companies based on variables such as similarity in resources and market approach (Porter 1998: 127-132), while companies similarly endowed in resources may focus on entirely different market niches (e.g. Norwegian web browser developer Opera responded to Microsoft's dominance on PCs by porting its software to mobile devices), therefore being involved in distinctive value chains. It is important to be aware that every high-tech firm is part of at least one value chain, competing against another chain, not just against single companies – this thinking has a significant impact on how managers classify current or potential complementors and competitors within the network of interdependencies. Value chain is modular by nature – a company may attempt to assume control over a specific segment, or make a conscious strategic decision to leave the domain to partners. The cooperation within a value chain does not always need to be explicit, cemented by formal partnership agreements – often complementors do not form part of other products, but are nevertheless needed to guarantee appropriate performance and functionality. Microsoft and Intel products are purchased independently, Windows system and Pentium processor are not reciprocal suppliers, yet their success could only be mutual, and this aspect is adequately addressed by the strategies of both vendors.

Firms in any segment of the value chain can work on own products, or function as contracted service providers to other parties. Contract manufacturers include chip foundries, producing semiconductors based on external orders and specifications, Electronic Manufacturing Services companies, which can assemble hardware, and the most technically advanced Original Device Manufacturers, not only manufacturing, but also designing devices, which will be marketed by other companies). Contracted software developers are offshore and local software firms, writing specific parts of code to be embedded in other firms' systems, developing dedicated software con-

nectors, interface documentation, or conducting technical tests for their corporate customers.

Application of the framework to an individual firm helps better understand its current revenue model and market trends, stimulating potential shifts in the perceived sources of added value, so that new strategic options could be considered. This tendency resembles the notion of *value riding* (Funke et al. 2003: 95-96), creative ways of benefiting from the convergence and the emergence of new value chains. Telecom operators with revenues traditionally determined by time-based network usage in voice services can switch to data transfer pricing, based on the access time and later on the amount of data sent, towards the subsequent adoption of next generation content-driven payments, where customers subscribe and pay for particular services, regardless of their actual use, so that the source of value and revenues for telecoms is no longer the sole network provision, but rather the delivery of content. Virtual Network Operators in the mobile telephony rent the network capacity from traditional telecoms, not maintaining own network infrastructure and focusing instead on value-added services. Software vendors are trying to de-emphasize the initial customer investments in their products by changing traditional revenue models, based on one-off license payments upon the software acquisition, and focusing on recurring revenues from software subscriptions for time-limited licenses, rentals or programs made available by Application Services Providers (ASPs), transforming software into a service. Hardware makers are willing to enter into complex revenue-sharing deals with other parties to switch from prohibitive prices of their equipment, extending the revenue streams in time (through outsourcing, leasing or credit services), or spreading them over the entire value chain, so that every consecutive purchase of complementary products offers also revenues for the principal hardware maker (as in the case of video game consoles, subsidized by vendors to boost their diffusion, but offering additional revenue opportunities from game developers and peripherals manufacturers, paying royalties from every item sold). “Value riding” makes companies once again aware of the interdependencies in value creation processes. Telecoms would certainly miss important new sources of revenue without handset makers, who estab-

lished standards for mobile short text and multimedia messages, as well as logos and ring tones downloaded by the phone users. Software vendors enjoy synergies with specialized ASPs, who can host their products and make them available to customers as a service. Makers of portable media players benefit from third-party online music shops. Some companies try to move up the value chain to be closer to customers by acquisitions and investments[6], others rely on cooperation with third-parties, offering complementary solutions.

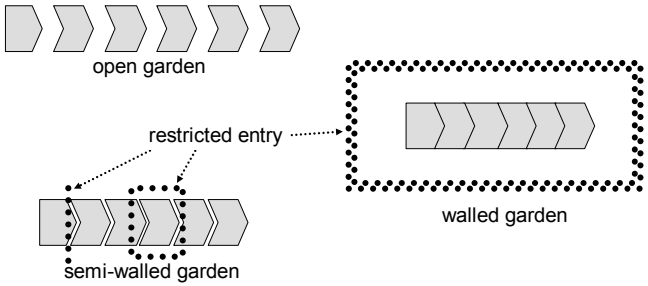

Fig. 7. Open, walled and semi-walled gardens in high-tech value chains

Another enlightening aspect of the framework refers to the presence of entry and exit barriers, from which value chain leaders can benefit. They may limit possible entries by promoting proprietary technologies, not open to all interested parties, adopting so-called *walled garden* approach with a closed, privately controlled environment, accepting only authorized partners. Alternatively, they may create a *semi-walled garden*, where standards are seemingly open, widely recognized, but their actual implementation in the specific value chain incorporates modifications, making them incompatible with the solutions used elsewhere and thus leaving control and bargaining power to the value chain leader. Particularly the semi-walled garden model is promising for the high-tech industry, as it stimulates

[6] Comp. media investments by telecoms (Raneberg 2003), attempts of Internet Services Providers (ISPs) to offer own content and real-life, offline services (Klein 2003), Microsoft's investments in ISPs, ASPs, cable television networks and telecom firms (described later in this book).

innovation and encourages many parties to join (technology closely resembles widely accepted, open standards – yet incorporates minor modifications, making solutions incompatible). Next chapters of the book will present examples of companies which successfully created semi-walled gardens, working with all interested parties to boost innovativeness within their value chains, but at the same time selecting a group of trusted partners who were privileged in benefiting from newly introduced technologies. Exit barriers for walled and semi-walled gardens are in turn potentially high switching costs, locking the partner in the value chain due to their relation-specific investments and the proprietary elements of technologies. This technological lock-in means that products and skills related to a particular chain are difficult to transfer to another ecosystem, and committed resources turn into sunk costs in the case of chain exit.

2.2.5 Dominant chain segments

The answer to a question of which segment is expected to dominate the high-tech value chain, may come as a disappointment. Market developments indicate that practically every segment of the value chain can be perceived as the source of substantial added value. In spite of the obvious commoditization and decrease of margins in semiconductor sector, the creative strategy of Intel allowed it to assume the key role in some value chains. Intel established strong brands for its Pentium and Centrino processors, making customers ask for solutions using particularly this ingredient, even though alternatives from competitors including AMD were closely matching the parameters of Intel products, with no technical arguments against the substitution[7].

Mobile telecommunications field is another interesting example of competition among several value chain, driven by companies who participate in their chains respectively as: telecom operators (including NTT DoCoMo and Vodafone), software makers (Microsoft), semiconductor manufacturers (Qualcomm) and handset producers (Nokia,

[7] For more information on the strategic potential of ingredient branding, and how suppliers of components can influence customer purchasing decisions, comp. (Norris 1992).

(Qualcomm) and handset producers (Nokia, Motorola). Even within the same vertical market, value chains differ in the focus and sources of added value, perceived by customers and industry players. While traditional frameworks for the high-tech industry emphasize the importance of "killer applications", compelling reasons to use certain technologies, coming from the segments of software and content (Downes and Mui 2000), there might be situations, when the popularity of certain content or software is driven by the availability of a "killer appliance", device porting an application. Apple iPod established the digital music industry by justifying online song purchases, and launching a new fashion among young consumers.

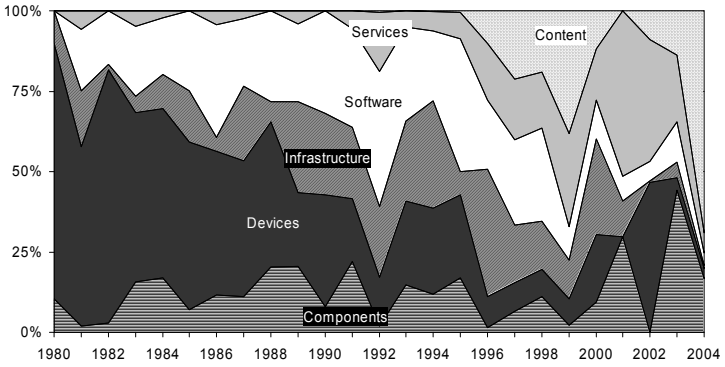

Fig. 8. Market capitalization of new IPOs from high-tech value chain segments as percentage of annual high-tech IPO values, 1980-2004. Data sources: Meeker and Cascianelli 2002, www.ipomonitor.com

	1980-1985	1985-1990	1990-1995	1995-2000	2000-2004
Components	16%	200%	2%	378%	112%
Devices	-71%	13%	172%	617%	-70%
Infrastructure	-32%	107%	-5%	1174%	-76%
Software	-39%	46%	126%	165%	16%
Services	-	-	112%	294%	-28%
Content	-	-	95%	415%	565%

Table 1. Changes to average valuation of newly listed technology companies. Data sources: Meeker and Cascianelli 2002, www.ipomonitor.com

Even though no single value chain segment can be classified as definitely dominant, opinions of market players and investors represent nevertheless their perceptions of the changing sources of value in the industry. Figure 10 demonstrates results of an analysis of 1803 IPOs of technology companies between 1980 and 2004[8]. Initial company capitalizations for all relevant IPOs were aggregated to compute annual willingness of investors to put their money into specific high-tech value chain segments. The results evidence a relative decline in the importance of device makers. Software enjoyed popularity among investors until the late 1990s, when the interest shifted towards services and content. The longitudinal changes in importance of firms from a specific segment of the chain correspond also to the changing average valuations of new companies in every segment (table 1): moving from semiconductors in the 1980s, through devices and software to the recent stunning growth of content businesses valuations. Figures 11 and 12 present additional information about all high-tech companies listed on the U.S. stock exchanges in April 2005 – relations between market capitalization and revenues (P/S ratios) indicate that investors valued by that time

[8] The analysis excluded telecom and media – telecoms were usually entering the stock exchange as established or even dominant players, while media broadcasters became involved in the high-tech market only after the industry convergence of the mid-1990s. The data used for analysis was coming from Morgan Stanley's Technology IPO Yearbook (Meeker and Cascianelli 2002) and IPO Monitor listings (www.ipomonitor.com). Companies active in several value chain segments were assigned to the segment from which they were deriving the largest part of revenues at the time of IPO.

particularly high the software, semiconductor and infrastructure companies, while device makers enjoyed dramatically lower ratings than the industry average.

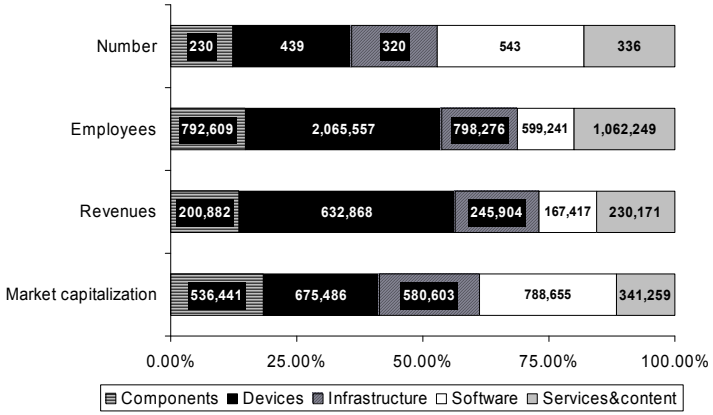

Fig. 9. Financial metrics of high-technology companies listed in the U.S.. Data source: Reuters, www.investor.reuters.com, April 25, 2005

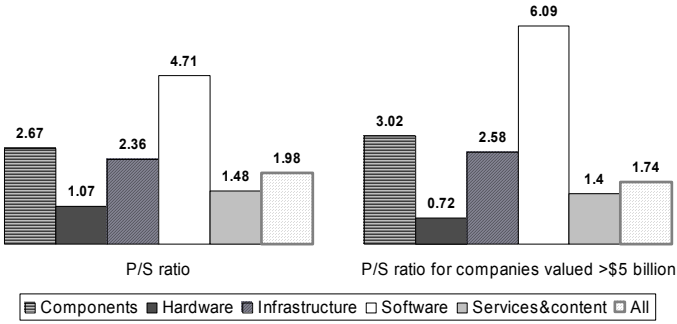

Fig. 10. P/S ratios for high-technology companies listed in the U.S. – all companies and companies with market capitalization over $5 billion. Data source: Reuters, www.investor.reuters.com, April 25, 2005

2.2.6 Generic value chain strategies

The book will further describe possible strategies within the value chain. Importantly, the types of strategies do not depend on the nature of technologies, as it has already been explained above: the industry convergence may lead to similar outcomes of equifinal approaches by companies from various segments. Firms from any value chain segment may assume the leading role and drive further development and diffusion of technologies, therefore it seems more appropriate to propose a generic typology, based on distinctive approaches to the market, ways of addressing the needs of end-customers, and patterns of cooperation with other value chain partners.

The distinctive strategic roles, which will be described in detail in the following chapters, are:

- value chain leader – company assuming control over a specific chain, stimulating the innovativeness and development of complementary segments (easily identifiable as it does not have direct competitors within a specific chain);
- complementor (niche player) – company offering complementary products or services, filling gaps in a specific value chain with its specialized skills and solutions, and promoting them in conjunction with the chain leader's offering, usually technologically locked-in within the chain;
- contractor (service provider) – company doing contracted work for other players, giving up the intellectual property rights for the outcomes of its work, so that another party can own them, what leads to a division between competencies and property rights.

These three ideal strategic types require different competencies, technological approaches and marketing orientations. It is useful to interpret own firm's position within a specific value chain using this framework in order to make conscious, well-informed strategic decisions. The positions do not merely depend on individual decisions; they may also result from the underlying structure of technologies and the chain itself, particularly for late entrants. For example, a company complementing solutions of a strong chain leader will have limited success in aspiring for the chain's leadership itself - as a result, it may undermine its relations with the powerful partner,

and actually launch attempts to create an own value chain, competing against the existing constellation (commercial success of such a scenario is nevertheless possible if the company possesses strong competencies, contact network to other potential partners and sufficient financial resources). The following chapters will explore these interdependencies and strategic scenarios available to firms, using examples of several value chains from diverse industry sectors.

3 NTT DoCoMo – innovation through partnerships

3.1 Overview

3.1.1 New product development and partnerships

The present chapter offers a comprehensive case study, presenting how the high-tech value chain framework could be applied to analyze relations and strategies of industry players. It describes the astonishing success of Japanese mobile telecommunications company NTT DoCoMo and its partners, local high-tech companies, was a source of ongoing discussions and controversies in Western business literature. Managers were interested in the success factors and its replicability, and problems of Western telecoms with following the model were attributed to specific characteristics of the demand for mobile data services in Japan. However, some of European firms were able to create successful mobile data businesses with DoCoMo's help, what suggests that other, yet unknown factors contributed to the success. The present chapter will discuss other so far unexplored aspects of DoCoMo's business model: the adoption of a unique governance form, combining long-term strategic alliances with arm's length relations and internal activities, stimulating the development of new products and services. The partnership pattern differs from the Western approaches, while also departing from the traditional view of Japanese business groupings. It will be positioned as a new institutional form, conditioned by local culture and the changing nature of industry, which requires radically shorter development times and increased competitiveness, and thus combining elements of the *Confucian dynamism* (Hofstede and Bond 1998) with ambitious strategic intent.

The case is also a good example of the complexity of high-tech solutions and the usefulness of the high-tech value chain framework for strategic decisions. Instead of analyzing direct suppliers and customers, the focus shifts

towards the entire set of complementors, linked by shared underlying technologies. As DoCoMo's experiences will show, all elements in the value chain are important – the company tried to streamline and control all of the chain's segments, not only direct inputs and outputs of own operations. In order to manage its value chain, a firm has to maintain a balance between alliances and internalization, motivating partners to cooperate and benefiting from their contributions. The approach, described in this case study, was rooted in the Japanese institutional logic, turned out to address all of these concerns – but the cultural embeddedness made it also difficult to replicate in other environments. As opposed to the home market success, effects of DoCoMo's foreign investments were rather disappointing – a firm cannot simply replicate some elements of its chain to other institutional settings. The high-tech value chain emphasizes the need for a thorough analysis of relationship network, often questioning what is obvious for certain cultures and industries.

3.1.2 Japanese institutional logic

Cultural differences play an important role in partnership strategies, and local partnering competences may prove difficult to apply in a different environment. Even though the high-tech industry is regarded as globalized, a recent study proved that strategies and structures of international high-tech companies do not converge, preserving regional diversity (Duysters and Hagedoorn 2001: 354). This is coherent with the previously introduced concept of embeddedness, suggesting that the effectiveness of alliances will depend on broader social institutions (Grandori and Soda 1995: 190) or institutional logic, e.g. concepts of loyalty, trust and moral obligations.

Japan, as other Eastern societies, was strongly influenced by the Confucianism, which emphasized the importance of harmony in society, resulting from naturally unequal relationships among people, resembling mutual obligations within a family, different from (and even inconceivable within) the Western concepts of individualism. Hofstede and Bond (1998: 16) introduced the notion of *Confucian dynamism* as a distinctive cultural variable, representing value orientations, frequently used by cross-cultural studies. According to the framework, the Japanese are strongly oriented

towards the future, emphasizing the perseverance (linked to long-term orientation in corporate strategies), thrift (offering "patient capital" as opposed to Western shareholder-oriented financial management) and the importance of previously described status-based relationships (where respectful inequality becomes a natural feature of both societal and industrial relations). While the general characteristics are common for other societies in the region (including South Korea, Hong Kong, Taiwan and to a certain extent also mainland China), more detailed anthropological studies suggest that the institutional logic for organizational alliances in Japan is rooted in the cultural construct of *ie* (home), representing the tangible possessions of a group of people and the intangible organization of a family to which these people belong (Bhappu 2000: 410). The world of an individual is divided into things and people, which are parts of one's *ie*, and the outsiders, and the Japanese feudal system of reciprocal obligations cultivated connections even among distant relatives (Bhappu, 2000: 410-412). The historically dominant business groupings (*zaibatsu*) evolved from family businesses, promoting loyalty, cooperation and consensus, and not surprisingly, these ties survived even the enforced abolishment of *zaibatsu* structures in the 1940s (Bhappu 2000: 412). Re-emerging groups were referred to as *keiretsu*, with subtle, long-lasting ties, not likely to disappear as "fundamental to the way in which Japanese firms operate" (Ming-Hong Lai 1999: 423).

The term *keiretsu* refers to various forms of alliances, characterized by strengthened internal control and symbiotic relations (e.g. streamlining of operations in supply-chain), asymmetries of status (resulting in uneven distribution of economic benefits and risks), and cohesiveness with order (by commercial justifications and personal ties) (Ming-Hong Lai 1999: 425-427). Partnerships are preferred grouping patterns, opposed to acquisitions, which involve high costs, destroying value and demotivating employees (Dyer and Ouchi 1993: 53). The keiretsu system promotes stability and long-term investments, resulting in economy sectors being concentrated but not monopolistic due to intensive rivalry among direct competitors from different groups (Ferguson 1990: 64).

Kigyo keiretsu (vertical keiretsu) represents supply chains, with a dominant role of one company, having sometimes minority shareholding in other firms (Ming-Hong Lai 1999: 428-430). Owing to this institutional arrangement, automobile firms "managed to preserve low levels of vertical integration and close dedicated supplier relationships in the absence of hard, legalistic contracts and comprehensive ownership" (Ahmadjian and Lincoln 2001: 685). As Dyer and Ouchi (1993: 53) explain, "the goal is to create a "see-through" value chain where both party's cost and problems are visible. Then both parties can work jointly to solve the problems and expand rather than split the pie". This comes however at a cost: suppliers "often must agree to prices set by the final assembler, even when, at times, those figures will not return a profit" (Cutts 1992: 51), and make customer-specific investments in physical assets and human capital, which tie them to one company and make their products highly customized. The secret of Japanese-style partnership are learning effects, positively linked to the stability of the relations: "U.S. manufacturers have repeatedly destroyed the experience curves of suppliers by ensuring that no one supplier could accelerate down the experience curve to accumulate decisive cost advantages (Dyer and Ouchi 1993: 55).

3.2 NTT DoCoMo and its value chain

3.2.1 Company

NTT DoCoMo is a wireless subsidiary of Japan's telecom giant NTT (Nippon Telephone and Telegraph), a former state-owned monopoly. DoCoMo was spun off in 1992, enjoying substantial growth in user subscriptions, and successfully floated in 1998. DoCoMo and its corporate parent were operating two parallel cellular networks: low-reach PHS network (transferred to DoCoMo by the end of 1998) and PDC network covering most of the country.

In February 1999, DoCoMo introduced mobile data communication service *i-mode*, which became a stunning success, attracting millions of subscribers, generating substantial m-commerce revenues and setting an ex-

ample for the international community to follow. *i-mode* was a platform, aggregating web pages for mobile phone owners. Dedicated handsets offered access to entertainment sites (including cartoons, ring tones, games), as well as more practical services (like stock charts, mobile banking or yellow pages). Due to high Internet connection fees in Japan, i-mode was for many people the only method of accessing the Internet (phones could also access unofficial sites, prepared using a simplified version of the web page description language). Official content providers were receiving subscription fees, billed from users by DoCoMo. Thanks to *i-mode*, the company became the leading player in the wireless industry, setting standards for other companies and exporting its platform to other countries. This part of DoCoMo's story is widely known and has been described by popular press and academic articles, although in many cases the provided interpretations seem superficial, referring mainly to the specificity of Japanese culture, generating demand for mobile communication.

DoCoMo's *i-mode* success induced also expectations that the company's next ventures will be equally successful. Analysts were disappointed when two smaller competitors attacked DoCoMo and tapped at its subscriber base – J-Phone (currently: Vodafone) introduced in 2000 phones with embedded digital cameras, and KDDI attracted more subscribers for its new generation services than DoCoMo. DoCoMo's strategic technology project was the implementation of the 3rd generation (3G) mobile telephony (and launch of 3G service FOMA, *Freedom Of Mobile Multimedia Access*), but the company described changes to the new platform as evolution not revolution, improving the quality of services and creating possibilities for launching new ones, in contrast with inflated expectations of market observers.

The global fascination with i-mode positioned it as a phenomenon apparently inconsistent with past strategies of DoCoMo and its corporate parent, former monopolist NTT. As this case study will show, i-mode was actually one of many innovative offerings, all launched through specific partnership patterns, practiced by DoCoMo over years. Although formal procurement procedures, described on DoCoMo's website (NTT DoCoMo 2004a) resemble the ones adopted by international companies, their external attrib-

utes might be confusing, as the actual partnership relations are rooted in the underlying Japanese institutional logic[9]. Further presentation of the case study will be structured by distinctive segments of the high-tech value chain, starting with the infrastructure, as the traditional focus of telecommunications companies.

3.2.2 Infrastructure

Telecommunications infrastructure is the driving force for product development in the sector: new platforms increase network capacity, improve transmission quality, enable voice and data communication, as well as other innovative services. Not surprisingly, major investments are focused on this value chain segment, involving such technologies as packet switching (facilitating data transfer to handsets in ways similar to computer networks, with phones "always on" and users paying for the transferred data, not the connection time), or the 3rd generation mobile telephony (dubbed 3G or UMTS, CDMA, W-CDMA depending on region and adopted technology, offering increased bandwidth and transmission speed, thus enabling users e.g. to access multimedia content via their phones). These technologies consist of multiple infrastructure layers and platforms, requiring cooperation with various suppliers and a sequence of decisions concerning technology standards.

Like most telecommunications operators, NTT DoCoMo has its own R&D unit, maintained to understand new technologies so that specifications for infrastructure providers can be prepared. Unlike other companies, DoCoMo's R&D centre in Yokusuka has over 700 employees, while the company's R&D budget is probably the highest in the telecom industry. DoCoMo and its parent company NTT intend not only to understand technologies, but also actively develop them and generate innovation by setting new standards for the global industry (Fransman 1995: 358-360). The company started testing 3G technologies in 1997, developed own

[9] DoCoMo's corporate parent NTT was subject to government-level procurement agreements between U.S. and Japanese states, committing to "allocation of procurement volume bases upon price, quality, delivery and other commercial factors" (Computing Japan 1997), but lacking transparency and diverging from international telecommunications standards.

pany started testing 3G technologies in 1997, developed own specification, called W-CDMA, which influenced relevant international standards, and launched W-CDMA services in 2001, ahead of most foreign counterparts.

DoCoMo's capabilities were developed through its technology partnerships – Motorola and Ericsson played important roles in the development of first networks, while local trusted infrastructure partners included NEC and Fujitsu. DoCoMo seemed to be motivated to support business of its local partners to guarantee they have up-to-date knowledge thanks to technical alliances with Western companies, and can benefit from the experience curve effects through involvement foreign projects related to export of PHS and i-mode platforms.

When DoCoMo developed specification for 3G network and invited suppliers to participate in experimental project in 1997, there was a substantial disproportion in specialist knowledge between the involved Western companies (Motorola, Lucent Technologies, Ericsson and Nokia) and their Japanese counterparts (NEC, Fujitsu and Matsushita). The participation in DoCoMo's W-CDMA project was very risky for suppliers: specification was not yet approved by international standardization bodies, and infrastructure development required substantial investments, which could not be reusable for other customers. The stakes in this game were certainly higher for Japanese companies, maintaining multiple levels of relations with DoCoMo, delivering not only W-CDMA infrastructure but also handsets and other solutions, as for them even potential sunk costs would guarantee continuous ties with the carrier. It explains why once key technology suppliers like Motorola stopped playing significant roles in DoCoMo's technology strategies, and decided to partner with Japanese companies in the area of new mobile technologies (Motorola and Siemens with NEC, Alcatel with Fujitsu, Ericsson with Sony). A recent study of global alliance patterns confirms the tendency: while in the 1980s and 1990s, Japanese high-tech companies tended to partner with multiple Western firms, by 2000 the largest Japanese firms formed a tight national cluster, concentrating new alliances among themselves (Knoke et al. 2002: 21).

Implementations of many projects involved Western suppliers of unique technologies (e.g. PacketVideo and HP in multimedia streaming, UbiNetics

in new generation data transfer technology), especially as innovative visions of DoCoMo could often were only shared by equally visionary start-ups. As Jeff Pancottine, managing business development of F5 Networks, delivering specialist software to DoCoMo, explained: "You have to have a unique solution and get designed in. (…) It's a very technical audience that you are selling to. They love technology and want to understand it and internalize it" (Rutledge 2003).

Unlike Western telecom operators, who usually motivate external parties by placing orders for their solutions, DoCoMo was able to encourage unsolicited submissions, especially through its certification program. Any hardware or software company could apply for logos *DoCoMo Value* and *Link to DoCoMo®*. This method of cementing partnerships resembles affiliate programs of IT companies like Microsoft or IBM, but is unique among telecom operators. For Japanese partners, it offered a benefit of being linked to the successful giant: a primarily emotional, yet very important argument in Japan.

3.2.3 Devices and components

Another segment of the value chain presents a fully-fledged model of Japanese-style partnership, with a group of trusted and submissive suppliers. While infrastructure solutions were non-repetitive and involved long-term projects of strategic importance to DoCoMo, handsets have short replacement cycles and established dominant designs, reducing technological uncertainty. Although their role is critical in mediating the end users' experience of carrier's services, Japanese telecom operators regard them as one of many elements of the value chain, just like automobile companies perceive components from their suppliers. This is an important difference from Western telecommunications industry, where handset makers were setting new standards and trends, gaining significant bargaining power in their relations with telecom operators.

In the early 1990s, first mobile phones were manufactured to carrier's order, thus giving DoCoMo control over the brand, end user price and of course detailed specification. The phones were sold through NTT's retail network and branded as *DoCoMo movaD*, *movaF* etc. to indicate by a sin-

gle letter the actual manufacturer. The number of *mova* handsets (the company retains the brand name for its phones, with a numbering system indicating series and features – e.g. *mova N505iS*) released annually was constantly growing – unlike the number of contracted suppliers, which remained stable over the years. In this way, an "inner circle" of *mova* makers was established, consisting of: Fujitsu, NEC, Matsushita (known for its brand Panasonic), Mitsubishi Electric and Japan Radio (incidentally, there were also two mova phones manufactured by Motorola and Ericsson).

In the 1990s, with depressed Japanese economy and limited consumer demand, the regular orders for mobile phones presented an important business opportunity for all electronics companies and fuelled their business growth (especially as millions of users were replacing phones on an annual basis). Facing pressures from industry and government, DoCoMo agreed to work also with other suppliers, but used co-branding to differentiate between them and the trusted (and thus recommended) partners: third-party phones were procured like *mova* phones, but sold as *DoCoMo by* phones (e.g. *DoCoMo by Sony*) to imply differences. Figure 11 presents graphically the closeness of cooperation between DoCoMo and handset suppliers, based on handset orders from the years 1992-2003 (the distance between a partner and DoCoMo represents the reverted number of orders placed in this timeframe) - 6 companies form the "inner circle" as of 2003, with Sony and Sharp admitted to the trusted group only recently.

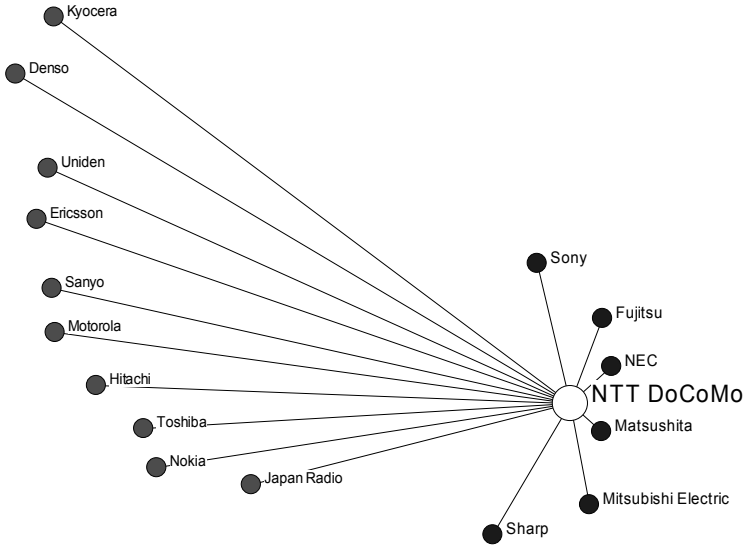

Fig. 11. Inner and outer circles of DoCoMo handset partners

Differences on technical level indeed existed – as Kanji Ohnishi from Sony Ericsson described the position of Sony, describing the times when they were a *by maker*: "We were the readers of the text (…) rather than the writers" (Meyer 2002), referring to the close cooperation between *mova* makers and DoCoMo in analyzing emerging technologies, acquiring knowledge, developing concepts and defining specifications for new handsets before the details were disclosed to all other interested (and disadvantaged) parties. An example of the scale of disadvantages is the first PHS handsets, released in 1995 (PHS business was by that time managed by NTT not DoCoMo, but the partnership patterns were similar). Sony's model weighted 190g, and the battery life allowed for 5 hours of conversation or 95 hours waiting time – while four other handsets weighted 95-160g, with respective battery parameters of 3.2-5 and 80-400 hours, as well as additional innovative features. Even though Sony was trying hard to

compete by offering superior usability and fashionable phone designs, its phones were technologically disadvantaged. There were many Japanese companies, supplying handsets to other mobile phone networks, which did not try to work with DoCoMo (like Casio or Victor) or supplied handsets once (Kyocera, Denso) only to realize their weak position. One could easily understand the hopelessness of foreign manufacturers' efforts to gain a significant market share in the Japanese market.

On the other hand, participants of the inner circle of *mova* makers benefited from their cooperation with DoCoMo and supplied phones also for other networks in Japan and abroad. In order to prevent premature knowledge-spillovers, DoCoMo's contracts were prohibiting external uses of technologies embedded in phones for a period of 6 months – this practice was questioned by the Japan Fair Trade Commission (JFTC) in 1999 and formally abandoned. Although severely disadvantaged, some of the *by* makers proved to add significant value over time – Sharp developed a phone with embedded digital camera, Sony mastered multimedia features, and Toshiba delivered in 2002 the lightest 3G handset with long battery life, all playing critical roles in boosting diffusion of new services.

DoCoMo's partnership strategy with handset makers based on the *mova-by* dichotomy was key to its innovativeness. The distinction was rooted in Japanese institutional logic, differentiating *kankei gaisha* (affiliated companies) and *dokuritsu gaisha* (independent companies) (Dyer and Ouchi 1993: 52). While DoCoMo remained open to new ideas and products from *by* makers, it also encouraged them to try harder so that maybe in the future they could become *mova* manufacturers based on the value they add. At the same time, the company was actively pursuing keiretsu-like partnerships with the "inner circle". Implicit guarantees of repetitive orders encouraged investments, specific only to relationships with DoCoMo, and established predictive transaction patterns. This enabled suppliers to benefit from experience curve effects, concentrate on continuous improvement and invest in assimilating new technologies – differing from the style of partnership between telecom operators and handset manufacturers, where the latter have to bear the entire risk of innovations in phone design, while the former may rotate suppliers to emphasize own bargaining power, not letting

them experience learning effects translating into cost and technology advantages.

The relations displayed also another component of vertical keiretsu: continuous competitive rivalry among trusted suppliers, intentionally established and enforced by DoCoMo. Japanese high-tech companies have traditionally stimulated competition among suppliers by contracting two competitors and constantly pushing for cost reduction and innovation – even by acquiring new technology from one of them to share also with the other so that "they would always remind us that they could go elsewhere if we didn't continuously improve" (Dyer and Ouchi 1993: 57), as one of NEC's suppliers explained. The evidence for cycles of imitations are regular launches of new *mova* handset series: each one was embedding some important modifications, and virtually every *mova* maker was releasing his own version with a maximum lag of several months.

Like in traditional vertical *keiretsus*, every supplier from the inner circle has to work with the others, sharing knowledge (usually to his own disadvantage) through regular group meetings, as well as probable passing of technical information by DoCoMo. The handset development was becoming difficult, as the phones were expected to serve more functions, requiring sophisticated software. The increased complexity resulted in frequent phone failures and subsequent handset recalls (although this information is never disclosed, the handset makers certainly bear at least part of the costs, so large recalls – like 230,000 of Matsushita phones in 2001 and 840,000 of NEC phones in 2003 – can be costly for them), and horizontal alliances among rivaling DoCoMo's suppliers. For example Matsushita and NEC joined forces in 2001 to develop a two-processor platform for 3G handsets, and later in 2003 established a joint-venture Cosmobic Technology, developing software for the 3G platform. Another example of coordination efforts was a decision of 19 technology companies, developing FOMA handsets, to establish a shared patent pool, eliminating knowledge asymmetries and helping define a dominant design for the future phone (Meyer 2002).

DoCoMo realized the complexity of handset business, alongside increased costs and risks to the phone manufacturers, which were particularly hard to accept as the 3G network in Japan differed from foreign standards,

even the closest European specification for UMTS, so that Japanese experiences and handset designs could not easily be replicated abroad. Development of components was critical in reducing costs, power consumption and size of devices – DoCoMo traditionally cultivated close relationships with a local specialist company Yozan, which was supplying the *mova* handset makers, but Yozan decided to exit the semiconductor business in 2002, when it realized that its investments in developing partner-specific technologies were difficult to recoup abroad. DoCoMo started investing in phone standardization by acquiring a license for mobile operating system Symbian, investing in alternative embedded Linux vendor, forging a strategic alliance with Intel to develop prototype next generation handset chips, and subsidizing development of semiconductors by Texas Instruments and Japanese Renesas Technology.

In 2003, the company adopted also new measures to tie closer their most trusted partners: it invested into five partner companies (Fujitsu, Matsushita, Mitsubishi Electric, NEC and Sharp) by covering 50% of the development costs for new handsets in order to boost supply and reduce unit costs. The subsidies would also give DoCoMo another advantage: joint ownership of any new handset technology developed, equaling long-term ties with every concerned manufacturer and royalties from phones delivered for other 3G networks. In this way, the 12-years-long mating dance with *mova* makers was sealed by a marriage-like arrangement.

3.2.4 Software

Software plays a role of a ”glue” in high-tech markets, combining other layers of value chain. Most of technical problems in DoCoMo networks, as well as handset recalls, were caused by software issues. According to Sony’s representative, there were 100,000 software items to check on 2G and 500,000 items on 3G phone (Meyer 2002), so the complexity and lack of standards motivated companies to join forces in this area.

The first handsets were using a locally developed operating system μITRON, commonly adopted by Japanese electronics companies, but later in the 1990s, DoCoMo entered partnerships with several providers of software platform, suitable as mobile phone operating systems (Microsoft,

Symbian and **3COM** – Palm), using them to learn and explore existing opportunities (Computing Japan 1999). Japanese firms were traditionally avoiding supply chains, where subcontractors were producing "black boxes", not understood by assemblers, thus strengthening the bargaining power of suppliers (Dyer and Ouchi 1993: 61) - "parts evaluation capability" was key to evaluate performance and cost structures of partners, especially in the case of breakthrough innovations (Ahmadjian and Lincoln 2001: 687-688).

DoCoMo selected Symbian operating system in 2003 and signed an agreement, allowing it to use the system's source code and build a proprietary user interface, distributed to handset makers. This approach could reduce future phone development costs, but also offers another means of controlling suppliers: the standard would be open (Symbian as a recognized platform), but also encompass specific modifications controlled by DoCoMo. Interestingly, a year later the firm added support for Symbian's competitor in the mobile operating system arena by investing in MontaVista Software, producer of embedded Linux system. DoCoMo' handset partners had therefore two recommended handset platforms – Linux and Symbian – with internal competition and incentives to innovate among supporters of both operating systems.

Apart from the operating system, mobile phones accessing the i-mode platform required a dedicated web browser, counterpart of the standard application on personal computers. When launching the new service, DoCoMo partnered with a small Japanese software house Access, which developed a language called cHTML, partly compliant with the web page standard HTML. Pages in cHTML could be developed without problems by web designers acquainted with HTML, and accessed through mobile phones with embedded Access' browser application NetFront. This easiness of development, and partly compliance with an established standard is often quoted as the main reason for the fast growth in the number of i-mode sites. In 2001, NetFront was installed on 70% of i-mode phones manufactured for DoCoMo and the steady stream of revenues accounted for 30% of Access' business (Normile 2001), moreover the company benefited later from DoCoMo's export of i-mode platform to other countries.

DoCoMo's perfection in establishing apparently open, but in fact proprietary standards and using them not just to innovate with partners, but to innovate with selected partners only, while motivating all other parties to try even harder, is best evidenced by the launch of *i-αppli* Java platform in 2001. Already in 1999, DoCoMo signed an agreement with Sun Microsystems, intending to incorporate its Java technology into future i-mode phones. Java would be used to run custom applications, turning a mobile phone into a device resembling personal computer, where new software could be installed. Using the technology, one could develop interactive applications (as opposed to static i-mode websites) and games, strengthening the security of communication (e.g. each bank offering its services through i-mode could implement own secure authorization mechanisms).

The plan to make Java available to mobile phone users was exciting for developers, but they were bitterly disappointed when they discovered that what was launched was not "Java" but "*i-αppli*", and the name proved not to be DoCoMo's only modification of the platform. The company did not disclose detailed specification of all Java classes implemented in its new handsets, retaining full control over applications developed for *i-αppli*. A group of official partners received sufficient details, and altogether only 38 *i-αppli* websites were available at the platform's launch in January 2001. A shortened (incomplete) version of specification was published on DoCoMo's website for other parties exactly one month before the launch of *i-αppli*, making any serious development efforts impossible. Moreover, DoCoMo did not provide any programmer tools, which could facilitate the application development. In spite of all these problems, small software firms started offering unofficial development kits for *i-αppli*, and in June 2001, there were some 4,450 sites with Java applets for DoCoMo mobiles (Mori 2001).

3.2.5 Services

The stunning success of i-mode platform would not be possible without services, enabling user communication. In spring 1997, DoCoMo launched a data communication service *10Yen Mail* in partnership with a small Internet Service Provider MasterNet, available through portable computers con-

nected to mobile phones. In 1998, DoCoMo introduced its own Internet access service *mopera*, undermining the reasons for using *10Yen Mail*. *mopera* was not its direct copy – it offered superior technology and extended functionality, allowing users not only to exchange e-mails but also to browse the Internet, with different pricing model. DoCoMo decided not to compete with its partner directly, but to surpass his offering by a substitutive new generation solution, and one year later, also i-mode included messaging and web browsing functionality, which soon became core services for every new phone.

Another popular service, *i-shot* (multimedia messaging, enabling users to take pictures with digital cameras embedded in the newest handsets and share them with other mobile phone users), emerged in a way similar to text messaging. In June 1999, PhotoNet launched its i-mode website, where users could upload and view photos taken with their cameras. PhotoNet had partnerships with a broad network of retailing points, accepting "normal" photos and scanning them to put on the website. The business proved to be very successful – but as the case of MasterNet demonstrated, being successful as DoCoMo's external supplier may encourage the powerful partner to substitute the offering with own solutions. In February 2000 DoCoMo released Toshiba's handheld device *camesse petit*, allowing to take and send digital photos over the mobile network. Several months later, in November 2000, DoCoMo's competitor J-Phone launched an improved offering: Sharp's mobile phone with embedded camera. The service enjoyed a stunning popularity, and it took DoCoMo over one and half a year to come up with its own counterpart: *i-shot* service available since July 2002. The service was almost identical with J-Phone's one, and substituted services of PhotoNet and other third-parties offered on i-mode platform – just like *mopera* replaced the *10Yen Mail* by improved functionality and additional benefits.

As i-mode platform did not offer compelling application for corporate customers, DoCoMo was constantly exploring new ways to improve its offering for this market. The company partnered in this area with Puma Technology, Microsoft (through a joint-venture Mobimagic) and NTT Communications. Step by step DoCoMo was also launching own services,

capturing specific niches of the corporate market, like BINWAN service, enabling wireless access to corporate mail accounts and thus substituting the services of Puma, Mobimagic and third-parties (according to estimates, in 2003 there were 136 Japanese companies, offering comparable solutions for corporate customers (Funk 2004), whose business was directly affected by the launch of BINWAN).

3.2.6 Content

DoCoMo-related publications present the company's model of cooperation with content providers as the reason for i-mode success: while never paying for the content supplied by partners, the company created a market, which attracted many players, contributing to the platform's popularity. In fact, the astonishing i-mode revenues were driven mainly by services (including mails, corresponding to short text messages in GSM networks, and mailing digital photo), enabled in turn by handset design and software platforms. The role of content providers seems to be over-rated in Western versions of i-mode story, especially as the content-based revenues have never met the enthusiastic forecast figures, and DoCoMo started looking for alternative sources of revenue as payment facilitator in 2004. The present case study proposes to look at content within the broad context of the high-tech value chain, within which Japanese content providers played certainly important, but definitely not leading roles.

DoCoMo established an approval procedure for every company interested in becoming an official content partner. This status was attractive both in terms of increased number of site visits (official sites were listed on "i-mode menu", launched whenever user was accessing the service), as well as in financial terms, as the accepted partners could benefit from DoCoMo's micropayments system. DoCoMo acted as a clearinghouse, billing users for the services they access and redistributing the fees to content partners (subtracting a 9% margin). Users were billed for monthly subscriptions to specific services by only three possible fees: 100 yen, 200 yen or 300 yen, matching the prices of paper-based magazines. DoCoMo's official story about the micropayments solution emphasized its convenience for content suppliers and users, apparently rooted in the Japanese tradition of

"lean thinking" (Ticoll 2001). While the analogy is compelling, the payment system was actually technically inferior to most Internet-based solutions, could not bill individual website visits or transactions only monthly subscriptions, so it could not be used for online payments or shopping. Nevertheless, many i-mode providers would probably never have considered launching own paid subscription services fearing difficulties with fees collection, which issue was addressed by DoCoMo.

Apart from conveniences, there were also numerous restrictions imposed on content providers – the process of becoming an official i-mode partner was long and strenuous. DoCoMo required its providers to update content more than once a day, making it "addictive" (encouraging users to return to the site) and enabling them to experience benefits (i.e. offering services, not only information) (Lynch and Clark 2000). This required not only interactive designs, but also a dedicated manpower, and DoCoMo was strict in enforcing compliance with the requirements. One day before the launch of i-mode, Takeshi Natsuno went through all the 69 i-mode websites and refused to put online two of them because of low quality content (J@pan Inc. 2001), so on February 22, 1999, there were altogether 67 official content providers, including banks, two securities firms, airlines, travel agencies, radio stations and yellow pages (Fujimoto 1999). Applications for the official i-mode appearance were analyzed at DoCoMo's discretion, and potential partners were required to go through one of DoCoMo's regional branches to launch websites first locally before the national roll-out (Collier 2003).

The system resembled ways DoCoMo used to work with other partners: selecting an inner circle of suppliers, but also remaining open to suggestions of external parties, motivated to innovate by observing benefits, which the trusted companies derived from the partnership. i-mode websites could easily be built by hobbyists, and private pages were accessible from DoCoMo phones (but not summarized in *i-mode menu* for fast and easy access). At the same time, the competition among official content providers was fierce, and i-mode platform itself was intensifying the rivalry – certification alone did not equal a successful business, and the critical factor, driving customer subscriptions, was the position of a website on *i-mode*

menu, changing monthly based on the number of already subscribed users. Just like handset makers, content providers admitted to the "inner circle" had some confidence that the sole fact can generate revenues, but within the circle, they were experiencing constant competitive pressures, being aware that other companies are offering similar content and certainly having advantages in some areas. The importance of being highly ranked on *i-mode menu* cannot be exaggerated: in June 1999, there were already 989 official i-mode content providers, and in April 2000, 9,337 sites competed for the attention of over 6mln users (Shibata 2000).

DoCoMo was promoting the business of selected content partners, especially ambitious start-up companies, sharing its vision and accepting the proposed "rules of the game", including continuous innovation and loyalty. The most prominent example is Cybird, new media company, offering content including: ring tones, wallpapers, games, horoscopes, movies, sport news, maps and travel information. The development of Cybird's business was benefiting from a vicious cycle, with positive feedbacks between its popularity and ranking on *i-mode menu*: being popular, it ranked high, meaning that even more users visited websites, which were easier to access in specific content categories. The company became one of DoCoMo's trusted partners, accompanying it abroad when i-mode platform was exported. DoCoMo did not compete with Cybird mainly because the company acted as content aggregator, licensing and delivering diversified entertainment services. Another successful content provider was Index Corporation, which launched an amazingly popular *"The God of Love"* (*renai no kamisama*) fortune telling service (Mann 2001). Index's commitment to DoCoMo (and DoCoMo's bargaining power) is best evidenced by the fact that although the company works also with other mobile operators, its fortune telling service is available only via i-mode: it sacrificed potential subscription-based revenues to maintain good relations with its corporate patron, benefiting over time from investments by DoCoMo-related companies and export opportunities with i-mode platform.

DoCoMo approached also important content partners from offline businesses, for example Bandai (leading Japanese toy maker, creator of toys *Power Rangers* and *Tamagotchi*), Disney or Sony (maker of the popular

video game console *Playstation*). When Java-based service *i-αppli* was launched, DoCoMo worked with the leading Japanese game makers and offered them detailed specification of *i-αppli*, not available to the wide public – for example, Namco, known for game classics such as *PacMan*, revived lifecycles of games, no longer suitable for modern computers, by porting them to mobile phones.

DoCoMo has actually never declared that it would not become a content provider itself. The risk of DoCoMo delivering content would certainly discourage partners, and its management implied in various interviews no interests in the space due to the company's lack of relevant knowledge and skills. Nevertheless, at the same time DoCoMo was actively investing in joint-ventures and exclusive alliances, intended to launch own services and capture segments of the content market, including formation of AirMedia (mobile music shop), D2 Communications (mobile advertising agency), and Location Agent (offering location-based services like maps or area information), as well as the purchase of a stake in AOL Japan to use its Internet content for i-mode (Williams 2001). Although some of the ventures failed, DoCoMo's attempts confirmed the pattern of innovations, driven by and later substituting ideas of partners. The company applied its proven method of partners management to the content area by creating an open market for concepts, and inviting as many parties as possible to bear the cost and the risk, only to pick the successful solutions and improve them with the trusted suppliers.

An example of the mechanism is Air Media, formed by DoCoMo and Matsushita to manage wireless record shop, with subsequent involvement of Sony and trading house Itochu. In January 2001, it started offering *M-Stage* service, distributing songs from 15 music companies. DoCoMo's interest in the market was related to the astonishing success of simpler services offered by i-mode partners. *Chaku-mero* were short melodies, downloaded by users to their mobile phones as ring tones. These third-party services enjoyed a high uptake and benefited many parties, including not only DoCoMo (data transfer fees and 9% of subscriptions) and content providers, but also music composers and the Japanese Society for Rights of Authors, Composers and Publishers (JASRAC). With *M-Stage*, DoCoMo

tried to innovate by going further than content partners and creating a market with CD-quality songs. Although it would not enter into direct competition with the ring tone providers, they would experience sales decline, as most users downloading *chaku mero* were music collectors, storing on average 30-40 melodies in phones (Poliakov 2004). *M-Stage* was expected to surpass the quality of partners' offering and benefit from the existing demand, created thanks to the openness of i-mode platform. Nevertheless, the service did not generate as much interest as expected - the first dedicated phone was working in the old PHS network only, and could not be used for other purposes (not even for voice communication), while download time and costs were prohibitive.

DoCoMo's latest innovation, combining multiple elements of the high-tech value chain, is a mobile phone with embedded *FeliCa* chip. *FeliCa* was originally developed by Sony as a contactless intelligent card, which could act as electronic wallets (used e.g. to pay for drinks in vending machines, coffee in bars, newspapers in kiosks) or public transport tickets (Clark 2003). DoCoMo tries to establish new revenue streams, moving beyond the traffic business and content delivery to real-life transactions, acting as payment facilitator (Einhorn 2004), rivaling financial institutions (which can regard this also as a new opportunity, like the Japanese credit card company JCB, one of the first specialists working closely with DoCoMo in this area), as well as getting involved with consumer retail market (DoCoMo signed e.g. a revenue-sharing agreement with media retailer GEO with a network of 600 shops (NTT DoCoMo 2004b)).

3.3 Discussion

3.3.1 Plural governance model

DoCoMo's partnerships displayed consistent partner management patterns, used for new concepts or products. As explained on the graph below, the company was starting by defining the "game": setting business rules and making sure the new area is attractive for potential partners, like in the case of micropayments for i-mode platform or sizeable orders for W-CDMA in-

frastructure. This innovation in business model was followed by innovative technical designs of future platforms – using semi-open approach, adjusting widely accepted standards by proprietary modifications, as it happened with i-mode or *i-appli*. Solutions based on these standards were relatively easy to deliver, as necessary skills and knowledge were already available, yet their proprietary character prohibited partners from supplying them to competitors. In the further process, DoCoMo tried to maintain a balance between openness (inviting all potential providers to generate new solutions without actual reimbursements for their efforts) and close partnerships (working with the inner circle of trusted suppliers, who benefit financially), so that companies not enjoying intimate relationships were motivated to innovate, while official suppliers were competing against each other as an oligopoly. For particularly promising markets, DoCoMo was launching own offerings, substituting solution from partners, while certain trusted partners were also tied more closely by investments and other long-term commitments like shared ownership of technologies. The model, confirmed for various new products launched by DoCoMo, inherently stimulated innovativeness of multiple parties.

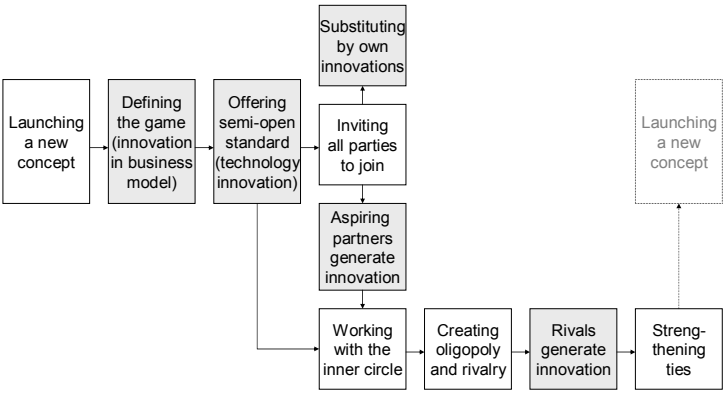

Fig. 12. Model of DoCoMo's relations with partners

The chapter studies one company, but corresponding partnership mechanisms were reported in Japanese automobile industry, and DoCoMo's case

proved their relevance for high-tech companies. DoCoMo's approach combined proven techniques of American companies like AOL and Microsoft (especially establishing "walled-gardens") with common Japanese institutional arrangements, as well as strives for technological supremacy, inherited from its corporate parent NTT. The Japanese-style of partnerships, presented by the DoCoMo model, displays interesting differences when compared with the dynamics of partnerships in Western industry: these relations have been described as "practicing polygamy with good taste" (Powell et al. 2002), denoting networks of multiple relations, whereas DoCoMo shows rather preference for "monogamy" or "multiple marriages" with trusted partners, while not remaining entirely closed to incidental encounters with third-parties, generating new value or even turning into longer-term relations.

The model can also be analyzed as an innovative institutional form, different from the arm's length relations and embedded partnerships, replacing both market and traditional governance mechanisms of *keiretsu*. The mixture of embedded and arm's length ties, intentionally maintained by DoCoMo, guarantees at the same time stability (within the close circle of trusted partners) and innovativeness (by stimulating competition among trusted partners, and between them and outsiders). The new governance form certainly emerged from NTT's historical dominance over submissive suppliers, and resembled relations in integrated supply chains of other Japanese companies, but it was not only rooted in the Japanese institutional logic. One should not ignore the importance of DoCoMo's strategic intent (for example, the company deliberately adopted the same model to manage also its relations with content providers, which were radically different from past technical partnerships) – interestingly, as the following chapter will describe, Microsoft operating in different geographical environment and industry sector, was successfully pursuing a similar governance form.

First explanation, discussed as the leitmotiv of the present article, was the desire to stimulate innovation across the high-tech value chain, speed up development and diffusion of new technologies by guaranteeing the supply of complementary products, and create healthy competition among partners, who nevertheless do not face the adversities of "normal" markets.

DoCoMo was able to align strategies of its partners by selecting the inner circle and imposing own vision to direct partners' product development. The motivation went beyond overcoming the asymmetry in resources, as proposed by the resource-based view on partnerships. In many cases DoCoMo was actually controlling the key resources (e.g. i-mode and *i-αppli* standards, phone operating system or custom-built chips), and had sufficient skills in-house to potentially replace partners, but decided not to do so, regarding alliances as a method to generate new innovations in the future, as long as partners are motivated to try even harder (as there always are other companies waiting to take their place) and cope with new technical challenges. In cases when DoCoMo substituted partners' products, the concerned parties were always outsiders, not forming the inner circle, so that the implicit commitments towards trusted allies were not endangered.

Additional argument refers to the ability to evaluate performance of partners by comparing many available providers and inducing continuous improvement based on cost and technical criteria. The governance form satisfied the transaction cost economics postulates with reference to the cost efficiencies from long-term cooperation – it comes as no surprise that Japanese handsets are significantly cheaper and based on newer technologies than their Western counterparts, as the trusted suppliers benefited from the experience curve effects, while DoCoMo was able to press its technologically and commercially locked-in suppliers for constant cost reductions. Changes in the number and intensity of ties with other organizations are interpreted in the literature as an important mechanism, allowing firms to manage their suppliers to achieve price efficiencies (Baker 1990: 591-597). Transaction cost reduction was however important in Japan mainly for mature products – as figure 14 indicates, initial stages of new concept development were open to all parties, while the inner circle was closing once a dominant design was established, so that DoCoMo's governance model was actually dynamic, with different motivations at different stages of product development and diffusion. Moreover, to achieve long-term cost reduction, DoCoMo did not supplement relationships by transactions with other parties, as Western organizations are hypothesized to do (Baker 1990: 595-596). It actually did the opposite by investing into key third-party

components (like operating system and chips for the mobile handsets) and into several trusted partners, so that they could securely draft long-term plans focused on cost improvement. Transaction cost arguments cannot thus explain the nature of the described partnership model, focused on NPD process, while certainly remaining an important factor for mature products.

Hybrid interorganizational arrangements, mixing market-based competition and trusted relations, were in Western literature interpreted mainly as offering cost efficiencies. However, the so-called plural governance forms, where companies simultaneously use internal operations and partners, e.g. within franchise restaurant chains (Bradach 1997) or component sourcing relations (Heide 2003), can also influence non-quantitative aspects of NPD. Partners are subject to constant competitive pressures thanks to a self-reinforcing control mechanism presented as *ratcheting effect*, where improvements by one party force the others to adjust, thus setting constantly higher standards (Bradach 1997: 289). DoCoMo enriched the framework by differentiating not only between own company and partners, but also distinguishing between the "lower" and "higher" partnership status, not definitely preventing aspiring companies from enjoying the benefits of the "higher" status, while using them as a constant threat for the existing trusted parties, encouraging unsolicited submissions of new products and ideas.

This demonstrates finally political aspects of the discussed governance form as the third possible motive for its emergence: it included a mixture of incentives and deterrents for different categories of partners. Persuasion proved to be more useful than contractual clauses (confirming other findings concerning the plural governance forms (Bradach 1997: 287)) – for example, even without written commitments, trusted partners were not using the same technologies or products with DoCoMo's competitors. The form played also an important signaling role for potentially interested parties by making visible both the market entry barriers and DoCoMo's bargaining power, facilitating self-selection by potential partners (Heide 2003: 25). Not surprisingly, foreign firms like Motorola, Nokia or Microsoft decided in the late 1990s to refrain from substantial investments in relationships with DoCoMo, and several Japanese electronics companies like Kyo-

cera or Casio realized that their opportunities are limited, deciding to work rather with DoCoMo's competitors. One should also remember the absolute power DoCoMo had in controlling various segments of its value chain: just before launching i-mode in 1999, the firm refused to put online some of its partners' websites, as they did not comply with previously defined (and difficult to measure) qualitative criteria.

Cooperation pattern	Rationale
Open technological platform with proprietary modifications (semi-walled garden)	• encouraging newcomers while maintaining control • strategic focus on key, unique resources
Partnerships with companies across the entire value chain	• control of solutions for end users • similar governance forms applied to every relation
Commercial and technological preference for trusted partners (inner circle)	• promoting competence building and experience curve effects • embeddedness, inducing reciprocal loyalty
Payments to trusted partners	• encourage partner-specific investments and long-term focus of cooperative strategies • guarantee timely supply of innovative complementary products
Competition among trusted partners	• limiting dependence on individual partners • stimulating innovativeness and cost reduction • avoiding over-embeddedness
Openness to ideas from other companies (outer circle)	• stimulating innovativeness, inflow of ideas from domains unexplored by trusted partners • development of new ideas and concepts at the cost of partners
Inhouse R&D related to technologies of complementors	• absorptive capacities in partner domains • ability to choose the right partners, set development directions and evaluate their performance
Learning alliances with technology leaders	• inflow of key innovations from external sources, supplementing inhouse R&D
Substitution of partner products by own new generation solutions	• stimulating innovativeness within the inner circle
Gradual institutionalization of relations with trusted partners	• long-term cost reduction through process innovations in mature technologies • gradual internalization of partner technologies

Table 2. Characteristics of DoCoMo's plural governance model

3.3.2 Unique characteristics of DoCoMo's value chain

In the recent years, relations of other mobile telecommunications companies with technology partners changed, imitating the ecosystem of

DoCoMo, but they are still rooted in a different mindset, not paying attention to interdependencies in the high-tech value chain. Telecoms are usually not motivated to support businesses of their partners, and prefer arm's length supply ties. A recent trend is ordering customized handsets branded by the carrier – but the phone design and customization concepts come from handset manufacturers not carriers. Outside of Japan, mobile phone manufacturers drive the development of the mobile industry thanks to the strength of their brands and technological lead – not surprisingly, DoCoMo's discussion partners in establishing new standards for 3G telephony were technology companies, not telecom operators, and the carrier was able to combine resources of the entire value chain to boost innovativeness.

New product development in telecom sector is usually divided into operator- and infrastructure-maker driven projects – and electronics companies such as Nokia, Motorola or Qualcomm are sources of major product innovations, used later by operators (Steinbock 2003). Western mobile markets can be presented as complex networks of independent actors, with competition and substitution relations at every level thanks to anti-monopolist interconnection rules and the use of mediating technologies (Andersen and Fjeldstad 2003: 402). Analysis of the alliances among U.S. telecommunications market players showed e.g. that in years 1999-2001, only 1% of all agreements involved content providers, and projects were usually focused on infrastructure development (Grover and Saeed 2003: 121). As opposed to this, DoCoMo's system is streamlined by an asymmetric alliance with the dominant (but not monopolist) telecom operator - some parties are thus probably not able to pursue all of their ambitious goals, but the entire value chain experiences a steady growth and development of new products. Additional difference in mindsets can be demonstrated by an alliance Innholdsnett (Andersen and Fjeldstad 2003: 405)), formed by Norwegian content providers to offset the bargaining power of telecom carriers. Suppliers of DoCoMo were also pursuing horizontal alliances, but with radically different motivations: e.g. handset manufacturers allied to reduce competitive rivalry in product development and to pool patents, necessary to develop a prototype 3G phone. Traditional Japanese alliances seem also

to be longer-lasting than vertical integration or capital investment, as additionally evidenced by DoCoMo's foreign joint-ventures with Microsoft, acquisition of AOL Japan or its investments in foreign telecom operators AT&T Wireless and Hutchison, which all were costly, but turned out not to offer expected benefits and had sooner or later to be abandoned, as opposed to the cooperation with local trusted suppliers, involving no shareholding but mutual understanding and long-term orientation.

Observers of the Japanese partnership system, particularly in automobile industry, often ignored the commercial character of relations, emphasizing their apparent over-embeddedness. DoCoMo pursued its partnerships with good strategic justifications, and established a system, involving competitive dynamics with rivalry among suppliers based on quality and innovativeness, where support for other parties was linked to business benefits, and partnerships were lasting because all parties understood these premises. The company was setting its own strategic directions, which surely were embedded in Japanese institutional logic, but not solely driven by the customs or norms: it creatively used the resource of local social institutions. This may also be interpreted as rooted in the dimension of *Confucian dynamism*, focused on perseverance and accepting inequalities as natural in social life (similarly, Western interpretations of *keiretsus* are flawed by assuming the analogy to the metaphor of family, with unconditional obligations and emotional attachment). The rivalry among DoCoMo's partners differed from model market competition with opportunistic agents, and was not simply adopted by DoCoMo as an influence instrument (unlike the mixture of transactions and relations in Western firms (Baker 1990: 595-596), rooted in individualist mentality), but rather evolved from the Japanese institutional logic and *keiretsu* tradition, which was re-evaluated after the 1990s economic crisis. The independence and willingness to confront established norms was also demonstrated by cases when DoCoMo decided to substitute offerings of its partners. A parallel tendency was described for the automobile industry, where in the late 1990s researchers identified "significant cracks in the system of mutual obligations" (Ahmadjian and Lincoln 2001: 684), which turned out to be linked to changes in underlying technologies. "Relation-specific investments have the greatest value early

in an industry's life cycle when the learning curve is steepest and levels of (e.g. technological and supply chain) uncertainty are high. As know-how is routinized and diffused, processes standardize, asset specificity falls, and the value of bilateral commitments and cooperation falls with it" (Ahmadjian and Lincoln 2001: 697). The same mechanism can be observed for DoCoMo: with decreasing uncertainty and growing standardization, the company waged to relax ties with some partners and launch own improved offering – long-term, keiretsu-style partnerships are thus not necessarily definite industry structures, while being instrumental in inducing new product development.

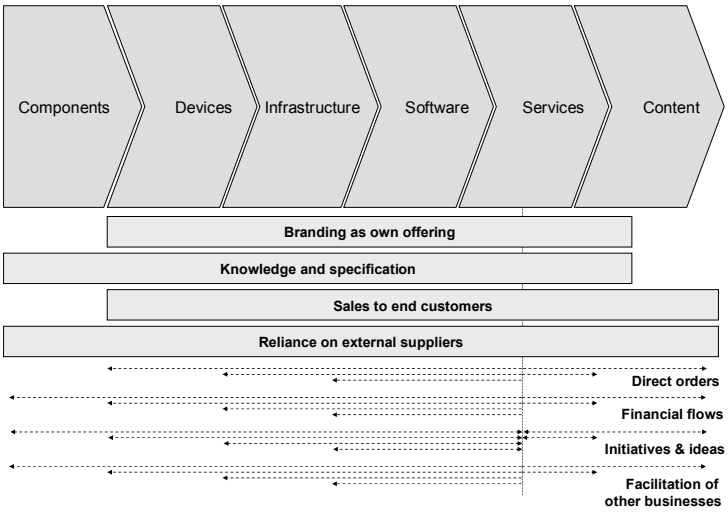

Fig. 13. Interdependencies within DoCoMo's value chain

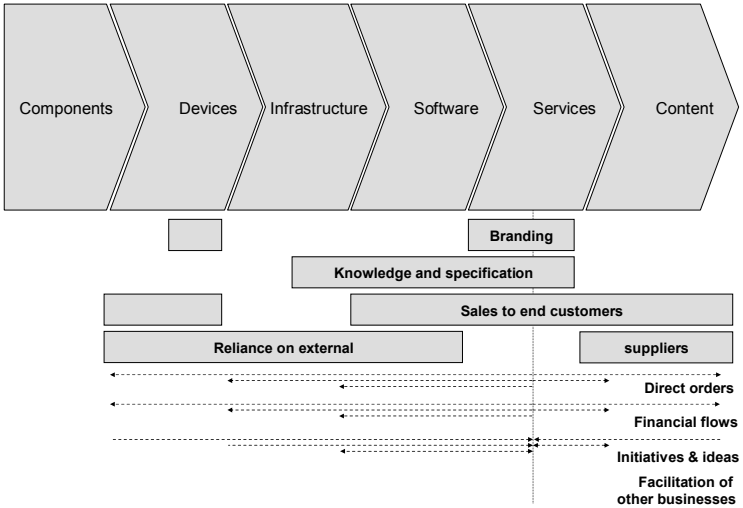

Fig. 14. Interdependencies within value chains of typical Western mobile phone operators

Figures 13 and 14 summarize the differences between DoCoMo's and a typical Western telecom operator's approach to partners in the high-tech value chain. First of all, they differ in the extent to which own brand is used for products and services. Another striking difference concerns the process of building in-house skills and knowledge base, so that new product development could be influenced or driven by the operator, as opposed to accepting "black boxes" shipped by partners and relying on their innovativeness without own involvement. Apart from orders for specific products, DoCoMo was engaged in activities deepening relations with partners - subsidies to stimulate research and development, exchange of concepts and ideas, as well as facilitating other businesses (by establishing export opportunities or indicating potential customers for companies like NEC, DoCoMo encouraged them to invest in learning and developing new technologies, which sometimes might have even been delivered to the carrier

below their actual cost, covered nevertheless by repeated sales in the future).

3.3.3 Imitation barriers

The chapter offered a detailed overview of partnerships in new product development processes of the leading Japanese high-tech company. The insight can help define own strategic directions – but thoughtless replication of the DoCoMo's model to other institutional environments would not be effective, especially due to different understandings of what "embedded relations" with partners should encompass. Corresponding transfer problems have already been encountered by foreign transplants of Japanese companies (Kenney and Florida 1995) and even by DoCoMo itself with its international ventures, where the company was hoping that this could establish trusting relationships similar to the ones it had with Japanese partners. Another challenge to a direct mimicry is posed by specific structural positions of DoCoMo, especially its prestige (Stuart 1998: 694), encouraging other companies to enter into partnerships and accept the rules set by their high profile cooperator.

The case study points to sources of DoCoMo's innovativeness, acting as guidelines for strategies and operations of Western high-tech companies. Past i-mode "success stories" emphasized the cultural elements of Japanese demand for mobile services as the source of the platform's popularity, thus implying worthlessness of any imitation attempts. Rethinking the role of partnerships in new product development at DoCoMo, interested companies should understand that imitating only superficial layers of DoCoMo's offering is not sufficient, and consider a more complex benchmarking exercise.

Western telecommunications firms replicated the external attributes of DoCoMo's relations with content providers, including revenue models and technologies, which were extensively described in relevant publications. In spite of this, none of them enjoyed such an impressive diffusion of wireless data services as DoCoMo – analysts attributed this to the culture-bound demand for the services, but the present articles suggests that cultural factors played also an important role in structuring the partnerships, critical for

launching new services. Japanese institutional logic enabled DoCoMo to work with loyal and submissive partners, striving for innovation, and the partnership model for i-mode content providers resembled DoCoMo's standard governance form, while for Western companies it was unique, difficult to implement and not easy to accept by partners, who themselves strive for domination in the high-tech value chain.

At last, companies supplying technologies or products to Japanese companies will certainly benefit from an opportunity to reassess their positions in value chains and own roles compared with other partners. Suppliers of unique technologies might want to consider establishing a business model, offering potentially longer-lasting partnership opportunities, especially realizing the risks of one-off transactions resulting in knowledge transfer, enabling their Japanese partners to master the technologies and subsequently substitute them by own solutions.

4 Microsoft – strategy of the value chain leader

4.1 Interorganizational politics and strategic alliances

Traditional approaches to industrial networks and partnership agreements emphasize their cooperative aspects (Elg and Johanssson 1997: 365), which lead to the efficiency improvements and innovation. Similarly, relationship marketing literature is focused on mutual interests of both partners, assuming that a trusting relationship, meeting partner's expectations, inevitably leads to beneficial economic exchanges (Grönroos 1996:8). Networks of firms are however formed through political processes, which balance both mutual and conflicting interests of various parties (Astley and Zajac 1991: 399; Elg and Johansson 1997: 361), and power struggles often dominate the interorganizational relations (McLoughlin et al. 2001: 275).

The political perspective is linked to the interpretation of organizations as political entities, with members pursuing own, potentially conflicting interests (McLoughlin et al. 2001: 276), and a limited number of actors coordinating scarce resources, which are important to other firms, and thus establish asymmetries in power (Elg and Johansson 1997: 363). Conflict is viewed as a natural element of social life, not only a failure in communication (McLoughlin et al. 2001: 278). Political actions of firms are linked to the controlled resources and structural positions – this view is consistent with the resource-based perspective on partnerships, and learning races, where the acquisition of knowledge shifts the power balance. Dominant firms will defend and exploit their positions by controlling the flow or resources and the conditions of exchange, while smaller partners will try to reduce the dependencies (Elg, Johansson 1997: 366). The perspective helps address critical questions, concerning the processual aspects of partnerships. Dynamic view of alliances, which evolve over time, focuses on joint problem solving and the gradual emergence of trust among partners (Ring

and Van de Ven 1994; Das and Teng 2002). At different stages of the partnership process, formal elements such as bargaining, contract fulfillment and role interactions are complemented by informal sense making, psychological contract and interpersonal relations (Ring, Van de Ven 1994: 97), thus creating opportunities to use social influence mechanisms. Firms use multiple direct mechanisms, influencing other players and making them follow the firm's desired actions (Elg and Johansson 1997: 364; Avakian 1999: 42):

- inducement – involving motivational investment, making the cooperation more rewarding for loyal partners;
- coercion – worsening of the other party's situation unless it selects a suggested alternative, e.g. by restricting access to specific resources, or threatening to compete;
- obligation – binding the opponent to make him follow an intended course of action;
- persuasion – presenting rational and emotional appeals.

The creative use of governance form by DoCoMo, described in the previous chapter, combined these direct influence mechanisms to align partner strategies by offering them incentives, but also threatening with competition and substitution. Firms controlling key technologies can maintain their dominant positions not only because of superior technologies and compelling strategic visions, but also thanks to the incorporation of political actions into their business models (Avakian 1999: 43-45).

Power does not need to be linked to the resources possessed by an organization – systemic power can equally result from specific relations and social structures (Astley and Zajac 1991: 403; McLoughlin et al. 2001: 281). Political process consists of both observable moves (*surface politics*), as well as subtle activities, not directly involving resource exchanges, especially preventing issues from being discussed and decisions from being made (*deep structure politics*) (Elg and Johansson 1997: 365-366). A politically-oriented company can benefit (Elg and Johansson 1997: 367-368):

- from connections within a network by building coalitions and "fighting wars";

- from effects on the reputation of partners, as every firm is watched by other parties;
- from exploiting competitive forces to align partners, supporting them in rivalry with their competitors;
- from establishing entry barriers to the network;
- from affecting decision rules, rationalizing political motivations, or managing perceptions of partners;
- from a simple lack of action or decision, which helps pursue own interests, e.g. by blocking initiatives of other players.

Finally, partner selection and socialization processes are also used to align partners with the focal firm's strategy by internalization of goals and convergence of strategies (Wathne and Heide 2000: 44-47).

The present chapter will apply the perspective to strategies of the high-tech value chain leader to illustrate, how a dominant firm can use a broad portfolio of political "tools" to manage its partners. Recent history of high-tech companies demonstrates, that a mere formation of partner coalitions does not guarantee the future dominance. The chain leader may loose its position to other players, as it happened with MIPS, creator of the RISC platform, lacking the ability to coordinate partners, or IBM, who had successfully established the standard for personal computing, but subsequently lost control over the new market (Chesbrough and Teece 2002: 130-133). The political power of a company helps establish and successfully defend a technological standard (Anderson and Tushman 1990: 616), as well as maintain the supremacy in a related value chain. Resource-dependency theory suggests that in an alliance, a partner contributing more resources has more chances to control the other party – but the following case of Microsoft shows that intelligent use of political tactics can optimize partner contributions for the benefit of one player.

Political sociology offers a useful analogy to the dynamics of high-tech industry. The seminal study of the rise of the fortune and political influence of Medici family in the renaissance Florence (Padgett and Ansell 1993) explains mechanisms, which helped this family and its most powerful representative Cosimo de' Medici exercise power through networks of relations and interlocking interests. Medicis brought about dramatic changes in the

political and economic organization of the state, without holding any formal position in the government or other administrative institutions. The style of exercising power was compared to the game of chess, where successful strategies involve locking-in other players, restricting their options and making them pursue strategies convenient for the winner – Cosimo de' Medici excelled in this type of game without direct decisions, prescriptions or orders (Padgett and Ansell 1993: 1264). The sociologists referred to the phenomenon as to a *blockmodel*, with multiple ties, through which the Medicis were restricting the freedom of choice of other families - including strong ties (marriages, business partnerships, trade relations, real estate ownership or bank employment) and weak ties (friendship, patronage, personal loans and reciprocal honorary obligations resulting from earlier help with legal issues) (Padgett and Ansell 1993: 1274-1277). The network of locked-in families remained loyal to the Medicis in ways resembling the relative loyalty of Microsoft partners - the heritage of political sociology will thus help understand the phenomenon of strategic interlocks with the discretionary use of incentives and deterrents to induce and maintain partner loyalty.

4.2 Microsoft as value chain leader

Microsoft is nowadays one of the largest high-tech companies, leading in multiple value chains. It was founded in 1975 by Bill Gates and Paul Allen as software development company, and six years later was contracted by IBM to develop operating system for its new PC. IBM needed help from Microsoft and Intel to quickly launch the new product, but later these two partners took over the leading role in the personal computing market, defining new standards without IBM's involvement. Microsoft introduced numerous new product families to diversify from the original operating system focus. The company worked with Apple Computers to develop productivity applications for Mac computers, including text editor and spreadsheet software, and in this way learned the merits of graphical environment with an intuitive user interface, later adopted by the developers of Windows. In addition, Microsoft's technology and skill bases expanded by

acquisitions – for example, the 1987 purchase of Forethought, developer of the leading presentation software for Macintosh, enabled the company to offer a comprehensive software bundle Microsoft Office. Literature discusses also legal disputes and tricks of Microsoft – including unlicensed use of compression technology owned by Stac Electronics (Johnston 1994), or Apple QuickTime source code (Picarille and Johnston 1995), reinforcing the not entirely justified image of Microsoft as an unscrupulous player.

Years 1993-1994 were important for Microsoft, marking its entrance in the enterprise computing market. The company was traditionally offering software for personal computers, but the launch of Windows NT, a client-server system, started a new era in its history. The present analysis of partnership strategies will primarily concern the years after 1994, when this change occurred - in the development of earlier products, Microsoft tried to be self-sufficient by satisfying all functionality requirements from customers with own software (Cusumano and Selby 1995), but the introduction of a universal computing platform required complementary products, support and implementation services, as well as close cooperation with hardware companies. Although Windows NT evolved from technologies already used in previous Windows versions and DOS, the NT concept was a breakthrough innovation: an attempts to enter the high-end market, dominated by expensive mainframe and Unix systems. Before the launch of NT, personal computers running Windows or Mac operating systems were regarded as user-friendly tools, automating everyday office tasks, such as writing documents or conducting simple calculations, lacking the processing power and stability needed to automate mission critical tasks in enterprises, for example run databases, support book-keeping, schedule production or plan inventories. The first release of Windows NT was not stable enough to support these tasks either, with no support from specialized enterprise software, hardware, or IT services companies, but Microsoft embarked on a new strategy to enter the high-end enterprise-wide computing market, soon becoming one of key market players.

The success of NT can be interpreted as an example of disruptive innovation (Christensen 2000), initially characterized by significantly inferior performance, compared with incumbents' products, but simultaneously offer-

ing also other functionality, important for customers (like graphical user interface, ease-of-use and lower cost of necessary hardware), over time improving the critical performance parameter to exceed predecessors. Equally important are however commercial elements of the product strategy. Academic and popular literature, as well as documentation of numerous lawsuits involving Microsoft, describe the use of proprietary technological standards and product bundling to eliminate competitors and enter related segments. More importantly, the company formed a wide coalition of partners, supporting Windows NT, even though this support was often damaging their traditional revenue streams and own technology platforms. This process was costly and required specific partner management skills – but based on the adopted partnership model for Windows NT, Microsoft was later able to diversify into new areas, also not related to personal computers, driving the convergence of computing, communication and media businesses.

Even though Microsoft was frequently substituting partner products with own solutions, there were numerous companies maintaining close complementary relationships, not affected by the technology developments. A seminal example of this trusted relationship is Intel, which jointly with Microsoft established the dominant design of personal computers, and both companies worked later as an informal technology coalition, often presented as "Wintel". New versions of Windows were optimized to work with upcoming releases of Intel processors, and the firms collaborated also on the design of new technology platforms and features, such as support for peripheral hardware, 3D graphics or network telephony. There were also cases, when Microsoft blocked some of Intel's initiatives to make sure their strategies don't collide – e.g. when Intel started developing own software for digital media, and entered a domain eyed by the software giant, Microsoft demanded its partner to stop the development, threatening that Windows might not support new features of the next processor generation Pentium MMX, thus restricting Intel's sales opportunities (Thibodeau 1998). While the relationships was certainly beneficial for both parties, Microsoft still seemed to derive more benefits from it, influencing strategies of Intel.

1995	implementation of Plug-and-Play framework for peripheral devices
1995	multimedia streaming over the Internet project
1996	cross-licensing of proprietary protocols for Internet conferencing
1996	Microsoft works on a version of DirectX graphics for Intel MMX Pentium processor
1997	specification for Simply Interactive PC (SIPC)
1997	work on sending data over airwaves (with Compaq)
1997	ACPI specification for computer power management (with Toshiba)
1997	Device Bay specification for removing and inserting peripherals (with Compaq)
1997	prototype PC supporting FireWire IEEE1394 standard for peripherals
1997	IRDA standard for infrared communication (with HP and Sharp)
1997	joint investment in Wildfire Communications, speech-recognition specialist
1997	work on multimedia Advanced Streaming Format (with 19 other companies)
1997	Microsoft licenses Intel Application Launch Accelerator to embed in Windows 98
1997	Virtual Interface Architecture for developing cluster applications (with Compaq)
1998	e-commerce alliance Pandemic created (with Compaq and SAP)
1998	Intel Intercast software for web TV included in Windows 98
1998	alliance promoting ASDL technology (with Compaq and telecom providers)
1999	Universal Plug-and-Play initiative (with HP)
1999	prototype server appliance with embedded Windows
2000	Intel processor selected for Xbox game console
2000	prototype TabletPC
2001	Speech Application Language Tags (SALT) Forum (with Cisco and other companies)
2002	work on optimizing designs and software for Windows-powered portable devices
2002	reference architecture for portable video devices
2002	work on Palladium processors, supporting encryption and digital rights management
2003	promotion of EFI technology to replace computer BIOS

Table 3. Selected joint initiatives of Microsoft and Intel, 1995-2003

Similarly important for Microsoft were large IT services providers, and the history of relations between Microsoft and Digital-Compaq-HP family is the best example of the *mantis grip* of the software company. Though a series of arrangements, Microsoft aligned the partner's strategy to guarantee support for Windows platform. The approach not only comprised of typical agreements and joint initiatives, but also of discretionary invest-

ments, contracts for services or standard setting initiatives in areas not critical for Microsoft, but important for the partner. The techniques will be discussed in detail later in this chapter, but Digital and its corporate successors are excellent examples of gradual strategic alignment, limiting the partner's alternatives and leaving it dependent on Microsoft, resembling the strong grip of a mantis.

Table 4. Selected joint initiatives by Microsoft, Digital, Tandem, Compaq and HP, 1995-2002

Digital	Tandem	Compaq	HP
1994 joint COM specification			
1994 NT clustering			
1994 contract to manage MS websites			
1995 strategic alliance: training investment			
1995 Digital Open VMS linked to NT	1995 NT clustering		
1996 first system integrator for MS Internet server	1996 strategic alliance: training investment	1996 work on handheld computers, Simply Interactive PCs, NT clustering	1996 campaign for SMEs, work on handheld computers, SI PCs
		1997 Device Bay specification, standard for sending data over airwaves, Virtual Interface Architecture for cluster-aware applications	1997 HP licenses COM; work on IRDA, Simple Web Printing
1997 Digital licenses COM to use in own platforms	1997 Compaq acquires Tandem		HP acquires VeriFone and Symantec's unit working with NT
		1997 Compaq testifies against Microsoft and confirms illegal bundling practices	1997 strategic alliance: training, Unix integration, projects to reduce the PC costs; OpenMail development suspended
1998 migration services from HP OpenMail to Exchange, Expeditor workflow for Exchange		1998 strategic alliance: work on NT platform, support for COM	1998 PocketPCs for Chinese market
1998 Compaq acquires Digital		1998 contract to manage MS websites and databases	
		1998 e-commerce alliance Pandemic	
		1998 alliance promoting ADSL technology	
		1998 joint investment in a broadband Internet venture RoadRunner	1999 Universal Plug-and-Play initiative, work on Intel's 64-bit processor
		2000 promoting partner solutions for Exchange	
		2000 joint investment in ASP provider Digex, alliance to provide ASP services in the U.K. (with Cable&Wireless)	
		2000 Windows Media as default format for iPaq	
		2002 HP acquires Compaq	2002 strategic alliance: joint multimillion dollar investments, training of 5,000 employees
			2002 contract for MS technical support

The most interesting case from Microsoft's history concerns the co-option of direct competitors, who used to promote own mainframe or Unix platforms, and making them act as complementors for Windows NT. Starting with no established supporters in 1994, within 5 years Microsoft managed to form strong ties with the most important players in enterprise computing market. The companies decided to create Windows-based versions of their best-selling software, manufacture Windows hardware, and often even phase out product lines competing with Microsoft solutions. Microsoft initially developed several versions of Windows NT, supporting processor platforms of various vendors, as by that time Intel's standard was competing with PowerPC, MIPS and Digital Alpha CPUs. Due to NT's availability for various computing architectures, the co-option process started with Tandem and Digital, who were paid to train specialists and develop Windows-compliant solutions, but subsequent partners did not need to be attracted by direct financial means, as the bandwagon started rolling. Even IBM, competing with Microsoft by offering OS/2 operating system, for its mainframe platform AS/400 developed integration with Windows not the own counterpart (Goldberg 1996). The only market player who decided against cooperation was Sun Microsystems, fighting legal battles against Microsoft related to the use of its Java standard in Internet Explorer, but Microsoft contracted a German software developer Software A.G. to offer Sun integration kit (DiDio 1996), so that practically every available Unix or mainframe platform became interoperable with Windows NT, and multiple developer tools were available to migrate specific applications to the environment.

Microsoft benefited from the partnerships not only by restricting potential or existing competitors, but also by gaining new complementary solutions for Windows. For example, high-availability enterprise-wide computing required server clustering – adequate Unix solutions were redesigned by partners for NT platform, increasing its credibility. Multiple software components developed by partners were also licensed by Microsoft and embedded in Windows, and joint development initiatives helped re-use Unix-oriented skills to improve next generations of Windows. Partners abandoning their original businesses and committing to work with Win-

dows, were later gratified by Microsoft through other projects, developing jointly with the software giant new standards and specifications, what gave them head-start over competitors in certain markets. By the time the next generation of NT, Windows 2000 was released, Microsoft no longer needed to support multiple processor and hardware architectures, as all vendors conformed to Intel standards, and every significant hardware maker was offering Windows equipment. Within 5 years, Microsoft became an important player in the enterprise computing market, and the instrumentality of political actions cannot be underestimated.

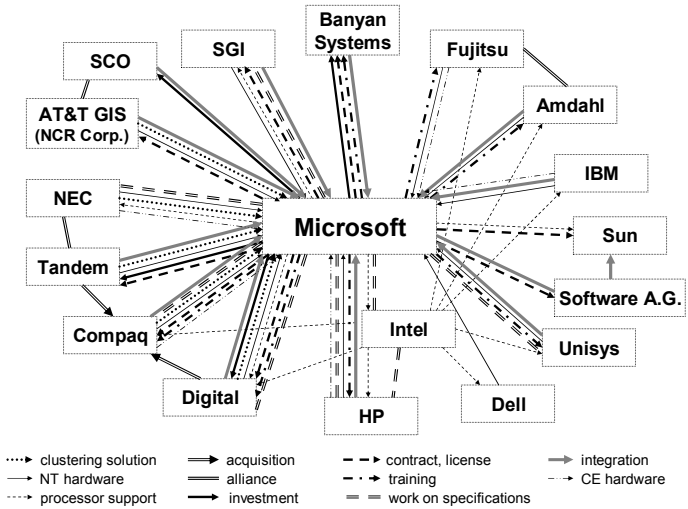

Fig. 15. Microsoft's multiple ties with key Unix and mainframe market players, 1994-1999

Windows NT is only one of many examples of Microsoft's blockmodel – other technology platforms were promoted among new partners using similar techniques. Literature discusses the notion of *demand engineering* (Nalebuff and Brandenburger 1997: 30), where the focal company generates demand for its innovative technology by stimulating the development of dedicated solutions, which could benefit from new features of the tech-

nology. Intel guaranteed demand for increasing computer processing power and new processor generations by boosting the development of multimedia and communication solutions, which required faster data processing than standard computers. Microsoft used similar techniques to stimulate the diffusion of its platforms by guaranteeing the supply of important *killer applications* (Downes and Mui 2000), offering customers compelling reasons to buy the new technology. Moreover, the company was promoting technologies by forming partnerships with potential customers and in this way "buying the market". As table 5 demonstrates, the strategy was very costly for Microsoft - especially compared with the much cheaper scenario of co-opting NT supporters. In order to sell dedicated solutions for Internet providers and interactive media, it was investing in companies from various market segments and offering revenue opportunities to make them adopt Microsoft standards (Microsoft was e.g. purchasing network capacity from committed Internet companies for its MSN service). The arrangements blurred the boundaries between suppliers, competitors and customers - all of them were at the same time buying Microsoft products, reselling them, supplying own solutions to Microsoft, as well as helping to diffuse Microsoft platform by complementing it for end customers.

Table 5. Microsoft's investments in telecom, Internet and television providers

Year	Company	Value	Segment
1997	Comcast	$1B	cable tv
1999	UPC (Netherlands)	NA	cable tv
	NTL (U.K.)	$500M	cable tv
	Portugal Telecom (Portugal)	$38.6M	telecom
	NorthPoint Communications	$30M	ISP
	AT&T	$5B	telecom/cable tv
	Nextel Communications	$600M	telecom
	Concentric Network	$7.5M	ASP
	Rogers Communications (Canada)	$400M	cable tv
	DSL.net	$15M	ISP
	Globo Cabo (Brazil)	$126M	cable tv
	United Global Communications	NA	cable tv
	Asia Global Crossing (Asia)	$200M	ISP
	USWeb/CKS	$67.5M	ASP
	Telmex (Mexico)	NA	telecom
	Data Return	$5M	ASP
2000	Corio	$10M	ASP
	Digex	$50M	ASP
	Jato Communications	$10M	ASP
	Interland	$5M	ASP
	Gilat Satellite Networks (Israel)	$50M	satellite ISP
	BroadBand Office	$25M	ASP
	TITUS Communications	NA	ISP
	CAIS Internet	$40M	ISP
	FutureLink	$10M	ASP
	Telewest Communications	NA	cable tv
	Blixer (Italy)	NA	ISP
	USinternetworking	$50M	ASP
2001	Telecom (New Zealand)	$128M	telecom
	KT (South Korea)	$500M	telecom
		Total > $9B	

4.3 Partner management techniques

4.3.1 Overview

Microsoft was active in multiple markets, through many value chains and groups of partners, as opposed to the previously described NTT DoCoMo, focused on one value chain only. This richness of experiences helped the company develop its partner management techniques, so far unmatched by industry rivals, guaranteeing continuous growth of sales and profits. Microsoft was probably the first software company seriously appreciating the role of complementors. Its partnership and certification programs were copied by other companies, but the actual partner management framework comprised of various elements, which were not widely known or even identified by competitors. Analysis of the specific techniques used to manage partners will benefit from the adopted political perspective: politics is about making people do, what otherwise they would not be doing (Avakian 1999: 42). The further discussion will outline the identified techniques, differentiating between financial, marketing and technical incentives, and deterrents used as potential threats to partners businesses, all intended to motivate them and restrict their potential opportunism.

4.3.2 Financial incentives

4.3.2.1 Minority investments

The trade-off between acquisitions and strategic alliances is a popular topic of academic literature (Roberts and Liu 2001; Dyer et al. 2004; Kale and Puranam 2004), but as Microsoft's history suggests, financial investments and alliances are independent phenomena, not two contradictory scenarios on a governance form continuum, as some authors suggest. Equity investment can help implement product strategies by tying partners and inducing reciprocity – similarly to the Florentine families, where loans and shared investments were used to establish inter-family linkages, accompanying marriages or employment relations. Japanese *keiretsu* groups practice cross-shareholding to guarantee the system's stability, and the high-tech industry knows numerous examples of companies aggressively

investing in smaller players to align their strategies and have access to their unique technologies. Possible motivations for minority investments include:

- return on investment;
- *payola*;
- control over partners strategies;
- access to resources;
- signaling function of the investments.

Minority shareholding differs from an acquisition, which helps control the acquired business – marginal investment is simply another partnership technique, focused not on direct return on investment, but rather generating added value by binding partners. Investments in technology start-ups were risky and may not offer a fast payback, moreover investment ideas are often generated by people working with Microsoft products not finance management. Application of venture capital logic to partnership management of a high-tech company does not represent the motivations of a value chain leader, involved in a political game with complementors and competitors. Investments in partner companies should rather be interpreted as means to stimulate technology diffusion – companies like Microsoft are willing to pay the firms to encourage them to develop products complementing their technology platforms. This approach seems to be particularly effective for competence-destroying innovations, usually opposed by companies, whose knowledge bases and technologies become obsolete (Anderson and Tushman 1990: 612), and cash inducement helps align their strategies. First providers of complementary products often must be motivated by financial incentives to address the "chicken-and-egg" problem: if there is no installed user base, companies are not willing to invest in the development of compatible products, but users would not buy solutions without available complementary goods (Hill 1997: 14). This approach can be expensive and risky, but successful introduction of first products launches self-reinforcing bandwagon effects, and no further investments are needed for new partners, as in the case of Windows NT or Microsoft's Internet and multimedia technologies.

The investment can also block and „convert" a hostile firm – for example, Microsoft co-opted InfoImage and Interliant, important partners of its competitor Lotus IBM, by offering them financial benefits and technical opportunities related to own technologies (Deckmyn 1999; Deckmyn 2000). According to an analyst, "whereas once a company may have had its own agenda and been marching towards its own goals, an injection of Microsoft money meant that the company was turned around and had begun marching in Microsoft's direction" (Avakian 1999: 47). Welfare economics introduced the term *payola* to describe situations, when a party is "paid to play" - support or promote specific products. The term was originally applied to the radio industry, which was receiving payments from record companies for airing specific songs (Coase 1979: 269), but its examples can easily be found in other settings, when a party is "bribed" to support specific products: in the cases of product placement in movies, retailer discounts for special promotion in bookshops (Caves 2000: 294-295), overstating popularity of specific items by broadcasters and retailers in published sales rankings (Vogel 2001: 487), or claques in theaters. Although the term *payola* has never been used with reference to technology products, among high-tech companies, struggling to establish own standards, *payola* plays important strategic role, helping buy users or supporters. Apart from co-option, Microsoft used financial investments to settle patent and trade secret disputes – in 1994, it acquired 15% of Stac Electronics for $39.9M, putting an end to controversies concerning use of its patented compression technology in Microsoft DOS (Johnston 1994), and one year later, similar measures were adopted to resolve issues of the intellectual ownership of OLE technology: Microsoft bought 10% of shares in Wang Laboratories for $90M (Ouellette, Weinberg 1995). Later investments in competitors such as Apple Computers and Inprise (Borland) were similarly combined with dispute-settling technology licensing agreements.

Minority stockholding helps control partners' strategies, but harmony within business groups is not a characteristic feature of Western partnerships - this is best evidenced by the failure of NTT DoCoMo, which tried to forge long-lasting alliances by taking minority shares in foreign mobile telecoms Hutchison and AT&T Wireless, and ended up supplying finance

to troubled businesses, finally not accepting DoCoMo's i-mode platform as a standard. DoCoMo had no real control over their strategies, while the company's other partnerships, not involving investment, turned out to be more reliable, and enabled DoCoMo to penetrate key markets with Germany's E-Plus, France's Bouygues Telecom, or Spain's Telefonica Moviles. Similarly for Microsoft, investments alone did not guarantee the loyalty and commitment of partners - most evident examples of such disappointments are: Internet content provider Individual, partnering with Microsoft's arch-rival Netscape to supply personalization service (Lash 1997), and multimedia streaming specialist Real Networks, pursuing its own ambitious strategy, for which Microsoft's technologies and standards for media market were only obstacles (Evers and McMillan 2003).

Access to unique resources could be a motive for investments, but effective control over technologies is possible only through majority shareholding or complete acquisitions. Non-equity based alliances might be preferable depending on the types of possible synergies among partners and the nature of involved resources (Dyer et al. 2004: 111-114). When Microsoft was preparing the launch of its video game console Xbox, it acquired or invested in multiple game developer firms, and later supplemented the group by of one of the largest specialists, Rare (Becker 2002). Internalization seemed to be the only plausible way to guarantee the supply of a satisfactory number of games in short time - in December 2001, a month after the Xbox release, 38 games were available, most of them developed specifically for the new platform (Weinstein 2001).

Minority investments became a formalized ritual, not only offering the partners money, but more importantly, endorsing them as trusted complementors to potential customers or other partners. A label of Microsoft-invested company could be a strong selling point for a company's products, suggesting the existence of strategic linkages between the two players. A demise of trust in mutual relations could in turn lead to de-investment as in the case of Microsoft selling off in 1998 shares of Real Networks, which dared to testify in court against Microsoft (Nash 1998). The signaling role of marginal investments cannot be overestimated – for example, by providing financial support to former competitors, Microsoft was demonstrating

its dominant power and announcing radical changes to the competitive environment, sending a message to customers, and showing which company they can rely on as financially healthy and offering future-proof products.

Year	Company	Competitive domain	Investment value	Further actions
1997	Progressive Networks (*later: Real Networks*)	digital multimedia (Real Media)	$30M	disposal for estimated 127$M (1998)
1997	Apple Computer	operating system (Mac) and digital multimedia (QuickTime)	$150M	Apple agreed to bundle Internet Explorer with Mac OS
1999	Banyan Systems	operating system (VINES)	$10M	Banyan's exit from software business (1999), becoming ePresence (ISP)
1999	Inprise (*later: Borland*)	developer tools	$25M + $100M license revenue	Inprise licensed Microsoft Foundation Classes and SDKs and supported them in its development tools
1999	InfoImage	e-mail server, portal (key Lotus IBM partner)	$10M	InfoImage developed components integrated with Microsoft's portal
2000	Interliant	e-mail server (key Lotus IBM partner in ASP market)	$10M	Interliant's bankruptcy (2003)
2000	Corel	operating system (Linux), Office tools (Word Perfect)	$135M	disposal for $12.9M (2003)

Table 6. Microsoft's minority investments in competitors

4.3.2.2 Direct financial transfers

Over the years, Microsoft perfected its portfolio of non-equity based financial incentives through direct and indirect transfers, which effectively replaced shareholding in providing money for the partner companies, not requiring reporting to Microsoft's investors. The available forms included **joint development projects** (with shared risk and resource input), **subcon-**

tracted development work (one-directional payment, offering revenue opportunities to the partner) or **ordering partner's services and products for internal purposes**.

Joint ventures among key players in the converging computing, communications and media industries, became a standard inter-organizational arrangement in the 1990s, even though from today's perspective, their effectiveness may be questionable. For example, due to its efforts to enter the emerging mobile data services segment, Microsoft established joint-ventures with Qualcomm (Wireless Knowledge - 1998), NTT DoCoMo (Mobimagic - 1999) and Ericsson (Ericsson Microsoft Mobile Venture - 2000) – none of them bore tangible fruits, all were later dissolved or internalized by partners, and Microsoft's contributions turned out to be worthless in the end. However, a more careful investigation shows that the ventures played an important blocking role. NTT DoCoMo did not select default operating system for mobile handsets until 2003, releasing in the meantime many handheld devices based on Windows CE. Ericsson's involvement opened doors to Microsoft Mobile Explorer, web browser designed for mobile phones, offering MME a head start on the competing WAP browser providers. Additionally, Qualcomm's focus on value-added mobile data services facilitated its decision to halt further development of Eudora mail server, competitor of Microsoft Exchange. In 2000, Microsoft contributed $385M in cash to form a joint-venture Avanade with Andersen Consulting, employing several thousand technical consultants dedicated solely to Microsoft-based business solutions, instrumental in positioning Windows 2000 as the platform for enterprise-wide applications (Dash 2000).

Subcontracted development projects are traditionally used by high-tech companies to outsource non-core tasks, either requiring specific skills (e.g. development and maintenance of spell checker module, not related to other product technologies, while requiring a sound knowledge of linguistics), or time-consuming but not sophisticated (e.g. software testing based on predefined procedures). Microsoft relied on subcontractors for complex projects, combining various technologies, especially when the final product was hardware, as in the cases of Xbox, smart phones, portable media players

and Windows Media Center PCs. The firm controlled the ownership of IPRs, even though it was not be able to capitalize on them internally, lacking the appropriate skills. For software technologies, there were multiple solutions involving either licensing or ownership transfers; Microsoft also uses Indian off-shore software houses to do the testing work for new releases of its operating system. Microsoft case revealed however a popularity of another type of subcontracting, not related to specific internal development projects, but concerning complementary solutions, where Microsoft was not assuming IPR control and only paid the third-party to develop certain product, in line with the previously discussed model of *payola*. The practice was initiated by "buying" support for Windows NT – contracting various firms (including Tandem Computers, Digital Equipment Corporation and Banyan Systems) to work on integration between NT and their own platforms, so that they could also benefit from selling these connectors and migration services. The companies were probably not sufficiently motivated to work on adequate technologies by the mere appeal of NT technology, as the costly development would simultaneously decrease installed bases of their own platforms – payments from Microsoft helped overcome the fears and spelled a prolonged death sentence to the other platforms. The same approach supported diffusion of other technologies – Microsoft contracted in 1999 Transvirtual Technologies (support for Microsoft standards in virtual machine Kaffe Java for embedded systems (Sliwa 1999)) and ActiveState Tool Corporation (development of Windows version of Perl (Shankland 1999)). The company was from time to time using the development contracts also for other reasons: to help financially troubled companies, which it partly owned (e.g. Internet providers UUNet Technologies and XO Communications), or to fight political battles (as in the case of SCO Group, Unix vendor, who sued Linux community members for copyright infringement – soon afterwards, Microsoft infused SCO with cash trough a sizeable licensing agreement).

An innovative aspect of Microsoft's strategy was a close integration between procurement processes and the partnership program. Every large company needs to rely on third parties for IT infrastructure and support services, but Microsoft was selecting solutions not only technically supe-

rior, but also "politically correct". Purchasing decisions functioned as both endorsements for partners, as well as implicit pressure mechanisms, and historical analysis of Microsoft's relations with partners proves a surprising co-occurrence of orders for internal use and certain commitments by suppliers. Evidence made public in various Microsoft-related litigations and lawsuits indicated the subtle but categorical tone in negotiations with OEMs or other partners, with all offered incentives accompanied by implicitly expected mutuality. Large services contracts to support Microsoft's IT infrastructure were key motivators respectively for Digital, Compaq and HP since 1994, and every renewal of the contract was followed by new commitments from the service provider. Microsoft's decision to implement SAP R/3 for internal purposes (Cafasso 1994) made SAP support various Microsoft technologies, including SQL Server database and Exchange mail server. The purchase of Computer Associates InocuLAN antivirus software (Golde 1997) coincided with an alignment of the company's strategy around future-generation Windows platform. A contract for the Internet provision for MSN, awarded to MCI (Wong 1997), was similarly synchronized with MCI's migration to Microsoft technologies, purchase of licenses and commitment to promote the standards to telecoms customers (MacDonald 1996).

The multiplicity of used direct financial transfers suggests that Microsoft had a systemic approach to partners, not focusing on single transactions but rather on a broad network of interdependencies. Payments inefficient from the perspective of financial management were crucial in gaining support for emerging technologies, but convincing competitors to become your complementors is difficult and costly. For Microsoft, it was not enough to pay other companies for working with Windows – they had their own products, employees and competencies, so the "partnership package" had to include strategic visions and migration paths for existing technologies, helping convert the companies into reliable partners, and convincing them that they could play equally important and profitable roles in the new market. The strategy was unique, as usually vendors of disruptive technologies focus on surpassing and eliminating incumbents (Christensen 2000) – while here in-

cumbents were invited to join the disruptor's team, without a need to jettison what was precious to them.

4.3.2.3 Indirect financial transfers

There were many forms of indirect financial transfers used by Microsoft, including investments through third-parties or decreasing partners' costs at the company's expense. Literature on strategic alliances interprets the dedication of resources as investments in partners – for example, an assignment of employees, adjustment of administrative procedures or purchase of dedicated equipment (Rokkan et al. 2003: 210).

Due to its strong position in the financial market, Microsoft was able to link capital seekers with appropriate funding sources, including venture capital firms or trusted companies such as Compaq or Intel. The mechanism was based on informal personal relations among Microsoft's directors and investor representatives – for example, Microsoft helped SCO Group receive $50M investment from a venture fund BayCapital Star, by convincingly presenting SCO's prospects in relation to Microsoft's strategy (McMillan and Evers 2004). In order to stimulate the development of complementary solutions for Microsoft .Net Framework and Web Services standards, the company established Investor Connection program, working with venture capital funds to offer their corporate customers necessary infrastructure, access to knowledge and support in designing solutions (Luening 2001). Such links could certainly increase the credibility of small technology start-ups, affecting their valuation and the availability of funds. Research studies confirm high levels of social embeddedness of transactions between institutional capital suppliers and their clients (Uzzi 1999), and close ties with significant third-parties function as an important endorsement, helping companies succeed in IPOs or searches for venture funding (Gulati and Higgins 2003).

Techniques decreasing partner's transaction costs present even more potential. They include: pricing the access to technology (licenses or training), providing reference designs for partners' products and supporting marketing activities (the last technique will be described in detail in the subsequent section, focused entirely on marketing incentives). Microsoft

was providing selected trusted partners with royalty-free source code, attractively priced developer tools and subsidized training – the deviations from standard pricelists were adopted at the company's discretion, promoting business of preferred partners and thus stimulating developments of selected complementary products. Attractiveness of these offers was changing over time: first large system integration partner Digital was offered free training for 1,500 engineers (Goldberg and Bozman 1995), while next service partners were "only" granted convenient commercial terms of the knowledge transfer programs. Correspondingly, changes to the official pricing and licensing policies, concerning all partners and customers, were used to influence their strategies. The 1997 release of Microsoft Money, personal finance program, turned banks – so far customers – into partners, not charged for the Money software platform, components of which they were distributing to own clients, who remained the only party paying for it to Microsoft (MacDonald 1997). In 2001 Microsoft showed also strong support for the emerging Application Service Providers market by modifying its entire licensing model so that ASP firms did not have to pay upfront for customer software rentals (Vijayan 2001). The power of pricing arguments is best evidenced by the case of IBM: while negotiating a licensing deal to install Windows 95 on IBM PCs, Microsoft demanded IBM to delay the release of a new version of its Lotus Smart Suite, competing with Microsoft Office, and IBM's refusal increased royalties it had to pay for Windows (Wasserman 1999a).

Attractive pricing of own technologies helps also penetrate the market by discouraging other companies from developing comparable, competing functionality (Avakian 1999: 45). This approach helped Microsoft establish its position among PC makers with DOS in the 1980s – hardware firms enjoyed the overall cost reduction and abandoned own investments in the operating system area, becoming locked-in by the accepted technology. The rationale of penetration pricing of emerging technologies refers to the learning effects and economies of scale, leading to subsequent dramatic decrease of unit costs, which compensate for the initial losses (Hill 1997: 16).

Year	Partner	Employees trained in MS technology	Investment by MS
1995	Digital	1,500	~$50-100M
1996	Tandem Computers	1,000	$30M
1997	Ernst & Young	NA	-
	HP	NA	-
	KPMG	500	-
	Unisys	2,000	-
1998	Cambridge Technology Partners	1,000	-
	Compaq	NA	-
	ICL (Fujitsu)	4,000	-
	NCR	1,000	-
	Wang Laboratories	2,500	-
1999	Banyan Systems	500	$10M
	EDS	7,000	-
2000	Andersen Consulting	3,000	-
	Avanade	500	$358M
	KPMG	500	-

Table 7. Competence building in Microsoft technologies among the largest IT services organizations

The tradition of providing product reference designs is rooted in the software business, where tools, pre-defined templates and code samples were key in gaining a wide-spread acceptance among the developer community. Microsoft adopted a corresponding approach to the hardware market. In the 1990s, it worked closely with component and device makers on the reduction of end-user prices of Windows hardware, acknowledging the importance of hardware costs for software diffusion. Later it even started contracting third-parties to design prototype devices, offered jointly with Microsoft software to OEM partners. Owing to the arrangement, hardware makers no longer need to conduct own R&D in the concerned areas, using reference designs provided by Microsoft and dedicated contract manufacturers. The provision of reference designs helps boost adoption of new

technologies both in software and hardware markets – if applied creatively, it can also outstrip partners of their competencies and successfully lock-in by making dependent on technological standards.

4.3.3 Marketing incentives

4.3.3.1 Promotion

The most common partner incentive used by high-tech companies is joint promotion, done either by transferring funds to partners, or running campaigns with them. Owing to the scale of operations, Microsoft was able to run global integrated marketing communications campaigns, sharing designs and know-how. The preparation of marketing templates, scripts and manuals is also a form of investment in the partner community, reducing the necessary cost for partners interested in running a campaign. Microsoft offers the incentives only to committed, certified partners, who have demonstrated the importance of the link by investing in establishing skills and designing own products in relevant ways (Microsoft's partnership program formalizes the rules, indicating who and under which conditions is entitled to what types of marketing and business support). Joint promotion is additionally attractive for partners, as it extends the appeal of Microsoft's brand to their certified products – for example, a marketing campaign "Plays for Sure", launched in 2004 by Microsoft, promoted partner devices playing multimedia in Windows Media Format, assuring customers that products compliant with the standard are reliable and approved by Microsoft specialists (Borland 2004).

4.3.3.2 Sales

Funding joint promotions is nowadays a common practice in the high-tech industry, but Microsoft was reinforcing their results by a consistent sales strategy. The company provided underlying platforms for partner solutions, establishing innovative sales channels through technology development. For example, Windows 95 with Internet Explorer offered a unique way of distributing Internet Service Provider subscriptions: the operating system included drivers for phone modems, and Microsoft hosted the Internet Referrals Server: a customer, clicking on the icon "Connect to the Internet",

dialed a dedicated phone number and was presented with a list of available ISPs (authorized by Microsoft), from which she could select one to setup the connection (Pelline 1996). This is one of many examples of product bundling, a practice typical for Microsoft, and criticized by anti-trust authorities around the world. The legal criticism concerned however the bundling of own products to undermine sales opportunities of competitors, while the above example demonstrates, how the platform design helped Microsoft improve its bargaining power by offering sales-related incentives to selected partners. For them, the opportunity to have their products bundled with Windows or other Microsoft offerings spelled good sales prospects due to the substantial installed base which can be accessed in this way.

Microsoft benefited also from the bundling of complementary goods, improving the sales of own platform, and offering partners further sales opportunities for product extensions. This was the case for: Macromedia Shockwave (web animation viewer bundled with Internet Explorer, supplemented by commercial tools for creating the media files (Ricciuti 1996)), Symantec WinFax (offered with Outlook to send faxes from computer, upgradeable to fully featured version (Luening 1998)) or Crystal Enterprise (pre-defined reporting module for Microsoft CRM, which required an upgrade if a customer was interested in preparing custom reports (Cowley 2002)). Partners had therefore twofold revenue opportunities: initial payment for the bundled component from Microsoft, and sales of its upgrades. Moreover, some cases involved *symbolic bundling*, when Microsoft embedded non-critical components from a partner with the sole purpose of promoting the partnership and rewarding the loyal company – for example, Windows 2000 included a minor utility software from Computer Associates' Unicenter solution, and the fact enabled to position Unicenter as the right solution supporting the operating system platform, while comparable alternatives did not enjoy the privilege (Heskett 1998).

Microsoft was one of the first high-tech companies, which made own sales employees responsible for the sales of partner products – their targets involved of course also sales of relevant Microsoft licenses, pulled through by partner solutions. For example, an implementation of a specialist busi-

ness solution requires Windows and SQL Server licenses, and the deal may be equally profitable to Microsoft and partners, while the complementary application is actually needed to sell the underlying platform. Microsoft's sales strategy is based on "go-to-market" initiatives, where account managers work with key customers in a vertical market, offering them complex business packages, consisting of own and third-party products, accompanied by implementation services from a reliable partner. Instead of selling off-the-shelf commoditized software such as Windows or Office, Microsoft focuses on how these products can add value and address customers' problems, involving partners in the sales process to benefit from their complementary technologies and competencies. The established and locked-in customer base of Microsoft platform is critical for partners as a target market, potentially accessible through existing Microsoft-controlled communication channels, and is restricted in technology decisions by the already implemented system platforms. This is a reciprocal dependence, as Microsoft benefits from the availability of new value-adding solutions for own platforms, keeping customers satisfied, so that they renew support contracts or migrate to newer software versions.

4.3.3.3 Positioning own products

An important incentive, promoting the openness in partner relations, was related to how Microsoft positioned own products, presenting them as complementary or inferior to partner solutions. When releasing new products in domains previously controlled by partners, Microsoft was convincing the affected partners to further cooperate and supplement the products instead of competing with them, even if the products were posing considerable threats to their businesses. For example, Microsoft entered document management market with SharePoint Portal Server – its first version was positioned as collaboration portal for teams and departments, gaining support from major document management vendors, the second version was already released as a scalable enterprise-wide platform for managing documents, competing with the incumbent solutions, but the initial positioning kept partners loyal and supportive for some time. Similarly, Microsoft's plan to enter CRM market was opposed by many partners – CRM

specialists, who perceived it as a direct threat, but were reassured when the company started promoting the new product among small and medium-size organizations only. Microsoft can successfully partner with key players like Siebel in CRM area, or SAP in the ERP domain, while working on own competitive solutions – the partners try in turn to benefit from the time that is left to them and penetrate the Microsoft customer base before the companies become competitors.

Microsoft's approach resembles *salami tactics*, discussed in international politics literature. The Soviet Union assumed control over the Central and Eastern Europe after the Second World War by gradually exerting influence over new countries and domains of life, while not alarming other countries thanks to the slow, seemingly non-violent nature of the process. Hungarian communist Mátyás Rákosi compared the ways of dealing away with the internal opposition to slicing the salami – slowly cutting thin slices until all the sausage is chopped without protests. The salami metaphor emphasizes hidden agendas and crafty character of the product marketing process: intentional positioning of own products as inferior to keep potential competitors confident, and later strike them by revealing the actual potential of a product.

4.3.3.4 Certification

Certification programs offer affiliation with the dominant player's brand. They assure customers about potential benefits of partner solutions, their compatibility with technology platforms and design, based on recent standards and best practices. Microsoft adopted two certification frameworks – for partner companies and for their products. Partner certification is linked to professional training and examination, and partners are required to employ a prescribed number of engineers specializing in Microsoft technologies. Product certification refers to solution architecture and features, and is awarded after independent technical tests. Customers working with a certified Microsoft partner can expect the company to possess adequate technical competencies, while their decision to purchase products certified as compliant with certain platforms I based on implicit guarantees of product quality – certifications perform important signaling functions in complex

markets, offering means to differentiate suppliers. Microsoft introduced multiple partnership levels, with the most experienced gold partners - although the partnership program rules are formalized, they are not audited by third parties, so it is at Microsoft's discretion to promote a specific partner to the higher status, thus offering yet another instrument of power. Similarly for certified products, Microsoft tends to select some of many comparable partner solutions to include them in "go-to-market" initiatives, deliberately promoting the most loyal partners, who do not offer solutions for competitive operating system or database platforms.

Apart from the benefits, partnership programs are troublesome to partners: they require substantial investments in training and certification, especially as Microsoft regularly overhauls the curricula, requiring companies to upgrade their knowledge once new technologies are released, while product certification is costly: testing is a paid service, and product development must comply with Microsoft standards and development methods.

4.3.4 Technological incentives

4.3.4.1 Platform management

The technology strategy of Microsoft is a seminal example of platform management: offering a software layer, on top of which third-parties can build own solutions. Partner products become technically dependent on the platform, and could not be implemented in a stand-alone mode. Partners are aware of the dependency, carefully weighting arguments before they decide to support a specific technology, and Microsoft has to assure them of the continuous development of its systems, as well as offer migration paths between technology versions. For example, when managing the transition from 16- to 32-bit Windows, the firm had to minimize the technology's impact on partners, investing to make it backwards-compatible. Third-party projects require the platform openness, with programming interfaces and development tools – Microsoft was offering them for Windows, and later started designing other products in similar ways. Office customization was enabled by Visual Basic for Applications, and Internet Explorer supported ActiveX controls, adding interaction possibilities to websites. The strategy

of value chain leader involves substantial investments in technology development – power in partner relations is inextricably linked to responsibility.

4.3.4.2 Partner-oriented product development

In order to gain support for its platform, Microsoft had to design it in ways compliant partner products, ranging from microprocessors and computers to available programs or Internet websites. This required a good understanding of partners' needs, specificity of their solutions and future directions of technology development. Every release of Windows included support for specific processors (initially, Windows NT was ported to several alternative processors to better penetrate the market – while later the support was restricted to Intel and Intel-clones, as hardware makers gave up the other architectures), hardware (with drivers for peripheral devices, updated and tested by Microsoft) and software. Software integration was also helpful in penetrating the user base of competitors – as in the case of document import-export filters for text editor WordPerfect in Microsoft Word, and connectors to products from Oracle, Sun, Lotus or Novell.

Partner-oriented development is also evidenced by involvement in initiatives and standard setting consortia, extending beyond Microsoft's core competences. It pursued hardware-related initiatives with partners to establish new standards and support them in Windows – their examples include: interfaces Plug-and-Play and Universal Plug-and-Play (enabling Windows to automatically recognize and configure connected peripherals), computer standardization projects with Intel and Compaq, focused on reducing the manufacturing cost and optimizing performance, early support for emerging standards such as USB, FireWire and WiFi, and work with Intel and ARM to optimize Windows CE for various hardware architectures. Microsoft implemented also software interfaces, intended to enable interoperability of multiple software systems in Windows environment – for example ODSI (for third-party directory services), MAPI (for messaging and workflow products), DirectX (facilitating the work of game developers, who could write games regardless of the graphics hardware configuration of a specific machine). The complementary nature of high-tech products made

in many cases the partner-oriented development a necessity – when Microsoft wanted to enter the emerging market of B2B marketplaces with its online transaction processing platform BizTalk, it decided to offer connectors to four major online exchanges from Ariba, Commerce One, Clarus Corp. and VerticalNet, Inc. (Sliwa 2000), investing in connector development but gaining access to more potential customers than its competitor IBM, supporting only one of those portal standards.

4.3.4.3 Product inferiority

Technology-related literature discusses new products, initially not appealing to mainstream markets, but gradually improving performance and substituting previous alternatives (Christensen 2000). Their inferiority results from the nature of technology development cycles, where disruptive technologies are catching up with incumbents. Microsoft history offers however examples of a more sophisticated approach, based on *intentional inferiority*. The company was liaising with partners, keeping low profile of certain products, for which partner-made counterparts existed. By deliberately halting the development of own components, it offered "grace periods" for partner applications. Microsoft DOS included embedded antivirus functionality, but when launching Windows, the company decided to leave this domain to partners (Johnston 1995). When releasing Windows XP in 2001, Microsoft wanted to satisfy existing media software partners and offer them business opportunities, especially as the system bundled various features previously contributing to their revenues – the company decided not to offer DVD playback and MP3 ripping functionality, promoting commercial add-ins from CyberLink, InterVideo and Ravisent (Wilcox 2001a). Online shop MSN Music launched in 2004 did not exploit all opportunities offered by Windows Media format, which could support time-limited music rentals and monthly subscriptions – Microsoft intentionally left these options to partners and restricted own sales to pay-per-song downloads. Intentional inferiority could be dangerous for partners, lulling them into security, while the value chain leader's decision not to develop certain functionality could easily be changed: after some time, Microsoft released own antivirus software, and started offering DVD and MP3 sup-

port in Windows. Nevertheless, the intentional inferiority offers at least temporary revenue opportunities for partners, becoming an important technical incentive in strategic alliances.

4.3.4.4 Knowledge transfer

Training, technical documentation and dedicated support help transfer specialist knowledge to partners and enable them to build own solutions. They can also form an alternative source of revenue, and many firms are indecisive as to whether they should focus on cashing from partners, or establishing long-term advantage by building their competences to boost technology diffusion – interpreting the knowledge transfer as a revenue opportunity or as an investment. Revenues driven by customer projects implemented jointly with partners are certainly more promising than earning money merely from partners, and partner training events are often delivered at cost or even below cost. Microsoft's experiences demonstrate the benefits of flexible pricing approach to knowledge transfer – the company was willing to cover all costs for first partners, needed to gain critical mass for new technologies (for example, 1,500 of Digital employees were trained at Microsoft's expense), and large partners were offered attractive commercial conditions in return for their commitments to product development, support and employee certification (as previously discussed with reference to arrangements with system integrators, promoting Windows NT for enterprise solutions).

Knowledge transfer for partners can therefore be interpreted as resulting from interplay between four possible motives:

- financial motive – offering revenue for the company, either direct (from partner training and support), or indirect (as partners are expected to sell the company's solutions more effectively);
- technological motive – supplementing the high-tech value chain for a specific technology by complementary products and professional implementation services;
- commitment motive – inducing partner loyalty and reciprocity, when the company indirectly invests in a partner by covering costs, or the partner makes relation-specific investments in training and certification, later

limiting opportunism, as investments generate sunk costs once the relationship is terminated (Wathne and Heide 2000: 46);

- marketing motive – by signaling partner competencies to customers and growing support for own platform - for example, partnership with one of the largest system integrator EDS was critical to the successful introduction of Windows 2000, as large customers were often disappointed by the quality of Microsoft technical support, and adding 7,000 experienced Windows-trained professionals from EDS was an important signal in the market (Cole-Gomolski 1999).

Discretional financing of activities helps influence the strategies of partners and should be managed as part of a comprehensive partnership program. Requiring partners to make own investments in training and certification facilitates in turn their self-selection into the relationships, as they have to prove their willingness to bear the costs and efforts (Wathne and Heide 2000: 46). Knowledge transfer activities include not only training, but also assignment of own technical specialists, who work with partners on specific sales or development projects, help design their solutions, and evaluate technological or marketing plans. Corporate culture influences attitudes and perceptions of partners as extensions of one's own company, facilitates joint projects even when not every their aspect is governed by non-disclosure agreements, and enables informal access to information and decision makers.

4.3.4.5 Learning by doing

Learning by doing is an important technical incentive for partners, enabling them to experiment with technologies and build relevant competencies. Tacit knowledge, which is particularly important for technology projects, can only be acquired in action and cannot be substituted by even best formal training or documentation. For emerging technologies and new product platforms, Microsoft helped partners acquire necessary skills by offering learning opportunities through contracted projects, joint development and supply of specialist services for the company's internal use, enabling them to subsequently approach customers and demonstrate own proficiency and references. These projects had thus three parallel functions:

- financial – being an incentive for partners;
- tangible – delivering specific technical outcomes, useful for Microsoft's operations or technology development;
- intangible – helping partners learn by doing, so that they better know Microsoft platform and can deliver dedicated solutions for customers.

Joint partner projects, focused on the establishment of new standards, were also intended to build a reliable complementor and service provider base for Microsoft technologies. An alliance with the networking giant Cisco Systems offered important specialist contribution to Active Directory included in Windows 2000, but also improved Cisco's competencies related to Microsoft platform. Cisco was historically focused on Unix-based solutions, and through the project involvement gained a deep understanding of Windows, later balancing its technical knowledge and contributing to the diffusion of Microsoft standards (DiDio 1997). Multimedia streaming and editing formats ASF and AAF were in turn developed by Microsoft-led coalition of partners, software and media companies such as Adobe Systems, Avid Technology, Digidesign, Pinnacle Systems, Softimage, Sonic Foundry and Truevision, which thanks to the involvement and early access to the standards, built own compatible product lines (Busse 1998).

4.3.4.6 Stimulating knowledge generation

Knowledge and skills in new technology-related areas do not need to be transferred directly from the value chain leader – the company can also become a knowledge facilitator. Microsoft established a partner community, in which different partners were able to achieve additional synergies, contributing to the diffusion of technologies. Literature on strategic alliances compared similar activities with a "bazaar", where other market participants meet and cooperate (Gulati 1995: 20), as personal interactions and interorganizational dynamics play vital roles in knowledge generation and sharing (Nonaka and Takeuchi 1995). Microsoft runs regular events for partners and individual developers, stimulating personal networking among business and technical people. The company uses Internet to create a virtual community as a self-support system, and online discussion groups were recently supplemented by the use of *social networking technologies*:

thematic chat rooms, user-built encyclopedias (*wikis*) and streaming media on a partner community website named Channel9 (Evers 2004).

To further stimulate knowledge generation and competence development, Microsoft thinks about strategies **for** partners. It applied competency management perspective not only internally, but also to businesses of other firms, identifying their core competences and planning their evolution in parallel to the development of Microsoft's products. Trusted partners benefited from repeated ties, working with the software giant on many related projects and in this way improving own skills – for example, in hardware area, Microsoft partnered with the same companies on the development of respectively Windows CE-based handheld computers, Tablet PCs, smartphones, Media Center PCs and portable media players. All of the devices shared common software and hardware components, while each product category had also particular features, requiring new technical expertise – Microsoft's partners could thus re-use some knowledge, and supplement it by new elements, still benefiting from the experience effects and competence building. This approach helps reduce potential resistance of partners by showing that the promoted innovations are competence-enhancing, what helps shorten the technology adoption process (Anderson and Tushman 1990: 612). As the response of the community of practitioners is critical for the commercial success of new technologies (Anderson and Tushman 1990: 611), Microsoft took the initiative to facilitate communication among the community members and in this way influence their perceptions and technology decisions.

4.3.4.7 Technical privileging

Even though Microsoft technologies seemed open for interested parties, the control of proprietary technical standards enabled Microsoft to privilege or disadvantage individual partners. Exclusivity, traditionally used in other business sectors, does not seem a plausible contractual means in the high-tech industry, where knowledge spillovers are difficult to prevent, and limiting clauses usually questioned by antitrust authorities – instead, companies restrict access to specialist knowledge about technologies, involving selected partners in their development and bundling their components in

own products. Standard developer tools, documentation and code samples were often not sufficient to develop integrated solutions in certain areas. For example, toolkits for Unix-Windows applications porting, written by Microsoft partners in the 1990s, required access to the actual Windows source code. The case of Bristol Technologies shows the real bargaining power of Microsoft. After several years of successful cooperation, Bristol was denied access to the code (or rather required to sign a revised, unfavorable contract), and had to give up the product development (Sykes 1998). Similarly, not all Application Programming Interfaces for Microsoft products were available to partners – there were several levels of APIs, some public, others available to certified partners, and certain APIs used only internally by Microsoft and its most trusted partners (legal settlements with the U.S. government concerning the use of monopoly power forced later the company to release interfaces and protocols to all interested parties). Microsoft's approach was similar to DoCoMo's semi-walled garden strategy: using seemingly open standards, which could attract as many interested parties as possible, but modifying them slightly to control the group of partners having access to some added-value features of the technology, guaranteeing loyalty by an implicit *technological blackmail*.

Partners involved in standard setting and development of specifications are privileged over other parties because of the early access to technologies and more profound knowledge than provided by official documentation. Microsoft was also embedding in its products components developed by certain partners, offering the selected companies opportunities to apply their insider knowledge to develop integrated solutions, using methods not available to other players. Wang Laboratories were working with Microsoft on the development of MAPI interface, an underlying messaging layer for Windows-based systems, and benefited from the work, promoting own related workflow system to the indignation of other workflow vendors (Ouellette 1995). On the other hand, Microsoft's competitor in the portable devices market Palm was not able to strike an interoperability deal with the company – as a result, Palm-based appliances cannot be synchronized with Windows computers as easily, as those based on Windows CE (Garretson 2002).

4.3.5 Deterrents

4.3.5.1 Legal measures

Control of partner strategies involves not only incentives, but also deterrents. The most frequently quoted means of restricting partners, used by Microsoft, were legal measures – its OEM and licensing agreements were frequently debated in courtrooms. The public criticism forced the company to amend its contract templates, dropping some controversial clauses, such as requirements to offer bundled products (e.g. Windows with Internet Explorer, or Internet Explorer with pre-defined Active Channels featuring content from Microsoft partners). Microsoft initially barred partners from selling competitive products - OEMs could not install other operating systems or browsers on PCs (Thibodeau 1999; Niccolai and Trott 1997; Berger 2002), ISPs and content providers were prohibited from informing customers about the existence of alternatives to Internet Explorer (Goodin 1998a; Goodin 1998b). Some licensing deals were constructed in ways making the distribution of competitive solutions unprofitable - royalties paid by OEMs for Windows were since 1990 calculated based on the overall number of computers they manufacture, regardless of which operating system they were shipped with, thus discouraging installations of competitive solutions (Caldera 1996). Partners were also prevented from developing products integrated with Microsoft's competitors - software developers working on applications for Windows 95 received non-disclosure agreements, restricting involvement in enumerated initiatives, competing with Windows and Office technologies, as well as prohibiting work on own development tools, which would potentially compete with Microsoft's ones (Johnston et al. 1994).

Such techniques also have disadvantages, as they may undermine the intrinsic motivation of partners, making the focal company potentially liable for breaching anti-trust legislation and affecting its image. Policy restrictions may discourage partners, but the political dimension of alliance strategies goes even further: relaxing the sometimes outrageous requirements will be interpreted by the market as a positive sign, attracting new supporters for emerging technologies.

4.3.5.2 Partner lock-in

Lock-in conditions occur when a party cannot leave the relationship without incurring losses or high switching costs (Farrell and Shapiro 1988). Companies try to take hostages from their partners in form of investments in relation-specific assets (Wathne and Heide 2000: 44-45), and the creative use of lock-ins became a core aspect of technology strategies and a wide-spread practice (Shapiro and Varian 1999). Semi-openness of technological standards creates an effective partner lock-in – their integrated products cannot easily be ported to other platforms, competencies acquired over time are inextricably linked to the supported technology, while sales and marketing relations with a partner limit their commercial options.

Even seemingly open and transparent hardware drivers architecture in Windows, tested and packaged by Microsoft to support as many compatible devices as possible, offered a way to restrict partner strategies: in 2001, Kodak accused Microsoft of designing Windows XP to maintain control over the user experiences for digital cameras by streamlining all photo handling processes on computer, directing users to Microsoft software bundled with Windows, and thus not leaving much space for solutions from third-parties like Kodak, limiting their roles to hardware delivery (Wilcox 2001b). When Microsoft introduced MAPI as a universal messaging interface in Windows, Lotus and Novell – developers of e-mail software competing with Microsoft Exchange – abandoned their proprietary development efforts and raced to support MAPI only to later discover that Microsoft concealed from the general public some elements of the interface, giving Exchange a head start on competing systems (Mohan 1995b). ISPs including AOL and Lycos, who licensed Internet Explorer 4.0 code to build custom browser versions, intended to induce customer loyalty to a specific company, were later not able to benefit from new features in IE 5.0 like auto-completion of web forms, which were desired by customers, switching to the standard client versions (Krigel 1999).

Probably the most inventive example of technology lock-in creation in Microsoft's history was its legal settlement with InterTrust Technologies: InterTrust accused Microsoft of having infringed its digital rights management patent by Windows Media technology. Microsoft agreed to pay Inter-

Trust and license its patent, but its validity would be limited to standard implementations of the relevant Microsoft platform. If Microsoft's partner – portable media player maker, online music shop, video-on-demand provider or media editing software vendor – wants to modify and add value to Microsoft Digital Rights Management, it would have to negotiate separate licensing terms with InterTrust. Because of the substantial costs, everybody prefers to stick to the standard version, thus not endangering to Microsoft's dominance in the emerging digital media market (Roberts 2004). Technology platform locks in partners, restricting their future technological choices and preventing entry in certain markets, while creative technology strategies allow companies to use other parties to even deepen the lock-in, as in the case of litigation threats by an external patent owner.

4.3.5.3 Extending own platform

While intentional product inferiority and relevant positioning offered partners revenue opportunities, the opposite scenario could be used as an important deterrent. Microsoft captured numerous niches, entering them with own products, often bundled as standard components of new versions of already established solutions, and details of the mechanism will be discussed in the following chapter.

Innovation and launch of new products, competing with existing alternatives available in the market and quickly capturing large market shares through the bundling seem to be a development of technology, in many cases Microsoft's decisions raised concerns of anti-trust authorities, especially as Microsoft's products were usually cheaper than previously available solutions. Literature has also identified a critical role of pre-emptive product announcements in eliminating potential competitors, who were abandoning their development plans once Microsoft announced the future availability of certain solutions (even if the announcements were only in early stages and concerned products never materialized) (Avakian 1999: 47). This mechanism can be interpreted as a counterpart of the inferior product positioning, used as a powerful deterrent to manage expectations of market participants (Farrell and Saloner 1986: 942; Shapiro and Varian 1999: 275).

4.3.5.4 Eliminating competitors

The previously described *payola* helps not only motivate partners, but also restrict competitors or reduce support for competitive standards. Microsoft tried not to completely eliminate competitors, trying rather to make them dependent on own standards and limit their user bases. The company acquired minority stakes in its traditional competitors Apple Computer, Inprise and Corel, helping them financially in return for adjustment of their strategies to own plans. Linux supporters were incensed by Microsoft's acquisition of antivirus business unit of a Romanian software company GeCAD Software – its product RAV AntiVirus was the best antivirus solution for Linux platform, no longer available after the acquisition (Evers and Roberts 2003). Additionally, Microsoft was offering benefits to partners, willing to suspend development of competitive products – for example, HP agreed to give up its e-mail server OpenMail for Windows NT platform and support Microsoft Exchange in return for involvement in various joint initiatives and the preferred supplier status for Unix mail platforms integrated with Exchange (Mohan 1997). Microsoft was also trying to "convert" key partners of its competitors (as the previously described Lotus IBM partners InfoImage and Interliant), or restrict competitors through legal settlements. For example, the company agreed to pay a substantial settlement in patent lawsuits with Sun Microsystems, but Sun committed to improve interoperability of its products with Microsoft platform and not to support the open-source competitor of Microsoft Office, OpenOffice, originally based on source code of Sun's StarOffice (McMillan 2004). There were cases, when Microsoft intentionally modified own products to disable the usage of or deteriorate the performance of competitive applications - Real Networks media player failed to run once a competitive Microsoft's product was installed (Johnston 1998), and web browser by Opera could not display correctly pages of MSN, as the portal was generating different page views, depending on what browser software was identified (Hansen and Festa 2004).

4.3.5.5 Sales and partnership model

Another deterrent is Microsoft's sales and partnership model, including elements of the plural governance form, discussed in the previous chapter: parallel work with multiple partners, who compete among themselves, and have additional motivation to innovate and differentiate their offerings. Hybrid sales model with multiple channels and partnership levels enables in turn creative distribution of margins and links it to partner investments in marketing, training and technology development.

4.4 Discussion

The following table summarizes the partner management techniques, analyzing their relevance and impact on the strategies of value chain partners. Not every technique is equally effective, and often only a combination of several measures assures the desired outcomes.

	Technique	Decreasing partner's transaction cost?	Stimulating partner's relation-specific investments?	Stimulating partner's innovativeness?	Restricting partner's new product development decisions?
Financial	Minority investment		√		√
	Direct transfers	√	√	√	√
	3rd-party investment		√		√
	Pricing technology	√	√	√	√
	Reference designs	√			√
Marketing	Promotion	√	√		√
	Sales	√			√
	Positioning own products	√		√	
	Certification		√		√
Technical incentives	Platform mgmt	√			√
	Partner-oriented development	√			
	Product inferiority	√		√	
	Knowledge transfer	√	√	√	√
	Learning by doing	√	√	√	√
	Stimulating knowledge generation	√		√	
	Technical privileging	√			
Deterrents	Legal measures		√		√
	Partner lock-in		√		√
	Extending platform			√	
	Eliminating competitors		√		√
	Sales and partnership model		√	√	

Table 8. Partner management techniques and their impact on the strategies of partners

Technology develops through periods of radical and incremental changes, and its social nature manifests itself in the rise and fall of organizational communities, linked to specific technology variations (Tushman and Anderson 1986: 439-440). The collective process starts with an era of technological ferment, when various companies experiment by releasing competing prototype products (Tushman and Anderson 1986: 441), struggling to either absorb the innovative technology or destroy it to preserve its in-

cumbent position (Anderson and Tushman 1990: 610-611). Variation and selection processes lead to competition among and substitution of multiple designs (Anderson and Tushman 1990: 612), and finally a dominant design emerges, becoming the accepted form of a new product class, so that further developments are focused on incremental, not radical improvements (Tushman, Anderson 1986: 411).

The emergence of dominant design was presented in the literature as social or even political process, where firms with diverse interests try to influence the opinions of practitioner community. The technological changes may be beneficial for incumbents, enabling them to balance their existing skills and technologies (*competence-enhancing innovations*), but equally often the changes can render organizational knowledge bases obsolete and damage business opportunities (*competence-destroying innovations*) (Tushman and Anderson 1986: 442). The process resembles Kuhn's (1996) description of the emergence of new scientific paradigms: as long as the changes are only incremental, members of the academic community can benefit from their knowledge and continue "solving puzzles" within established frameworks, but radical change occurs when a new paradigm calls for refutation of previous theories and thus destroys the value of existing skill bases. The adoption of a paradigm depends on the community, members of which have varying motivations to support or reject the new approach, and the transition can be long and difficult. Similarly, the emergence of new technological standards is a community-driven process - technology can only be successful if it has supporters, and the winning solutions are not necessarily superior. "Dominant designs are not simply an artifact of the way in which innovations diffuse. (…) The emergence of dominant design is an outcome of the social or political dynamics of compromise and accommodation between actors of unequal influence." (Anderson and Tushman 1990: 615-617). Once the design is collectively accepted, competing companies focus on incremental improvements, related to cost and variations of standard, interchangeable products, and in this ways reinforce the established social structures (Anderson and Tushman 1990: 618).

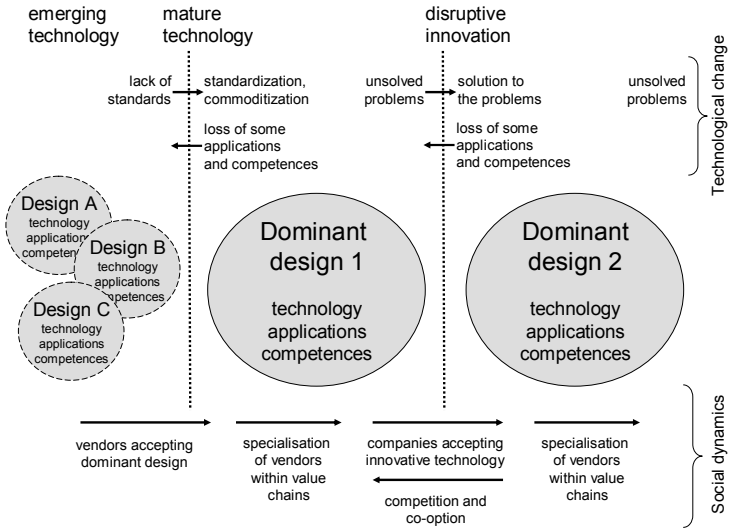

Fig. 16. Technological and social processes related to the emergence of a new dominant design

Partner management techniques are therefore linked to the community-based evolution, helping the focal firm establish a coalition of other players to support its proposed technology (Hill 1997; Roberts and Liu 2001). Availability of complementary products and their compatibility with existing solutions are critical for the success, so in emerging markets it pays back to "buy" partners. The stakes of companies are high, and previous investments in technology development need to be accompanied by additional expenditures to gain support for the innovation. Partners are not only needed to provide complementary products and services, adding credibility and benefits to the core technology, but also to shorten time-to-market (Roberts and Liu 2001: 27) - Microsoft could potentially develop own solutions in all complementary areas, but this wouldn't give it time-based advantages over competitors.

In addition, *payola* may be indispensable for partner companies, which regard the new technology as a threat. Their businesses would be nega-

tively affected by its diffusion, so they could not find strategic justifications in favor of its support, especially as it may substitute their existing products and destroy competences. When Microsoft was co-opting partners to support Windows NT for enterprise computing, it had to deal with established companies, servicing and deriving large shares of revenues from the Unix market. Windows was regarded by most of them as a competence-destroying innovation – and only political actions helped Microsoft convince the first large partners to cooperate. Companies like Digital, Wang, Banyan or Tandem needed substantial incentives to start working with the platform. Their involvement sparked bandwagon effects among both customers (as the strong corporate backing for Windows was noticed by client organizations) and other partners – so that once a critical mass was reached, further partners were deciding to support Windows without the additional incentives. Partner relationships, established to promote new platforms, have self-reinforcing character: a large installed user base leads to greater interest of partners, increasing in turn the customer demand and encouraging new companies to enter into partnerships (Hill 1997: 9), but this "chicken-and-egg" problem can only be solved by convincing the first partners to offer the critical complementary products.

The example of Windows-related partnerships leads to a conclusion that the stage of technology lifecycle is an important factor determining the right choice of partner management techniques. It is not possible to offer unequivocal guidelines about recommended governance forms for different lifecycle stages, as empirical data would contradict such a generalist model (Roberts and Liu 2001; Roberts and Liu 2003). It seems more important to understand, which particular incentives and deterrents are suitable for managing partners at which stage of the lifecycle. To simplify the analysis, only two distinctive phases are discussed: the era of ferment, when companies struggle to build the largest installed base, and the period of technology platform dominance (decline and substitution phases do not need to be addressed within the model, as they are inextricably linked to the introduction of new substitutes by the leading companies). Some partner-oriented activities may be particularly effective in expanding the installed base, while not being critical for the further technology development – for example, cash inducement is instrumental in co-opting

inducement is instrumental in co-opting providers of complementary products, but not necessary for established technologies.

	Technique	Expanding installed base	Managing established platform
Financial	Minority investment	√	
	Direct transfers	√	√
	3rd-party investment	√	
	Pricing technology	√	√
	Reference designs	√	√
Marketing	Promotion	√	√
	Sales	√	√
	Positioning own products		√
	Certification	√	√
Technical incentives	Platform management	√	√
	Partner-oriented development	√	
	Product inferiority		√
	Knowledge transfer	√	√
	Learning by doing	√	√
	Stimulating knowledge generation	√	√
	Technical privileging		√
Deterrents	Legal measures	√	√
	Partner lock-in		√
	Extending platform	√	√
	Eliminating competitors	√	√
	Sales and partnership model	√	√

Table 9. Changing effectiveness of partner management techniques in technology lifecycle

Microsoft's approach to partners revealed also another interesting aspect: the competence-destroying character of innovations, which usually is a barrier to adoption and support from other companies, can be de-emphasized thanks to the use of adequate techniques. Moreover, the company used recurring ties to accelerate the introduction and adoption of breakthrough innovations – with partner-oriented technology development, it started doing competence planning for own partners, designing new products to re-use some of their existing skills, or even offering technical designs and recommended contract manufacturers, especially for breakthrough products based

on custom versions of Windows CE, such as intelligent displays Mira, Tablet PCs, or Windows Media Centers. The partner-oriented design required optimization for existing architectures and skills, not only development of superior technology – but investments in this area and using repetitive ties with several dedicated partners turned out to be cheaper than building new partner coalitions and co-opting necessary players every time. Literature recommends structuring technology deals in ways maximizing potential revenue streams from customers throughout the entire technology lifecycle (Shapiro and Varian 1999: 143-148), initially showing willingness to encourage adoption by low pricing, in further stages benefiting from lock-in effects, and finally, carefully planning substitutive offering for the same market. Microsoft adopted this approach to partners, regarding alliances not as one-off means to boost product diffusion, but cultivating them to achieve synergies across many businesses, and preparing for the introduction of new product generations. Technologically locked-in partners were not regarded as victims, but as important social capital, useful in other projects, and therefore kept satisfied. Even though the values of particular partner contributions were declining over time due to technological change (Wathne and Heide 2000: 45), Microsoft was loyal to the selected group of companies, helping them upgrade their competencies and jointly work on emerging solution classes.

5 Complementors

5.1 Overview

5.1.1 The role of a niche player

The discussion of the high-tech value chain was focused on the role of value chain leaders, but the present chapter analyzes in turn strategies of companies working with the chain leader and complementing his technology. Focus on a narrowly-defined group of customers is one of strategic options, discussed in management literature. Niche players voluntarily limit the scope of their activities and addressable markets (Porter 1998: 42), finding specialist areas in which they could excel by concentrating their usually limited resources and using them more effectively than less-focused competitors. Numerous studies offer implicit suggestions that the transition from a specialist to a generalist firm is a natural scenario for strategy development. However, there are many successful committed niche players or even entire industry segments adopting such strategies (Carroll 1984: 126-127). Similarly, within the high-tech value chain, not every company needs to become a chain leader, as other options can be equally beneficial. Particularly young firms have improved survival chances, if they specialize on a narrow market segment and initially avoid competing against large organizations (Romanelli 1989: 374). Even though the core technologies, developed by innovative startups, could be used for many purposes, the firms do not have sufficient funds and need to focus on specific vertical applications and easily accessible customer groups (Cusumano 2004: 55-58).

The importance of niches is also emphasized by the ecological perspective in organization theory[10], presenting niches as emerging and closing without significant involvement of individual companies, with a determi-

[10] For a review of relevant empirical research streams concerning the ecological perspective, comp. (Wholey and Brittain 1986).

nistic view of organization lifecycle. This inertia reduces potential impacts of corporate decisions and strategies (Boone and van Witteloostuijn 1995: 268), and the dynamics is interpreted as inevitable, with organizational forms and strategies selected rather by "the environment", than by individual players. The perspective cannot adequately interpret the phenomenon of interorganizational networking (Boone and van Witteloostuijn 1995: 265-267), but its important contribution is an emphasis on the inevitability of organizational decline, as once crowded niches later lose appeal and close. Management literature regards the decline as a stimulus for innovation, in line with the statement that "necessity is the mother of invention" (Mone et al. 1998: 118).

The theory of flagship (Rugman and D'Cruz 2000) discusses asymmetrical alliances and symbiotic relationships, with the flagship company exercising control over strategies of partners, who in turn have no reciprocal influence over the flagship's plans and activities. This view resembles the organizational ecology - it externalizes the locus of strategic control, a niche player is completely dependent on his large partner, who at the same time wants to maintain the partnership to guarantee uninterrupted supply of certain required goods and services. Flagship solutions may however replace the products of partners, thus undermining existing synergies, and this risk is not addressed by the idealistic theory. Although some theorists quote structural inertia (including the embeddedness in social networks) as a reason for not entering new markets and leaving them to partner companies (Mitchell 1989: 211), the empirical evidence counters these claims. While the flagship firm relies on vertical partnerships, the relations can be disturbed by inhouse technology development and substitution: the flagship can both maintain the entire ecosystem, and deliberately destroy businesses of individual partners.

Negative aspects of asymmetrical partnerships are emphasized by the resource-based perspective on strategic alliances and the learning race metaphor: the stronger player tends to learn from a partner, gradually acquiring necessary intangible resources and building internal competencies, which make the partner contributions redundant. In a direct contrast to the cooperative postulates of flagship theory, the view emphasizes the competitive

character of alliances, with ongoing implicit bargaining among partners, inevitably leading to the demise of the weaker firm (Inkpen and Beamish 1997).

Interestingly, the strategies of NTT DoCoMo and Microsoft presented in the previous chapters could not be explained using any of these theories. These companies were not learning from their partners to substitute them, but rather experimented with new concepts in parallel to the cooperation processes. There were no learning races, characterized by transfers of intangible resources from smaller partners and their appropriation against the interest of complementors. The dynamics could rather be described as "development races", with the chain leader adopting a novel approach to markets, previously penetrated by his partners, but also guiding the partners through the disruptive changes, and offering them new business opportunities.

High-tech marketing literature is mostly concerned with the strategies of value chain leaders, ignoring the challenges which complementors may face in their partnerships with these dominant companies. Partners are needed to strengthen and legitimize a new product, but later should be substituted by own development of the focal company, which is advised to "design out" the partners (Moore 1998: 86). These recommendations do not represent the nature of many high-tech partnerships, lasting throughout entire technology lifecycles, as companies tend to maintain partner ecosystems even for mature products. Partners engage also in recurring ties, finding new cooperation topics - when a specific niche is closing, firms tend to look for new ways of adding value to existing customers or related markets. Successful niche players stay in synergistic relations with value chain leaders even when their current products are endangered by substitution - trusted partners may be offered new business opportunities, as long as they are innovative and constantly think about adding value to the leaders' technologies.

5.1.2 Complementor strategies

The discussion of complementor strategies should start with a more general reflection about the nature of relations with their stronger partners. Tech-

nology platform leadership does not imply that a particular firm adopts also a strategy of the high-tech value chain leader. The company may actually be dependent on another, more powerful player, exerting unidirectional influence over its strategy, or may not attach much importance to complementary partnerships, preferring to substitute solutions of potential partners by internal development. Both scenarios are dangerous for the niche players – in the former case, they would certainly derive more benefits from aligning their strategies directly with the chain leader, whereas in the latter scenario, they should rather consider competing against the firm.

Cisco Systems certainly has mastered the partnership management, but does not really use the skills to support value chain complementors. Niche players can work with Cisco either as distributors and service providers for Cisco products, or as potential acquisition targets. As opposed to companies like Microsoft or NTT DoCoMo, Cisco does not maintain long-term partnerships with complementors, focusing on internal development and acquisitions to fill any gaps in own product portfolio – at Cisco, the "company policy is to «eat our young»" (Chaudhuri and Tabrizi 1999: 126)[11]. Such companies can be characterized as dominators, who "consume" the businesses of other players, pursuing "stand-alone strategies", closed to third-party complementors (Iansiti and Levien 2004: 69). Domination, involving own supply of all complementary products, was the key element of IBM's strategy in the past and contributed to its failure when Apple and later Microsoft established alternative, more open ecosystems (Iansiti and Levien 2004: 75). In the case of Cisco, the preference of internalization is however linked to the nature of its products, located mostly in the infrastructure segment of the high-tech value chain, where standardization of networking components and their technical parameters are key to gaining market share. This differs from software or telecommunications services, where the real added value comes from solving particular business problems.

[11] At the same time, Cisco partners with a small number of key players such as Microsoft, Intel, HP or Motorola, presenting these horizontal alliances as strategic, with the focus on joint development of new technology standards.

Niche players need therefore to understand, with whom they partner or intend to partner – as the brief discussion demonstrated, the stronger partner may turn out not to possess enough power to enforce standards and offer its complementor a sustainable position within the high-tech value chain, or may even pursue a strategy contradictory to the cooperation-based value chain approach.

The various perspectives on alliances with technology leaders, discussed above, present an overwhelmingly *static* view of the alliance, even though some looked at changing roles within a relation. They ignore possible changes of markets and technologies – resources important at one point of time may lose their appeal later, when new challenges arise, and a dynamic view of alliances should emphasize the evolution of partner co-dependence and their technologies. In long-term relationships, future initiatives are likely to extend beyond the present cooperation. The synergistic relations can be actively managed, so that complementors are aligned with the flagship strategy at all times, even when their short-term interests are endangered.

In addition, the focus of previously discussed perspectives is on single-product companies or single-market partnerships – while the actual alliances are more complex, as companies tend to work in parallel on multiple projects, and are embedded in networks, where individual decisions may affect other related businesses. Industrial economics introduced the notion of *multimarket competition*, where firms simultaneously compete in several markets, and may respond to aggressive moves by retaliation in another area than the initiating action (Jayachandran et al. 1999). Partners participate in various high-tech value chains and develop dependencies on multiple levels, so that sometimes they affect the business of another company by seemingly unrelated decisions. The economic concept of *tacit collusion* describes implicit processes of communication among competitors, who know the limits of own activities and learn from experiences, when and how the other player could retaliate. In value chain alliances, partners "dance" with each other and learn, which moves are acceptable, and which are not. At the same time, theorists of multimarket competition suggest that innovative companies would not withhold technological breakthroughs due

to the tacit collusion, constraining only repetitive and relatively predictable activities such as the use of marketing techniques (Jayachandran et al. 1999: 51), so a complementary relationship does not discourage companies from introducing radical innovations.

Third important restriction of the previously reviewed theories is the nature of relationships between the flagship and its partners. The niche players deliberately limit their strategies, giving up certain business opportunities, but receive something in return – ideally both from the flagship (as the complementor adds more value to its platform), and from end customers (who enjoy more benefits from an integrated value chain). There is nothing wrong per se in being co-dependent – as long as he continues adding value to the chain leader, the complementor will benefit from his status.

Niche players pursue nevertheless their own independent strategies, which tend to be aligned (but not identical) with the chain leader's strategy. It makes sense for them to work with a strong partner, who offers access to its installed base and technology platform, as well as other incentives. Niche players are also willing to keep up with the technological change induced by the chain leader, who may substitute their existing solutions, but at the same time offer opportunities to innovate and develop new technologies. Effective partnership with a specific value chain leader results from added value and innovativeness of the complementor. As potential customers need to know about the existence of the complementary products in question and relations between complementor and chain leader, so the niche player needs to build own brand and continuously reassure the market by confirming close links to the flagship – it cannot simply rely on the stronger partner to promote its business.

Sources of competitive advantages of niche players make the focal company attractive to both its corporate partner and customers, and guarantee that partnerships would last even when some decisions of the value chain leader undermine the complementor's position. Generalist companies may overwhelm once specialist segments, transforming profitable niches into mainstream products (Porter 1985: 21). This scenario could be observed in the case of Microsoft, entering markets which used to be independent complementary niches, and bundling technically inferior products with popular

packages to destroy competitors (Cusumano 2004: 59). The source of competitive advantage for a niche player would therefore not be a specific product but core competencies, capabilities and underlying technologies, which could be embodied in new products once a specific niche closes. Specialist companies do not vanish when their traditional segments become unprofitable, but adjust their strategies to the observed market changes. Legal measures protecting intellectual property are not effective, as they can only limit direct imitation, not substitution by superior technologies – while chain leaders may introduce superior, improved technologies to replace existing solutions. The technological lead of a niche player can therefore be sustained only if the firm can innovate as fast as other players (Porter 1985: 182-183).

In spite of possible synergies, some complementors opt not to maintain close relations with value chain leaders. They may have ambitious plans to take the chain leader's role themselves (not always realistic, and leading to risky and costly competitive battles) and fears that they would be exploited in a *learning race* by stronger partners, or may even be too proud to accept the dishonor of an asymmetrical alliance (as in the case of many companies relying on Windows architecture but deliberately declining to work with Microsoft). Model strategy for value chain complementors suggests however that partnering with a chain leader offers important synergies, while other scenarios could only yield sub-optimal results.

There are also examples of companies, distancing themselves from previous value chain partners – the most frequently quoted one is Netscape, once an excellent complementor of Windows platform, which started positioning its web browser as a potential independent technology platform, capable of running web-based applications in ways independent from operating systems. Not surprisingly, the strategy infuriated the challenged chain leader Microsoft, who literally destroyed Netscape's business (Cusumano 2004: 78) - the clash was however not inevitable, if only Netscape had restricted its ambitions and stayed within the confines of a complementor's strategy.

5.2 Patterns of substitution and innovation

5.2.1 Substitution case studies

Introduction of own products by the value chain leader means disruptions in his value chain – as the cases of NTT DoCoMo and Microsoft demonstrated, the new products substitute but not imitate the offerings of complementors. Niche players, so far focused on adding value to the technology platform, may feel abandoned by the platform extension, which reduces their future revenues. On the other hand, the change stimulates their innovativeness, so that they can abandon the commoditized areas and look for new value-adding applications. The substitution patterns for technology partnerships will be demonstrated using examples of eight complementary product categories, substituted, substituted by Microsoft.

5.2.2 TCP/IP protocol

The networking protocol was initially developed in 1978 for ARPANET, predecessor of the Internet network. In the middle of the 1990s, it reached the mature stage of technology lifecycle as an open standard, nevertheless continuously competing with other (mainly proprietary) alternatives. Major operating systems started offering support for TCP/IP, but in 1994 only about 6% of computers were using the network standard (Callaway 1994). Even though the protocol was widely supported, its use was complicated: it required a time-consuming individual configuration of every computer, and this issue was addressed by specialized software from companies such as FTP Software or Ipswitch, offering dedicated applications for Windows environment. Microsoft decided to embed the protocol in Windows – the solution was superior to other commercially available software, as the new 32-bit drivers were given high priority in accessing system resources, so the data transfer speed was improved, not affected by other applications (Horwitt 1994). Even though TCP/IP drivers in Windows undermined the business of several companies, analysts were emphasizing positive effects of Microsoft's decision on the diffusion of TCP/IP, development of related products by specialist companies, and sales of high-end TCP/IP solutions

(Mohan 1995a). Reacting to the commoditization of TCP/IP software, all of the specialist companies moved in the high-tech value chain from infrastructure software towards value-added solutions: groupware and web servers (FTP Software), personal FTP and network monitoring (Ipswitch), Internet messaging and network security (Process Software), and PC-to-Unix connectivity (Net Manage). In parallel, they were actively working with other value chains – the underlying technology for TCP/IP was ported to many platforms, so they were able to reuse their existing components for Unix, Mac or IBM AS/400. Microsoft's decision destroyed nevertheless core businesses of these companies, and no further cooperation was offered to them by the chain leader.

5.2.3 Clustering

Making Windows a highly available server environment was key to the enterprise-wide diffusion of the operating system. The concept of building computer clusters, in which one machine can instantly take over the workload when another one fails to assure continuous operations (*failover*), and processing tasks can be distributed across several machines (*load balancing*) was first introduced by Tandem Computers in 1975, and later become wide-spread for Unix platforms. As Windows NT was gaining popularity among business users, several companies released their own dedicated clustering solutions. These companies included Digital, NCR, Tandem, Data General and Compaq, all focused on high-end hardware and IT services, regarding Windows clustering modules as a way to stimulate hardware and service sales. Although Microsoft desperately needed clustering functionality, multiple available solutions were not compatible, and therefore not supported by standard business applications, as their developers were required to prepare different versions depending on the clustering variant. For hardware and services companies, proprietary clustering soft-

		TCP/IP	Clustering	Antivirus	OLAP	Push	ERP	Document management	Media authoring
	Type of solution	infrastru-cture	infrastru-cture	infrastru-cture	business solution	business solution	business solution	business solution	entertain-ment
	Stage of tech life-cycle	mature	mature	mature	dominant design arising	no dominant design yet	mature	mature	dominant design arising
Microsoft's product decisions	Role of MS	commodi-tization	standardi-zation	commodi-tization	commodi-tization	standardi-zation	commodi-tization	commodi-tization	commodi-tization
	Source of MS technology	developed internally	developed with partners + acquired	acquired	developed internally	developed with partners	acquired	developed internally	developed internally
	Pre-announced	yes	yes	yes	yes	yes	no	yes	yes
	Performance limitations	no	no	no	no	no	yes	yes	no
	Functionality limitations	no	yes	no	no	yes	yes	yes	yes
	Inferior positioning	no	no	no	no	no	yes	yes	yes
	Pricing	free bundled	free bundled	free / lower than com-petitors	free bundled	free bundled	lower than competitors	lower than competitors	free bundled
	Continuity offered for existing partners	no	yes	yes	yes	yes	yes	yes	yes
Partners	Affected partners	FTP Soft-ware, Ipswitch, Net Manage, Process Software	Digital, NCR, Tandem, Data General, Compaq	Symantec, McAfee, many others	Arbor, Mi-cro Strategy, Comshare, Seagate	PointCast, BackWeb, Tibco, Data Channel	SAP, Peo-pleSoft, JD Edwards, Baan	Documentum, FileNET, OpenText, Eastman, Compaq, Xerox	Avid, Adobe Systems, Matrox, Pinnacle Systems, Sonic Foundry

		TCP/IP	Clustering	Antivirus	OLAP	Push	ERP	Document management	Media authoring
	Importance of the solution for partners	core	not key – helps sell other products	commoditized, focus on complementary solutions	core (except Seagate)	core	core	core (Documentum, FileNET, OpenText) not key (others)	not core
	Other products of partners	utilities	hardware, services, business solutions	multiple security solutions	integrated databases	broadcasting servers, content	other business solutions (CRM, SCM, e-business)	other document and process-related solutions	professional media editing products
Strategies of partners	Moving within value chain	FTP, Ipswitch, Process Software	all	McAfee, Symantec	Arbor, Micro Strategy, Seagate	PointCast, BackWeb, Tibco, Data Channel	SAP, PeopleSoft, JD Edwards	Documentum, FileNET, Open Text	-
	Focus and adding value	-	all	McAfee, Symantec	Seagate	PointCast, BackWeb, Data Channel	-	Eastman, Compaq, Xerox, Documentum, FileNET	--
	Diversification to other chains	all	all	-	Micro Strategy, Seagate	PointCast	SAP, PeopleSoft	Xerox, Documentum, FileNET	-
	Competing	-	-	-	-	-	all	Doc., F.N., O.T.	-

Table 10. Patterns of partner product substitution by Microsoft in eight selected product groups

ware was not a significant source of competitive advantage, diffusion of the technology was inhibited by the lack of standards, and maintaining own software in line with Windows development was costly. Microsoft launched a standardization initiative with over 60 hardware partners (including the key clustering vendors), introduced a common specification for third-party developers of "cluster-aware" applications, and later worked on a module code-named Wolfpack, which in 1998, after many delays became Microsoft's standard product for NT failover clustering. Later the same year, Microsoft acquired a small specialist company Valence Research and used its software Convoy to offer NT Load Balancing Service, so that the native Windows clustering functionality substituted all of the partner solutions. The standardized module was offered at a lower cost than previously available solutions. It did not depend on any particular hardware and network configuration (so increasing competition among vendors), but at the same time it "expanded the pie", and created strategic benefits for all involved parties (Jap 1999), making NT a credible platform for enterprise-wide applications and thus boosting the sales of Windows machines and related services. An implementation of a cluster-based system means at least double sales of servers for a given configuration. Incumbents, traditionally offering clustering solutions, were deprived of proprietary solutions, but on the other hand they were able to focus on their core domains (hardware and services) – therefore, all of the affected companies decided to focus and add value to Microsoft's solutions, engaging in multiple subsequent Windows-related initiatives.

5.2.4 Antivirus software

Protection against viruses was available since the 1988 release of first commercial antivirus products by Dr. Solomon. Microsoft DOS included a dedicated antivirus utility, but when releasing Windows, Microsoft decided to leave the space for third-party vendors (maintenance of antivirus software was costly, as it required regular updates and tracking of new viruses). Initially, viruses were transmitted through files saved on floppy disks, but Internet quickly became a new transmission channel. Antivirus software was also undergoing gradual commoditization – in 1996, Syman-

tec experimented with offering a free web-based virus scanner, and the move was followed by other vendors such as Panda Software. Antivirus companies moved beyond basic virus detection and removal, offering sophisticated server-based protection and integrated security solutions. Basic functionality remained nevertheless critical for individual computers, and over the years, companies like Symantec or McAfee Associates were selling subscription services for PC virus scanners, while other players were offering similar functionality for free from their websites. Meanwhile, Microsoft's image was badly damaged by numerous flaws in Windows, exploited by attackers and viruses. The company acquired in 2003 specialist anti-virus technology from GeCAD Software, and in the following two years took over also anti-spyware software vendor Giant Company and spam-detection software maker Sybari Software. The functionality was already commoditized, while repeating security was important for Windows users – so the year 2005 marked Microsoft's entry in the security market with a release of own software for individual users. The company started competing against existing complementors, but they had over 10 years to harvest the market, still charging very high rates for basic subscription services. After Microsoft's move, companies like Symantec and McAfee Associates continued working on high-end security solutions, trying to offer better protection for corporate customers – McAfee focused on encryption and software vulnerabilities, while Symantec started merger discussions with storage specialist Veritas Software.

5.2.5 OLAP

Online analytical processing (OLAP) was a term coined by a company Arbor, which in 1992 offered "analysis server", speeding up database queries by restructuring the analyzed data into multi-dimensional tables. OLAP became soon an important business solution for extracting and analyzing data from other systems. In 1994, Arbor released its first OLAP toolkit for Windows, using MS Office as the user interface for a proprietary Arbor database, and soon multiple competitors entered the market, including three Windows complementors: Micro Strategy, Comshare and Seagate. They launched standardization efforts, which revealed the existence of multiple

incompatible approaches. In 1997, Microsoft released its own specification for Universal OLAP Data Access, intended to guarantee interoperability of various OLAP applications and databases. Two years later, Microsoft SQL Server had an own OLAP component, substituting solutions from complementors, and offering several new features, such as "write-back" functionality (supporting what-if scenario analysis) and "member properties" (for managing distributed queries), offered at a much lower price than other alternatives. Meanwhile, specialist OLAP companies moved towards value-added solutions – many of them developed pre-configured analytical applications for specific vertical markets and business reporting tools, extending beyond technical toolkits. Seagate (later spun off as Crystal Decisions) was able to continue complementing Microsoft platform with its reporting engine Crystal Reports, integrated among others with Outlook and Microsoft CRM. Other vendors decided to switch to alternative value chains - Arbor struck a distribution deal with IBM, Micro Strategy added in 2002 support for Unix and Linux (earlier, the company was surprisingly loyal to Microsoft, as its DSS Server was available only for Windows platform (Hall 2002)), Comshare started in 1997 supporting multiple databases including Oracle.

5.2.6 Push software

Push or broadcasting software was developed to facilitate information transfer across corporate networks by actively pushing new important items to individual computers instead of expecting the users to visit specific websites. With the low Internet transfer rates and the lack of dominant designs for web-based applications, push initially seemed to be a promising type of solution. Even though nowadays the technology is long forgotten, elements of the concept are used in media streaming and mobile phone messaging, and in the second half of the 1990s, many large companies were working on the push software. Specialist firms PointCast, BackWeb, Tibco Software and Data Channel had their own, incompatible broadcasting solutions for corporate Intranets, while the web browsing market leader Netscape intended to use similar mechanisms in delivering Internet pages to individual users. Microsoft, at that time actively fighting the browser war against Net-

scape, took interest in the market and allied in 1996 with the largest specialist PointCast to define the push standard CFC (Channel Definition Format), supported by Microsoft Internet Explorer: commoditization of the client-side would facilitate wider diffusion of the technology, allowing specialist firms to focus either on push server development, or on content delivery, without worrying about the technicalities of information reception. Microsoft partnered with numerous content providers, delivering customized news channels for IE 4.0 users, and helped establish the dominant technology design, working closely also with PointCast competitors to assure interoperability of various platforms. Although the standardization undermined sales opportunities for client software, push vendors focused on specialist applications of the technology. BackWeb worked on pushing antivirus updated with McAfee, solutions for customer service departments and BackWeb Sales Accelerator for delivering market intelligence updates to mobile sales force. Tibco used its middleware to integrate with key business systems such as SAP, Baan, Peoplesoft and Clarify, automating push for specific information, e.g. sales orders, later transforming this into an all-purpose application integration platform. PointCast switched to corporate solutions, and in 1999 was acquired by Launchpad Technology, which wanted to integrate PointCast server with its e-commerce software. Even though none of the broadcasting companies was ultimately successful in this field, the entry of Microsoft with the standard client interface could actually have been helpful for the diffusion of their push-based solutions.

5.2.7 ERP

Enterprise Resources Planning is a common name for a group of business solutions, automating physical and financial flows in an enterprise, and could be traced back to first systems by the German SAP, released in 1973. At the end of the century, the ERP market was already mature, and key vendors were moving towards related areas such as Customer Relationship Management and Supply Chain Management, exploring opportunities in small and medium enterprise segments, for which traditional ERP systems were too complex and expensive. Microsoft traditionally partnered in the market with SAP, providing joint solutions for NT platform, but there were

also numerous other complementors, actively promoting Windows-based systems, including Peoplesoft, J.D.Edwards, Baan, Great Plains Software and Navision. Microsoft decided to enter the mature market and commoditize ERP, addressing particularly the yet unexplored segment of SMEs. In December 2000, it acquired Great Plains Software, SME market leader in the U.S., and in 2002 bought Navision, one of the key European players. These acquisitions were unique in Microsoft's history, as the company entered an entirely new software domain, relying only on skills of the newly acquired divisions. This move was also unexpected for its long-term partners such as SAP, who nevertheless were assured by Microsoft that the products would target smaller customers, offering limited performance and functionality compared with the fully-featured ERP systems. The complementors tried to fortify their positions in several ways: by moving in the value chain (pre-configured vertical solutions for specific industries, supply chain and customer relationship management, online delivery of software as service), extending product portfolio (among others new solutions for SMEs, directly competing with Microsoft products), and working closely with other chain leaders (for example SAP started offering versions for Linux and Microsoft's database competitor Sybase, later introducing also own web application platform NetWeaver, directly threatening Microsoft .Net platform). Microsoft's strategy was interpreted by ERP vendors as targeting their future revenue streams, and they all tried to retaliate, while surprisingly also attempting to maintain cooperation and benefit from Microsoft's partnership as long as such opportunities existed. The entry in the ERP domain was not a simple extension of Microsoft's platform, but venturing into a completely new market, only vaguely related to its existing product and competence portfolios, enabled by two unannounced acquisitions.

5.2.8 Document management

Archiving, locating and retrieving documents were functions of another key business solution for Windows platform. The idea of computer-based document management came from Xerox, soon disposing however of most of the related capabilities and spinning off numerous companies, which

soon became important players in the emerging market. Document scanning, storage and search solutions were available for Windows users in the 1990s, and many vendors integrated them closely with Microsoft applications such as Office, Exchange and Outlook, using SQL Server to store document properties. Key complementors included Documentum, FileNet, Open Text (offering solutions for multiple platforms) as well as Compaq, Eastman and Xerox (supporting only Windows). Their product architectures and features were incommensurable, with various combinations of document storage, search and retrieval, workflow, workgroup collaboration and even portal functionality. The differences in approaches were particularly visible when the concept of knowledge management gained on popularity and every company tried to offer its own vision for how software could help manage enterprise knowledge. Facing the knowledge management hype, Microsoft initially started actively promoting partner products, but in 1999 announced plans to develop an own "knowledge workplace" solution. Finally released in 2001, SharePoint Portal Server was a low-level document management system, combining basic features of a corporate portal and a simple workflow, seamlessly integrated with Microsoft Office. Vendors of high-end document management systems had no reasons to regard SharePoint as their competitor – it was designed for sharing departmental documents, not capable of managing enterprise-wide document archives. On the other hand, it incorporated many innovative concepts and offered an astonishing ease-of-use, making document management tasks as easy as using Microsoft Office. Since the first announcements in 1999, Microsoft had been encouraging partners to add value to the upcoming system, offering previews, releasing early components and integration kits. Documentum and FileNet released integrated client interfaces, enabling users to access their document repositories from SharePoint, while Eastman and Compaq gave up the development of own products, focusing on dedicated service offerings. When Microsoft launched the second version of SharePoint, it already was a powerful, scalable platform for large organizations, based on the user-friendly concepts elaborated initially and competing directly with its former complementors. SharePoint licenses were significantly cheaper than alternative products, making document

management a commodity. Specialist companies decided to compete with SharePoint, focusing on extensions to the core document management functionality, for example solutions streamlining insurance claim processing, storing records in accordance with government standards, or managing digital media assets.

5.2.9 Digital media authoring

The use of computers for digital media authoring started with high-end solutions for movie and record studios, but was brought in the 1990s to individual users of personal computers, as the machines became more powerful and dedicated media capture hardware cheaper. One of Microsoft's strategic initiatives was focused on the use of computer for home entertainment purposes. It started with setting standards for digital media files, and later benefited from the availability of broadband Internet, enabling online media streaming. The field of Windows-based digital media is very comprehensive, and Microsoft over the years fought several standard battles against companies such as Real Networks and Apple. The present analysis of complementor substitution pattern focuses on an area, where Microsoft was not competing but closely working with other companies and promoting their products – the domain of home media authoring. As digital camcorders and other devices converting analog media to digital formats became accessible to individual consumers, there were also multiple incompatible applications, allowing users to edit and store the media files on Windows PCs. In 1998, Microsoft and a group of video editing specialist firms defined Advanced Authoring Format, facilitating exchange of editable audio and video data among various editing tools. This standardization was an important step towards the commoditization of basic, low-end media authoring functionality among non-professional computer users. The second step was Microsoft's decision to release its new application Windows Movie Maker and bundle it with Windows Me (2000) and XP (2001), making it freely available for every user of these Windows versions. Windows Movie Maker did not include sophisticated editing features available from other complementors, but was able to satisfy most requirements of home users, with a wide support for various cameras and a spectacular ease

of use. All of Microsoft's complementors decided to tighten their links to Microsoft, focusing on other domains – such as high-end professional systems for newsrooms, broadcasters and record companies (Avid, Matrox, Adobe Systems, Sonic Foundry), or integrated hardware and software bundles for home users (Pinnacle Systems).

5.2.10 Discussion

Even though the eight substitution cases present different initial conditions and reactions of complementors, more general mechanisms could be identified. Microsoft was entering new technological areas to either standardize emerging technologies, or commoditize the basic functionality of mature or declining ones. Standardization could be observed in the cases of clustering and push software, where it enabled interoperability of various solutions, attracting more customers and letting individual complementors focus their strategies instead of building complete platforms from scratch. Commoditization occurred in the cases of TCP/IP, antivirus, OLAP, document management, digital media editing and partly also ERP solutions, following different patterns for infrastructure-level software and business solutions. Infrastructure is prone to become a commodity as soon as a technical standard it supports diffuses – nowadays, most hardware vendors bundle dedicated software packages for free, and any competitive advantage resulting from the control over specific software cannot be long-lasting, except for explicit patent protection and economic effects of scale. Business solutions can in turn be commoditized by bundling and radical price reductions, which make previously specialist software available to mass market through multiple sales channels.

Microsoft's moves were undermining some revenue streams of partners, but in most cases they clearly were expecting this to happen sooner or later, observing the growing commoditization of their domains, and carefully planning next strategic steps. Microsoft was usually willing to continue cooperation, asking partners to continue complementing its products – but complementors were not always interested in this, especially if they were not able to add much value to newly released software, or decided that they were strong enough to free themselves from the dependence. In the com-

moditization scenario, niche players working with a value chain leader had reasonable amount of time to harvest their niches before the stronger partner entered the area – they were benefiting from economic rents until the margins radically decreased. As it was observed in the analyzed cases, smaller partners were not prematurely giving up their niches based on announcements made by Microsoft, instead slowly phasing out and redirecting their strategies. The literature on pre-emptive announcements emphasizes their role in attracting customers and deterring competitors (Robertson et al. 1995; Wu et al. 2004), but they are also instrumental in signaling partners the need to re-examine their own technology strategies. Only Microsoft's entry in an entirely new domain – ERP market – was not announced to the affected partners, who indeed reacted to this move by retaliation.

The patterns of substitution are similar to the mechanism of disruptive innovations, with Microsoft initially entering the market with a low-end product and keeping partners loyal until the product functionality and performance surpass the parameters of their offerings. At that time, partners can make strategic decisions about their future cooperation with the value chain leader. Technology management literature mentions *sailing ship effect* (Howells 2002), where the introduction of a technological innovation induces significant improvements to older technologies, as incumbents try to defend their positions. The substitution patterns involving high-tech value chain leaders are sources of innovation among complementors, making them re-evaluate existing strategies and directing their interests towards new technological domains, especially if the substitution is pre-announced. The technological substitution inevitably accompanies high-tech value chain partnerships, but as opposed to the traditional model of disruptive innovations, the innovating company (chain leader) and incumbents (complementors) do not always compete, often jointly passing the transition period. Even though certain high-tech niches are closing, related niches emerge, and entry costs are relatively low for specialist companies, which could re-use their capabilities and core technologies.

Management researchers interpret this phenomenon as a consequence of market development processes, where niches are gradually absorbed by ex-

panding all-purpose platforms. Although small firms tend to excel in specialized, narrowly-defined market segments, as soon as concerned product categories become popular among mass-market customers, large generalist firms can better address the demand (Romanelli 1989: 376). Although the technology platform extension comes at the expense of niche players, it actually improves the "ecosystem's overall health" (Iansiti and Levien 2004: 77), and could benefit even the affected complementors, providing that they learn how to balance existing skills and technologies to keep up with the changes. Organizational decline is an important source of innovation, particularly when the causes of this decline are stable and foreseeable (Mone et al. 1998: 124), as in the case of the phased entry into a new domain by the value chain leader, who discusses the intended strategic directions with partners to prepare them for the transition. Explicit pre-emptive announcements benefit the complementors, as otherwise they might fail to anticipate the upcoming decline of their segments. On the other hand, the reactions of complementors and choices of corrective strategic actions may also deepen the crisis (Weitzel and Jonsson 1989: 97), so value chain leader should counter these threats by not only announcing his intentions, but also offering new opportunities for existing partners.

The impact of substitution on a complementor depends on the value chain segment where the company operates. Segments closer to the end customer (including software and services) offer many differentiation possibilities and are based on socially constructed technologies, so firms can easily adjust their strategies to stay aligned with the chain leader. Lower segments of the chain are in turn focused on cost efficiencies and technical performance, so the substitution can pose serious threats to the concerned companies. They can reduce the risk by offering solutions to business requirements, not only bare infrastructure or components (this could be done either by entering other chain segments, or by *engineering demand* for own products: stimulating development of other segments, as Intel did for its processors by boosting the development of multimedia applications).

The bigger the distance within the value chain between two partners, the less likely the substitution: diverse chain segments require distinctive capabilities and experiences, while complementors operating in the same seg-

ment as the chain leader are most susceptible to substitution. Complementors operating in an area where the chain leader enters, have four strategic options:

- focus and complement the chain leader – by finding new applications, adding value to the leader's solution, and moving with him towards new markets;
- do nothing – with inevitable competition against the stronger partner, which can be justified if own installed base is strong and loyal;
- change position within the same value chain – for example software providers may work on vertical applications, adding business logic and other content elements, and emphasizing the service delivery;
- move to another value chain – where the existing technology could be reused after some modifications, but without radical changes to the underlying skill base, and the company decides to join a value chain competing against its previous partners.

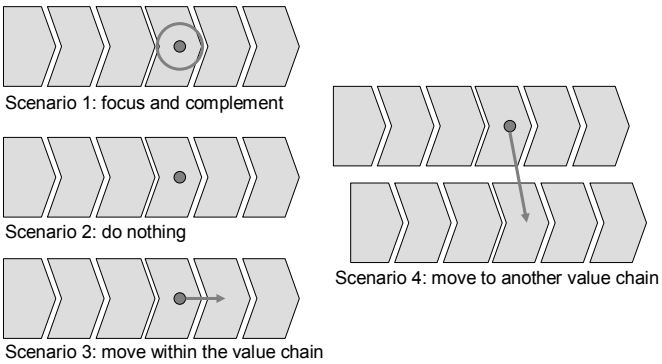

Fig. 17. 4 scenarios for a complementor substituted by a value chain leader

Each of the scenarios requires acquisition of new skills and thus involves additional costs – even in the "do nothing" scenario, the company has to improve own sales, marketing and service capabilities to maintain and grow its own user base independently.

Stronger companies may also choose to work with several value chains, or diversify business by pursuing several options at once – this however means parallel development and support of products based on multiple technology platforms, thus requiring diverse knowledge bases, complex testing procedures and needs to regularly adjust to changes of all the supported platforms. Staying loyal to the existing partner – either by focus and complementing his new products, or by moving to news positions within the same value chain – means access to a more limited, narrowly-defined market, but also better chances to penetrate it and benefit from an established relationship with the chain leader, motivated to promote the business of his loyal partner. Strategic management literature recommends smaller niche players to disinvest instead of defending their focus areas, when aggressive new entrants have superior resources and lower return-on-investment targets (Porter 1985: 512). Although the postulate to give up existing product domains and look for new opportunities within the same value chain may seem cruel and unjust for small niche players, the following section will discuss the benefits of this scenario, presenting examples of specific partnerships evolving over time.

5.3 Evolution of cooperation

5.3.1 The case of Symantec

High-tech marketing bestseller „Inside the tornado" offered recommendations for transforming own business from a niche positions to mass-market presence by gradually expanding product and customer bases, approaching new niches in a way resembling pushing balls through a bowling alley (*bowling alley model*) and finally, once the installed base is strong and product portfolio diversified, radically changing the marketing approach to come "*inside the tornado*" (Moore 1998). Although not every company may really aspire for the mass-market leadership (and thus reach the final stage of the market development cycle), these recommendations emphasize the evolutionary nature of niche strategies. As previous remarks about the substitution and commoditization patterns indicated, complementors need

to transform their businesses, reacting to changes in the market, often directly caused by value chain leaders. Returning to the ecological analogy, presented earlier in this chapter, ecosystems regularly create new niches, but degrade the older ones, "reduced diversity at one level can lead to the creation of a stable foundation that enables greater and more meaningful diversity at other, sometimes higher, levels" (Iansiti and Levien 2004: 73). Strategies of complementors could benefit from the dynamics, as any expansion of a technological platform means not only destruction of existing niches, but also creation of new opportunities for innovation. The benefits of this perspective will be presented in the following analysis of relations between Microsoft and its partner Symantec.

Symantec was an important complementor of Microsoft since the early 1990s, and one of the largest PC software companies, selling developer tools, utility and antivirus software. Symantec's product portfolio was changing over time in response to market trends, platform technology development and Microsoft's moves, as consecutive versions of Windows and other programs offered functionality, previously available from the complementor.

The partnership was clearly difficult for both parties, which at times were making decisions harming their reciprocal businesses, yet were still relying on each other. In the middle of the 1990s, Symantec was focused on software development tools, Norton utility package, and contact manager Act, predecessor of future groupware solutions, in all these areas working only with DOS-Windows and Macintosh operating systems. Windows 95 bundled numerous utilities, which before had been offered by third-party vendors including Symantec - but the system launch offered Symantec an opportunity to introduce new generation Norton tools, complementing the standard Windows functions: Norton Utilities with Disk Doctor, System Doctor, Space Wizard (helping locate and remove no longer needed files on disk drives) and Speed Disk (optimizing disk's read and write operations), Norton Navigator (managing files and FTP transfer), Norton Antivirus, and Norton Desktop Administrator (helping system administrators migrate multiple PCs to Windows). The popularity of Windows 95 boosted Symantec's sales, even though the company had to give up past sources of

revenue (for DOS, Norton Commander was the most popular way of browsing and managing files, replaced by Windows' comparable native functionality.

Microsoft worked with Symantec on dedicated developer tools for the new operating system, encouraged the company to offer utilities for NT platform, and to commit to support also Windows CE devices. Microsoft was however also close with Symantec's direct competitors. The company offered royalty-free access to Windows source code to antivirus specialist McAfee Associates and licensed McAfee's technologies to include them in own Internet server. It cross-licensed tools, agreeing on joint projects with development tool vendor Rational, and strengthened relations with Computer Associates, which was competing against Symantec in multiple areas. Microsoft decided later to purchase Computer Associates' InocuLAN antivirus product to use it internally, ignoring Symantec's long track of records in comparable solutions for Microsoft platform. Similarly, Symantec entered several domains, which were potentially harmful to Microsoft: integrated its Act with Lotus Notes and Palm, released Java development environment and HTML editor, and outlined plans for own videoconferencing solution. All these small steps and decisions were disturbing the partnership; moreover Windows 98 included even more bundled functionality, previously available at an additional price from Symantec, among others backup and recovery tools. At the same time, Symantec modified its strategy, disposing of networking applications and software development tool businesses, and consequently focusing on software, which could add value to Microsoft products: antivirus, desktop faxing and specialist utilities. Microsoft rewarded the efforts by licensing entry-level version of Symantec WinFax and bundling it with Outlook, what helped increase WinFax's installed base and encourage customers to upgrade to the full, paid edition.

In 2000, Microsoft started acknowledging the significance of antivirus protection for its products and services, but apart from Symantec, it worked with its competitors (McAfee, NetScreen, Trend Micro and Iron Port), released own Internet Security and Acceleration (ISA) server for protecting corporate networks, and finally entered in the desktop security domain by

acquisitions and product releases, substituting many of Symantec's products.

The moves could trigger competitive responses from Symantec, and there were many other cases, when both companies had different views about the market (including contradictory proposals to the U.S. Senate on how to fight the wide-spread problem of spam e-mails, or choices of embedded systems for security appliances), but the company instead accepted the inevitable commoditization of certain product domains, focusing on value-added solutions and not damaging its relations with Microsoft. Symantec released an own security solution as an add-on to ISA (even through the technology could also be packaged as ISA's competitor), enriched product portfolio by anti-spam software, and initiated merger discussions with storage application specialist Veritas Software.

The overview of 10 years of cooperation suggests that the smaller partner was many times forced to align his product portfolio with the expanding Microsoft's platform, giving up previously key areas. At the same time, Symantec never really abandoned Microsoft's value chain, realizing the co-dependence and need to work with this technology as the dominant computer operating system. Despite many missteps, the relationship benefited from cumulative trust building and maintained closeness, which in the figure 18 is represented by the physical distance between the two companies at a certain time. Graphical divergence vectors represent situations, when one company intentionally makes a decision negatively affecting its partner, or when several seemingly harmless actions jointly have a similar effect. The latter case refers also to situations, in which Microsoft was not clearly signaling real intentions, thus confusing partners. For example, it licensed Java from Sun Microsystems, later deciding to promote own ActiveX standard for web applets instead – in the meantime, Symantec worked on dedicated Java developer tools and maintained them for the following four years. Similarly, Symantec's investments in personal firewall or anti-spyware technologies seemed initially instrumental in promoting Windows and its security, but as soon as Microsoft unveiled plans for releasing own counterparts, the companies clashed in the concerned areas. Paul Watzlawick, theorist of interpersonal communication, stated that "one

cannot not communicate" – even unintentional statements or actions, seemingly not influencing the communication process (or partnership in the case discussed here), will nevertheless be perceived, interpreted and acted upon by the other party (Craig 1998). Within the broad context of strategies and technology development, effects of initially unrelated actions can accumulate and change the relationship. The previously described mechanism of tacit collusion is not perfect, and corporate strategies cannot be ideally aligned without open communication about plans and intentions justifying certain decisions. While in most areas these plans were discussed in detail with partners such as Symantec, some elements caused confusion and conflicts.

The partnership between Symantec and Microsoft demonstrates also limitations of the traditional analytical framework for dyadic alliances, where researchers focus on the timing and number of recurring ties, ignoring their qualitative characteristics. The trust in interorganizational relations builds up over time, and focus of the joint cooperation evolves. The extent of possible evolution is best demonstrated by Symantec's product portfolio: starting with developer tools and contact manager software, later focusing on PC utilities, antivirus software, and finally offering integrated enterprise security and storage solutions. Every partnership is embedded in historical and technological context - effects of single decisions on the relationship cannot be understood without this background, moreover even a single decision negatively affecting the partner will not necessarily undermine an effective partnership.

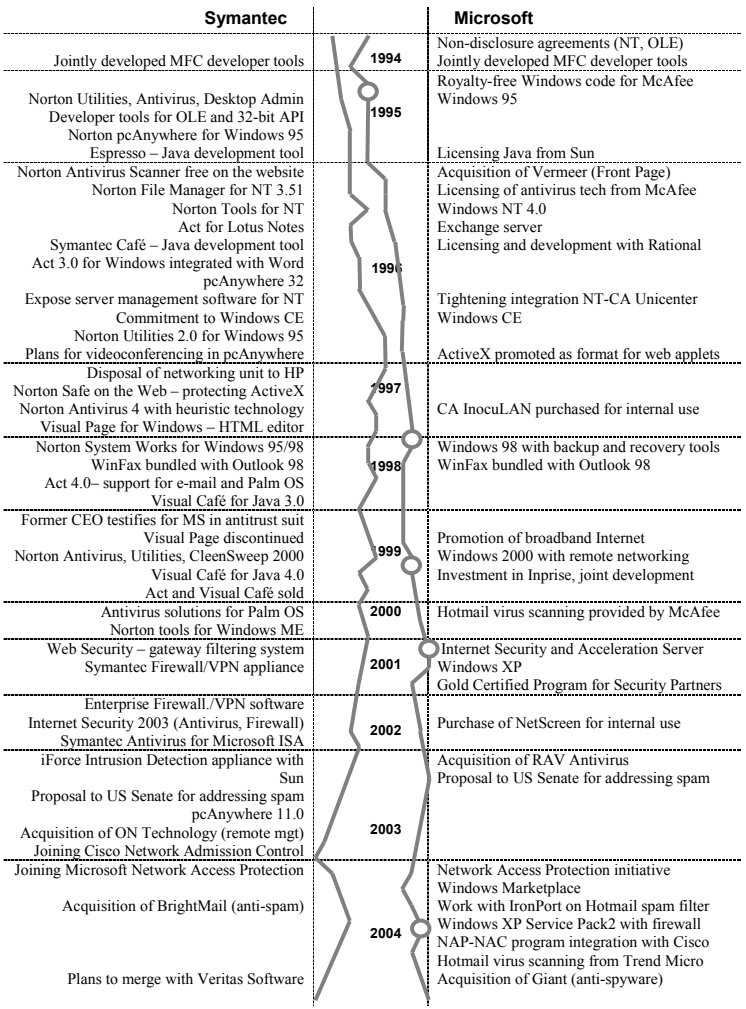

Fig. 18. Relations between Symantec and Microsoft, 1994-1999 – substitution, complementing and cumulative trust building

5.3.2 Synchronized strategies of partners

The metaphor of learning race assumes that partners have precisely defined objectives and development roadmaps, and the most successful company can learn faster to substitute the other party. The case demonstrated however, that technological alliances between high-tech value chain leaders and their complementors could rather be interpreted as two evolving and synchronized paths, representing the diversification of both firms' products.

The model of bowling alley is used to describe the sequence of events, in which a niche player gradually extends his product and target market, moving from the initial niche to other, related segments, by capitalizing on existing capabilities and product components (Moore 1998: 38-39). While consequently maintaining its niche character, the company goes through a "*bowling alley*", diversifying into new niches until it has a sufficient installed base to consider approaching mainstream customers.

The limitation of the bowling alley model is however the existence of the value chain leader, who may in parallel extend own technological platform to capture additional customer segments and undermine his complementor's strengths. The complementor certainly has to go through his own bowling alley to maintain technological lead and generate revenues from new customers, but he also needs to sacrifice some of the segments, which he used to harvest in the past, and which become captured by the expanding platform of the value chain leader. These segments do no longer offer new revenue opportunities for the complementor – while the future growth source lies in the ongoing cooperation with the stronger partner, so that both companies can move towards new applications and markets. Partnership-based technology roadmapping and strategic plans of complementors should take into consideration the interests and intentions of the value chain leader. While this attitude may seem over-submissive, it presents a very effective way of exploring future opportunities and maintaining close links with the technology platform leader.

The level of synchronization between partners' bowling alleys corresponds to the intimacy of the partnership, but also indicated potential conflict areas. Incidental collisions in the bowling alleys change product strategies – usually the smaller company gives up some of existing cus-

tomer segments and applications, and this implicit agreement over strategic directions resembles the *tacit collusion* described by economists (Jayachandran et al. 1999: 51; Martin 2002: 294, 327). The process could also be presented as a metaphorical dance, where one partner leads, and the other one agrees to be led – without the arrangement, wrong steps, different rhythms and struggles for control would turn the dancing into a particularly unpleasant experience. As every dance, the cooperation may however end, if partners decide to terminate it – from that moment on, strategies no longer have to be synchronized. This perspective differs from the concept of partner attachment (Inkpen and Beamish 1997: 194-195), emotional linkages and loyalty, developing over time.

Core capabilities, converted in successful products, may turn into core rigidities, becoming dysfunctional and inhibiting future developments if the concerned companies do not innovate (Leonard-Barton 1992). Particularly firms in the dynamically changing high-tech market have to go through constant change and renewal processes - partnering with an "aggressive" value chain leader additionally stimulates the innovativeness by substitution and commoditization of older product generations, accompanied by the creation of attractive new opportunities. Former Symantec's chairman Gordon Eubanks, testifying at Microsoft's antitrust trial in 1999, said that in the software industry, "you either have to be aggressively looking toward the future or the future will overtake you. You don't have time to rest on your laurels and rake in the gold" (Wasserman 1999b). Six years later, when Microsoft entered the antivirus market and analysts interpreted this as an upcoming war with the partners, Symantec's CEO John Thomson explained to investors that: "we applaud Microsoft's security initiatives. They are very necessary but, in my opinion, not sufficient for large enterprises. They don't offer a cross-platform heterogeneous solution and genetically they may be incapable of doing so. That's why Symantec and other purpose-built security companies will always be a better alternative" (Symantec 2005b).

In other context, he added that: "I think anyone in the software business is inevitably going to compete with Microsoft because Microsoft has such a large footprint in the industry. And for those of us who support the Win-

dows environment, in the infrastructure space, you're going to end up competing with Microsoft. That's inevitable. It is inevitable based upon the interest that we have to innovate around the Windows environment, and it is inevitable based upon the revenue growth, appetite, and interest that Microsoft has. And so them as a competitor and partner is not something that anyone in the industry should find to be unique or different" (Symantec 2005a).

The words are in a surprising congruence with opinions of Microsoft's Bill Gates, who in an interview with CNET News.com in March 2005 explained: "The history of Windows is that we do something in the platform and then there are some things missing that sell in high volume as add-ons. If a broad set of people want the thing, then in some future version (we add it). We're very clear; we show people, we tell them and then we build it in the system. People used to buy TCP/IP stacks. People used to buy basic backup software. People used to buy fonts. At least nominally, people paid for browsers... When you come into the world of software you know that if you are up at a higher level and you have something superimportant, it's going to move down, down, down and eventually be part of every copy of the operating system if it is something superimportant. Security is a very broad topic. There are so many different pieces of security, which creates immense opportunity for people like Symantec - if they keep innovating. There will be some things that they do that will move into the platform. We're very open with those guys. We talk to them every day, massively... We will get the benefit of the platform getting better and those partners continuing to add value" (Fried 2005).

The discussion reveals also that complementors should be pro-active – they cannot always rely on value chain leaders and expect them to promote and sell specialist products. Despite their reliance on stronger partners, niche players need to excel both in product development and marketing. Product innovations are needed to continuously extend capabilities and technology, so that new niches could be addressed, protecting the companies from being simply substituted by chain leaders. Marketing efforts help approach target customers – even though there was an obvious fit between Windows platform and Symantec's products, Microsoft had also other

complementing alternatives. Symantec was always competing against other Microsoft's partners, so it had to stay close to customers, promote products and establish appropriate distribution channels (e.g. by building relations with OEMs, shipping the software with every sold computer). Niche players need to think, how to promote their value propositions across the entire high-tech value chain, combining them with products of the chain leader and companies from other segments. As previously demonstrated for DoCoMo's trusted partners, they were in constant competition, forced to innovate and promote own offerings, as the value chain leader was intentionally maintaining relations with several comparable companies. Niche players need to add value to the business of the value chain leader and his end customers, but also make all other involved parties realize the value of complementary offering.

6 Contractors

6.1 Service orientation in the high-tech value chain

6.1.1 Service as product alternative

The present chapter concerns the last strategic role in the high-tech value chain: contractors or service providers. Such companies maintain no contacts with end customers, working for other chain participants, who use their manufacturing capacities or programming skills in own product development processes. Recent developments proved that contractors from India or Taiwan were able to capitalize on operational efficiencies and partner linkages, gradually establishing strong competence bases, own products and brands, and in some cases even turning against their previous corporate sponsors. Established electronics and software vendors rely heavily on external contractors, exposing themselves to potential threats of vertical integration, which potentially could be more disruptive than the substitution patterns in relations between chain leaders and their complementors.

The distinction between tangible products (such as hardware), information goods (software, content including business knowledge, reference models, processes or data structures) and accompanying services has not always been obvious in the history of the industry – in the 1950s, IBM was offering bundled solutions, including software, maintenance and training services in the initial price of hardware, and only the decision of anti-trust authorities forced the company to abandon the bundling practices and offer opportunities for other players (Attewell 1992: 11-12). Similarly, early patterns of I.C.T. use by client organizations involved working with external data processing bureaus, owning mainframes with necessary software solutions, and delivering transaction processing services (Attewell 1992: 9-10) – ownership of technical infrastructure has not always been regarded as essential, what explains the current popularity of outsourcing. The entire IT

services and software industry emerged from custom software development and "recycling", where generic, standardized software platforms were tailored to the requirements of individual client organizations (Attewell 1992: 12).

The historical context helps understand why nowadays all high-tech product businesses involve also service elements – from after-sales support to implementation, maintenance and product modifications. Software companies supplement their solutions by services, including ongoing technical support and product updates, purchased by customers on an annual basis, forming recurring revenues. A recent analysis of revenue structures for major enterprise software vendors revealed that the share of service revenues increased dramatically in the recent years, exceeding the product revenue levels (Cusumano 2004: 37-42). Another tendency is the growing diversification of product platforms, eliminating the needs for external services – developers of standard systems supplement them with modules, addressing the requirements of specific narrowly-defined groups of customers (including vertical solutions of ERP vendors, described in the previous chapter, developed to cope with the growing commoditization of the underlying platforms), or helping speed-up the implementation process (by offering recommended methods, toolsets and pre-configured modules – e.g. ASAP methodology from SAP, facilitating the implementation of its product, or comparable Fast Forward methodology from Oracle). The distinction between product and service is blurring, as customers look for complex solutions, not simply off-the-shelf products. This view of industrial purchasing is prevalent in modern marketing, following the whole product model, where service functions as a natural "product augmentation", desired by customers (Levitt 1980: 85-88), and has earlier been presented as the basis for the high-tech value chain.

The following discussion will however focus on a broader understanding of the term "service", presenting it as a possible strategic orientation for participants of high-tech value chains. Companies may decide to act as "servants", working as contractors of other vendors, having no or only limited contact with end users. In this perspective, every segment of the value chain can function as a service: software code written specifically for an-

other company, hardware assembled based on orders from other vendors, chips manufactured as specified by their designers. In the recent years, entire national industries have experienced stunning growth rates thanks to the adoption of service orientation, with the most prominent examples of Indian software developers and Taiwanese electronics manufacturers. The strategy can be as profitable as the pursuit of the two other strategic orientations in the high-tech value chain, but has its distinctive rules, not always realized by players. Moreover, successful service providers can gradually move towards niche player or even chain leader positions, if they consider it appropriate, benefiting from the competencies built at a relatively low cost and risk.

High-tech firms use multiple sales models, while specific models are particularly well-suited for particular value chain positions:

- direct sales - the ideal model for a value chain leader, maintaining close contacts with users, and thus managing the entire platform (by recommending appropriate add-ons and guiding the customers through technological changes) and its installed base (inducing lock-ins and customer loyalty, and controlling contacts between niche players and platform users);
- indirect sales – the model matches the strategies of value chain complementors, who can tap into chain leader's installed base and reduce channel conflicts, receiving signals from their stronger partner or own distributors about possible overlaps in technology roadmaps or platform changes;
- subcontracting or technology licensing - correspond to the role of contractor, doing his work for another value chain player.

The models fit precisely into the recommended strategies of value chain players – but the actual sales processes may differ from the model situations. For example, Microsoft decided to reduce possible channel conflicts and let partners distribute software and maintain contacts with end customers (with the exception of key customers, where Microsoft keeps the priming role).

Interestingly, even companies offering packaged products can adopt the service orientation through technology licensing – a good example is the

British software developer Picsel Technologies, provider of a specialist document viewer for mobile phones and portable computers. Picsel was disadvantaged due to its relative late entry into an already crowded market – but the company decided to adopt the service orientation, targeting other high-tech value chain players instead of end users. The company licensed its technology to electronics firms, including Motorola, NEC, Sharp and Sony, as well as telecom operators NTT Docomo and China Unicom, who embedded Picsel Browser in their devices, establishing its installed base and allowing Picsel to focus on core development, not large scale marketing, usually costly for a small software startup.

Another example of service orientation is offered by strategies of companies, developing mobile phone chipsets. Qualcomm is an aspiring value chain leader, trying to build compelling value propositions around its chips with complementary infrastructure and software platform BREW, ARM prefers the position of a complementor, working closely with software vendors and electronics companies (being the processor of choice for mobile phones from Nokia, LG, Philips, Samsung and Sony-Ericsson), while Renesas Technology and Yozan were pursuing a more service-oriented strategy, relying on contracts for custom chipset development from NTT DoCoMo[12]. Customization is the underlying principle of service orientation – contractors usually offer tailored solutions for specific partners based on underlying technology platforms and components, optimizing costs and benefiting from experience effects.

Similarly, also hardware manufacturers may decide not to use their own brands and rely instead on orders from other firms. Handset makers working with NTT DoCoMo benefited from regular orders placed by the telecom operator and distribution of phones through his retail network. Taiwanese firms dominate the global consumer high-tech market, but their products are sold under the brands of leading Western and Japanese electronics companies, who rely on them to design, develop and manufacture the devices. Many of the firms were established hardware product vendors (at least in their local markets), but reoriented their strategies witnessing

[12] Yozan exited the semiconductor business in 2002, becoming an Internet Service Provider.

commoditization of products, decreasing margins and needs for substantial investments to build brands in consumer markets. Similarly for Japanese electronics companies, the opportunity to work with DoCoMo and benefiting from repeating handset orders during the economic recession was attractive even if they were not able to actively promote their brands and control all aspects of the end customer experience.

For companies using contractors, the externalization can be particularly useful to deal with mature or declining technologies, as it helps reduce costs and risks of maintaining them (Roberts and Liu 2001: 28-30). The cooperation can take several forms, ranging from a scenario where the focal company provides detailed technical specification, through a contractor's involvement in the design of components, up to the cases, where the contractor is responsible for the entire problem solving process related to a product's component or an assigned project (Sobrero and Roberts 2002: 170).

Japanese supply chains in automobile sector were traditionally based on close involvement of suppliers in the design process of the final product, and DoCoMo's case presented a parallel from the telecommunications and electronics sectors. American organizations followed a different route, initially relocating relatively simple assembly operations to neighboring low wage countries such as Mexico, Puerto Rico or the Philippines, driven by the need to reduce cost of the concerned processes (Amoribieta et al. 2001: 130). Later Taiwan and China emerged as important supply markets, and in 2003, all forms of contract manufacturing represented about 17% of world's total electronics production (Electronics Weekly 2004).

The scope of externalization was gradually extended to encompass not only manufacturing operations, driven by cost advantages resulting from effects of scale and relatively lower salaries, but also knowledge-based research and development activities. While the relocation of corporate R&D centers to countries with abundant and skilled labor force became an important element of internationalizations strategies already in the 1980s (Pisano 1990), the idea to spin off the knowledge-intensive tasks is relatively novel. It is certainly more risky than the relocation of production, as knowledge and innovation are critical sources of competitive advantage.

While transaction cost theory helps explain the economic rationale behind R&D outsourcing, its impact on organizational knowledge bases is more problematic, especially when the ownership of new knowledge, generated based on a specific contract, is discussed (Pisano 1990: 159-160): not everything can be protected by intellectual property rights, and contractors can benefit from knowledge spillovers, gaining experiences, which could enable them to work on similar problems with other clients.

Empirical studies indicate that R&D outsourcing is increasingly used to solve the problems of R&D budget reductions and to increase the time-to-market in new product development processes - surprisingly also for essential technologies (Kimzey and Kurokawa 2002), what could make the companies critically dependent on their subcontractors.

6.1.2 Example of contact manufacturing

The increasing use of outsourcing transforms supply chains and changes the ownership of intellectual property rights. In electronics manufacturing, service providers are "becoming not just the screwdrivers and soldering irons behind the high-tech economy, but the brains as well" (Shankland 2000). Intellectual property used to be an important differentiator for OEMs (Original Equipment Manufacturers – large electronics companies), selling branded, in-house developed products – but the IP is nowadays migrating to component suppliers and contractors, while OEMs loose abilities to differentiate themselves from competitors, face decreasing margins and are attacked by newcomers, as the entry barriers to electronics markets are particularly low: any company can rely on a service partner for product development and manufacturing. Contract manufacturers from the 1980s were operating in low wage countries and working for dedicated clients-partners. These companies gradually transformed into Electronic Manufacturing Services (EMS) firms, offering additional specialist services, operational efficiencies and technological flexibility. They were working with multiple clients, focusing on economies of scale and volume pricing. Major OEMs adapted their business models to the opportunity by reducing own manufacturing capacity and relying on external manufacturers, who in turn were willingly taking over their clients' plants and opening factories close

to key markets. Table 11 lists the largest EMS firms in 2000, presenting their dependence on small groups of corporate clients, as well as relatively low percentages of production capacities in low wage countries. These inefficiencies made the EMS providers vulnerable to attacks from new Asian competitors.

	Solectron	Flextronics	Celestica	SCI Systems	Sanmina	Jabil Circuit
revenues 2000 (mln USD)	16,999	11,224	9,752	9,151	4,538	3,998
% of revenues from 10 largest customers	66%	62%	86%	>70%	49%	75%
customers accounting for over 10% of revenues	Ericsson (13%), Nortel Networks (12%)	Ericsson (26%)	Sun Microsystems (20%), IBM (20%), Lucent Technologies (10%)	HP (10%), Dell (10%), Nortel Networks (10%), Echostar Communications (10%)	NA	Cisco (23%), Dell (13%)
capacity in low cost locations (China, Mexico, Eastern Europe)	15%	30%	13%	21%	8%	28%

Table 11. The largest EMS firms, 2000. Data source: Fleck and Craig 2001: 54-56

At the turn of centuries, a new group of knowledge-based service providers emerged – Original Design Manufacturers (ODMs), mostly located on the small island of Taiwan. They are focused on R&D management, not manufacturing efficiencies, offering OEMs ready-to-reuse products and product reference designs. In 2004, about 80% of all laptop computers sold worldwide were actually manufactured by Taiwanese companies (Wendin et al. 2004: 7), but an average computer user is not familiar with the names of even the largest ODMs, as their products are branded by well-known electronics companies. When Dell shifted in 2001 its orders for computers

from the American EMS Jabil Circuit to Taiwanese ODMs Compal and Quanta, other Western firms followed the trend and traditional EMS companies ended up with unused manufacturing capacities in expensive locations and financial troubles, as their revenues were strongly dependent on relations with individual large clients. The largest EMS players experienced low or negative profits in the years 2001-2002 (Wendin et al. 2004: 10-11), and decided to supplement their business portfolios by own ODM divisions. ODMs are in turn able to prosper due to a different market approach: although they work like EMS firms exclusively with OEMs and are dependent on large orders, they can capitalize on economies of scale by working with several clients on similar products: generic technological design of a product is customized and offered in multiple versions, with slightly different industrial designs and functionalities. As a result, the same base technology, developed by an ODM, is used in seemingly different products from several competing OEMs.

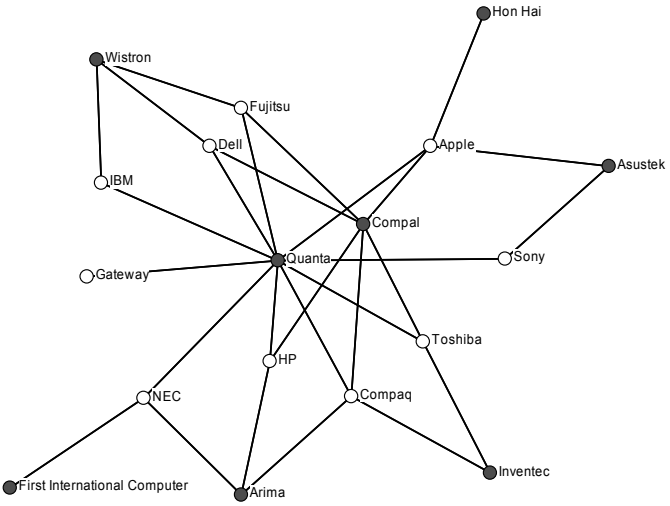

Fig. 19. Network of relationships between laptop computer vendors and ODMs. Data sources: Werner Heuser, Laptop and Notebook Manufacturer-OEM Relation Matrix, http://tuxmobil.org/laptop_oem.html, updated with information from multiple other sources in February 2005

ODMs are additionally able to improve product designs through relations with both component suppliers (Taiwan is the global leader in component design and manufacturing) and EMS firms (ODMs usually work with trusted contract manufacturers in mainland China). As a result, they can optimize cost, size and technical parameters such as energy consumption – and practically manage the entire supply chain, leaving to OEMs only the branding and sales of goods, designed, manufactured and delivered to them. A manager in a large electronics company can simply meet an ODM representative, go through a catalogue of industrial and functional designs, select any model he wishes, negotiate commercial terms and wait for the delivery of the packaged product with his company's logo imprinted to assigned distribution centers. The convenience comes at a price: ODMs grow in power, and OEMs are increasingly dependent on them, reducing own R&D activities and relying on third-party IPRs.

Offshore development and manufacturing of high-tech products is an obvious scenario for all electronics hardware vendors. The cooperation patterns are still heavily dependent on individual transactions, for example laptop manufacturers are frequently rotated for subsequent product lines, as the technology behind a laptop computer is commoditized, and cost remains the major decision factor. Table 12 lists EMS and ODM partners of Apple Computer for various product categories – for specialist offerings, key to Apple's strategy, such as the portable digital music player iPod, partnership patterns are more stable. Recently, product designs offered by ODMs include not only low-end mature technologies, but also newest electronics gadgets, as the companies understand that innovation is key to establishing long-term relations with specific high-tech partners and maintaining high profit margins.

Product group	Model	Contractor
Notebook computers	Aspire 1300	QUANTA Computer
	eMac	Hon Hai Precision Ind.
	iBook	Asusalpha Computer.
		ASUSTeK Computer
	iMac	QUANTA Computer
	Mac mini	Foxconn Electronics
	Powerbook	Asusalpha Computer
		ASUSTeK Computer
		Compal Electronics
		Hon Hai Precision Ind.
		QUANTA Computer
	Power Mac	Hon Hai Precision Ind.
Desktop computers	iMac	Hon Hai Precision Ind.
	Mac G5	Hon Hai Precision Ind.
Computer peripherals	AirPort Express (networking)	Hon Hai Precision Ind.
	Isight (digital camera)	Ability Enterprise Abico
		ViewQuest Technologies
Portable music players	iPod	Hon Hai Precision Ind.
		Inventec Appliance
	iPod Mini	Inventec Appliance
	iPod Photo	Inventec Appliance
	iPod Shuffle	ASUSTeK Computer
	iPod U2	Inventec Appliance

Table 12. List of contractors, designing and manufacturing Apple's products. Data source: Taiwan High Tech Research, Apple's OEM-ODM relationships, January 25, 2005, http://www.emsnow.com/npps/story.cfm?ID=9270

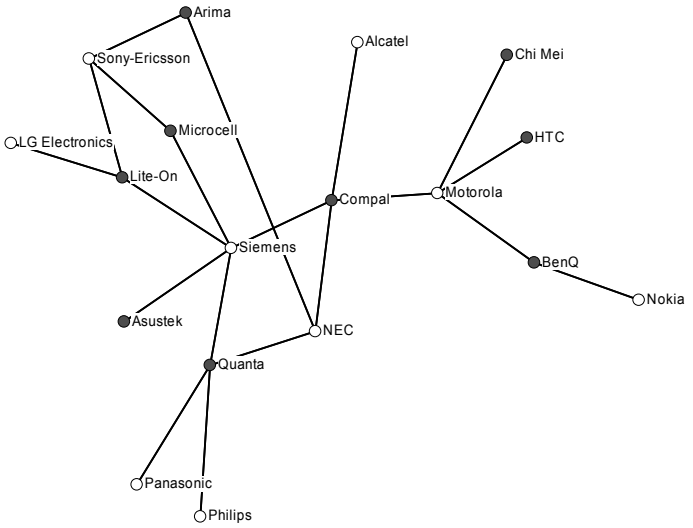

Fig. 20. Network of relationships between mobile phones vendors and ODMs. Data sources: iSuppli handset supply analysis, September 2004, http://www.emsnow.com/npps/story.cfm?ID=6903, updated from multiple other sources in February 2005

Microsoft was actively using ODMs to promote its operating system for portable devices such as PocketPCs, smart phones and smart displays. Microsoft was not able to convince major brands to use Windows CE in their appliances. Companies were afraid of the monopoly threat, and preferred to keep their options open by working with several platforms – but the development of advanced products would require substantial investment, which could not be recouped without strategic commitments. Telecom operators turned out to be a similar deadlock, focusing on telecommunications standards and leaving the decision about handset design to hardware companies. Microsoft discovered however that major electronics companies were sourcing their products from Taiwanese ODMs – an alliance with ODMs, providing reference designs and product customization services, could therefore be more effective than individual co-option of the major brand makers. In the middle of the 1990s, Microsoft and Intel were jointly developing reference designs for new generation

oping reference designs for new generation products, which were subsequently shared with companies such as Dell, HP or Compaq, using them to manufacture final products. Several years later, Microsoft spotted important shifts in the hardware industry, and decided to work with ODMs instead: the company was ready to invest to train and support selected Taiwanese and Korean companies, which were subsequently preparing multiple product designs for new devices, and actively selling their concepts to major brands. Importantly, the activities formed their core business, so Microsoft did not need to worry about their motivation to cooperate on product development and promotion among largest electronics and telecom companies, as long as there were no threats from alternative technology platform makers.

Taiwanese ODMs turned out to be excellent allies for Microsoft - highly popular smart phones, launched in the recent years and branded by Orange, mmO2 and T-Mobile, were developed and manufactured by the most important Taiwanese partner of Microsoft, HTC. Cost of developing such high-end products is substantial, and every telecom operator or hardware maker may only sell limited quantities in his market – but HTC was able to achieve synergies and economies of scale, customizing the designs for specific clients, while still benefiting from the same initial R&D investment. Partners of ODMs can quickly offer new specialized products even in small series, diversifying at low cost and risk. Nokia remained the last major phone maker not using ODMs, but even this mobile giant finally decided to place its first order with BenQ in 2004. BenQ crowned its strategic transformation with a surprising acquisition of Siemens' mobile phone arm to become one of the leading global handset manufacturers. Meanwhile, ODMs gained substantial experiences and strong bargaining positions – nowadays, NTC works also closely with Microsoft's direct competitor in the mobile phone market Palm, and BenQ releases own branded products, competing with its previous clients.

6.1.3 Example of contract software development

Changes in the software industry parallel the above described tendencies in the electronics market. Major software vendors outsource certain develop-

ment activities to foreign specialist firms, starting with relatively simple tasks such as product testing, but quickly moving towards even core development areas. Contract software developers (nowadays also referred to as offshore developers, as they tend to be located abroad) belong to a wider category of IT service companies, encompassing other also types of businesses such as:

- IT consulting companies - providing advice and delivering projects to corporate customers;
- system integrators - focused on custom development to integrate various technologies for specific customers;
- vertically integrated IT services organizations - which offer complex solutions including own hardware and software;
- IT outsourcers - divided into:
  - companies specializing in *managed services* - technical administration of customer's IT infrastructure;
  - *Application Service Providers* (*ASPs*) - supplementing the management of clients' infrastructure by own offering, e.g. standard e-mail, document archiving or accounting systems, attracting small and medium size organizations;
  - *Business Process Outsourcing* (*BPO*) firms – taking over entire business processes such as customer service or payroll processing.

The typology remains problematic, with many overlaps and confusing terminology – for example, the term "system integrators", which once used to be applied to specialized firms actually integrating diverse, incompatible technologies for customers, nowadays tends to denote all types of IT services organizations, implementing technology solutions for their clients. Boundaries are also blurring between consulting companies and outsourcers, as managed services and BPO seem to be natural successors of previous implementation services, requiring similar skills and technologies. Additionally, vertically integrated IT services organizations such as IBM, HP or Fujitsu, are no longer selling proprietary solutions only, trying rather to earn money from a wide variety of technology platforms.

Alternatively, IT services companies could also be divided into several groups depending on their focus on distinctive stages of the process of or-

ganizational innovation with IT, described by Ramiller and Swanson (2003: 8-9)[13]:

- development phase – firms providing services to developers of high-tech solutions, helping them build products for end customers, and selling services such as custom development;
- comprehension and adoption phases – companies selling to end customers complex systems, end-to-end value chain solutions, through costly and time-consuming sales processes requiring them to offer visions and business reasons to adopt the innovation;
- implementation phase – providers of consultancy and technical services, dedicated to a specific technology platform already selected by the customer, benefiting from the sales job done usually by another party;
- assimilation phase – companies helping customers effectively use the implemented technologies through customization, development of add-on modules, training, or support services;
- phase of everyday use – firms providing outsourcing services to optimize maintenance costs of implemented platforms.

Each of the phases calls for distinctive sales approaches, differing in marketing techniques and types of sales arguments. Surprisingly, the underlying technology-related capabilities are common for all types of companies – knowledge of a specific technology platform can be embedded in various services, ranging from the implementation of the platform for end user organizations to the development of connector modules for vendors of other systems, enabling integration with the platform. Financially stronger companies can focus on the comprehension and adoption phases, working with customers to convince them to purchase complex solutions – while smaller players are able to successfully sell their services by focusing on other phases of the IT innovation process.

The development phase is particularly attractive for startups: the target customer group is precisely defined as other companies in the same value chain (both chain leader and complementors), sharing similar specialist

[13] The original Ramiller and Swanson's (2003) process of organizational innovation with IT does not include the phases of system development and everyday use.

terminology, knowing the technologies and understanding the challenges of specific development tasks. Small companies initially working as contracted developers for other high-tech companies, can later offer services to end customers, in a way similar to Indian offshore software firms, which made subsequent steps towards infrastructure management, custom component development for non-technology clients, and later fully fledged implementation services or even offering packaged software products. Just like ODMs, the offshore developers were able to establish competence bases, strong brands and customer contacts to pose threats to some of their former clients.

Ambitious small companies can start their business by offering specialist services to other high-tech firms, reducing the need for initial marketing investments, and later becoming self-sufficient at a much lower cost and risk than in other scenarios. There are many parallel developments in offshore software development and contract electronics manufacturing. In both cases, contractors emerged by working for major market players and focusing on close relations, efficient operations, low costs and flexibility. These companies were maturing, establishing competence bases and gaining more bargaining power, as the partners were increasing reliance on their capabilities – and finally the sources of added value and intellectual property shifted to the contractors.

Similar dynamics may govern the strategies of companies in various segments of the high-tech value chain. Among component makers, there are numerous service-oriented firms, including *chip foundries* (manufacturing semiconductors, based on specifications and orders from other companies) and *fabeless IC designers* (counterparts of ODMs, focused on R&D of new chip prototypes). Telecommunications providers work with contractors, outsourcing specialized network services such as location-based offerings to third-parties. Innovative startups may act as *Virtual Network Operators*, who use network infrastructure of another company to offer own services (although the name VNO is usually associated with firms entering into agreements with existing telecom operators, the successful IP telephony firm Skype adopted the VNO approach without formally allying with infrastructure owners, by simply integrating its technology with existing

Internet and fixed telephony networks). Large Internet or telecom firms can also act as *bandwidth brokers*, using infrastructure of their partners in some regions – American broadband Internet providers in the late 1990s were offering unified web access services on national or state levels by using lines owned and maintained by multiple local companies; similarly, in scarcely populated areas mobile phone providers may agree to jointly share the same base stations. Finally, content providers aggregate content from multiple suppliers, who work for them, and business knowledge offered by major consultancies is often based on inputs from subcontracted third-parties, helping with data collection, analysis, or other specialist skills.

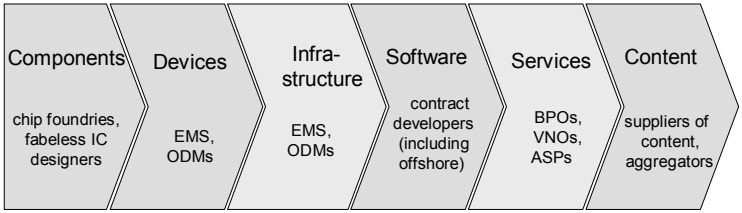

Fig. 21. Types of contractor companies in the high-tech value chain

6.2 Strategy of a contractor

6.2.1 Value disciplines

Every element of the high-tech value chain can be provided as a service. The service orientation requires focal companies to offer something attractive for potential partners to facilitate their make-or-buy decisions. This differs from the strategies of complementors, who focus on positioning, promoting and selling products to end customers (even if they use indirect sales model, the "packaging" of technological products needs to be customer-centric). Service-oriented firms need to realize potential sources of competitive advantages, which could guarantee repetitiveness of sales to specific clients and high project retention rates, instead of facing the same

uncertainty in every new bid. Only such continuity would allow them to build competencies and benefit from the experience curve effects[14].

Treacy and Wiersema (1993) offered a useful framework to analyze sources of competitive advantage, dubbed *value disciplines*. They argued that emerging market leaders are able to outperform rivals by redefining the notion of value for the customer, raising his expectations and matching them with own offerings (Treacy and Wiersema 1993: 84). Three fundamental identified orientations or value disciplines were: operational excellence, customer intimacy and product leadership (Treacy and Wiersema 1993: 92). Operational excellence means focus on price and convenience for the customer (not merely cost leadership), and is rooted in the assumption that excellent operations should meet and even exceed customer demands, among others through the widest selection of mass-customized goods (Pine II et al. 1993), direct no-hassle sales, as well as reduction of intermediaries and other costs through channel integration. Customer intimacy focuses on profound understanding of needs, detailed market segmentation and flexibility in customizing own offering to address specific requirements better than other players. Finally, product leadership equals continuous innovation in product development. The value disciplines are not exclusive and some companies may excel in more than one of them at the same time – as the further discussion of the Indian offshore software developers will demonstrate, they were broadening the scope of activities to address new markets by focusing on additional value disciplines.

The options available for service providers within the high-tech value chain include therefore:

- focus on a unique technology subset, product or component types (product leadership or innovation),
- close alliance with one strong partner, who could guarantee continuous orders (customer intimacy),
- competition through superior processes, resulting in quality, cost savings and flexibility in offered services (operational excellence).

[14] This corresponds to the popular concept of relationship marketing, interpreting an organization as a "servant" of customers, and proposing to re-define its domain a service business (Grönroos 1996: 9).

Each of these three options can lead to competitive advantage over other players – product companies transforming into contractors in the high-tech value chain would probably try to use their existing competences to claim innovativeness, while newcomers might initially prefer not to invest in any specific technology, focusing on operational excellence (including superior project management skills for software companies or quality control and high-availability for manufacturers). Trusted relationship with a larger partner is also a good starting point, and such an embedded relation often emerges from earlier personal contacts of the firm's founder. The following discussion of the strategies of Indian IT services companies and Taiwanese ODMs will help explain the scenarios.

Repetitiveness of transactions helps build competence bases and optimize costs, enabling firms to extend the scope of business by pursuing additional value disciplines and thus strengthening their competitiveness. It was the case of the largest Indian IT services firms, which started their international operations as low-cost contractors of American companies, later growing and offering a wide-range of services (ranging from contracted software development, through electronics design to IT implementation projects for end-user organizations). The ongoing revenue stream from major customers helped them also improve the internal processes – the Indians became obsessed with project quality, launching internal initiatives, adapting implementation methodologies, developing internal quality control systems and applying for various relevant certifications - this determination could only be compared with Japanese automobile manufacturers. They were also committed to knowledge and innovation management, maintaining R&D expenditures on levels relatively high for service companies, documenting customer references, actively collecting *lessons learned* in projects and preparing packaged service offerings, with reusable components and brand names, positioned as unique and difficult to imitate.

Company	Revenues 2003-04	Market share 2004	IT service revenues	% of all revenues	Net income	Profit margin	Head-count	Service revenues / employee	Cost of revenues / employee	Net income / employee
IBM	96,293,000	7.6%	46,213,000	47.99%	8,430,000	8.75%	329,001	140.46	183.16	25.62
EDS	21,476,000	3.4%	19,317,000	89.95%	(1,698,000)	0.00%	132,000	146.34	163.63	(12.86)
Fujitsu	44,970,642	2.8%	*16,860,000	43.93%	468,906	1.04%	156,169	126.51	278.88	3.00
HP	79,905,000	2.3%	15,389,000	19.26%	3,497,000	4.38%	150,000	102.59	402.27	23.31
Accenture	13,673,000	2.3%	13,673,000	100.00%	691,000	5.05%	100,000	136.73	133.55	6.91
CSC	14,768,000	2.3%	14,768,000	100.00%	519,000	3.51%	90,000	164.09	155.79	5.77
CapGemini	8,501,351	**1.4%	8,501,351	100.00%	(485,135)	0.00%	59,324	143.30	141.98	(8.18)
Unisys	58,207,000	**0.7%	4,724,700	8.12%	38,600	0.07%	36,400	129.80	122.48	1.06
Bearing-Point	3,139,277	**0.5%	3,139,277	100.00%	41,307	1.32%	15,300	205.18	158.43	2.70
Tata CS	1,641,182	**0.25%	1,515,118	92.32%	371,532	22.64%	29,000	52.25	30.62	12.81
Wipro Technolo-gies	1,355,115	**0.2%	1,228,963	90.69%	237,673	17.54%	28,502	43.12	38.52	8.34
Infosys Technolo-gies	1,096,979	**0.17%	1,065,811	97.16%	286,514	26.12%	25,634	41.58	28.56	11.18
Satyam Computers	604,441	**0.1%	585,609	96.88%	128,063	21.19%	14032	41.73	30.36	9.13
	Total market (+ others)	**100.0%**	**607,816,000**							

Table 13. Revenues of the largest international and Indian IT services companies. Financial data in thousands USD. Financial and employment data from: corporate annual reports, from the most recent reports as of March 2005. Market share data from Gartner Dataquest, February 2005. (*) Gartner's estimate. (**) own estimate for market share calculated as proportion between IT service revenues and global IT services market value, indicated by Gartner. Gartner's market share calculations deviate from calculations based on the actual corporate revenues. Foreign exchange rates used: 1$=106¥, 1$=0.74 €, 1$ = 43.4 Rps

Nowadays, after several years of continuous growth, the Indian firms successfully compete against their Western counterparts, while maintaining cost advantages of the offshore location. Table 13 compares the largest Indian IT services organizations and their foreign competitors – an important difference between these two groups is the scope of offered services, as the global organizations derive most of their revenues from customer implementation projects and recently also outsourcing, while the Indians continue working as subcontractors for other high-tech companies in parallel to projects for non-technology end-customer organizations.

6.2.2 Customer intimacy

Customer intimacy will be discussed as the first value discipline, as the embedded relations were the initial sources of first foreign contracts for Infosys and its local competitors. The intimacy enabled offshore companies to establish new revenue streams and pursue close, long-term ties with key clients or partners, guaranteeing business stability and growth. The relations were developed on multiple levels, involving numerous *part-time marketers*, technical employees having contacts with clients and influencing their experiences, who were not formally parts of the traditionally defined sales or marketing personnel (Gummesson 1991: 60), so that the entire organization was guided by the same customer-centric principles. The intimacy and trust are built over time through ongoing interactions, positive project experiences and mutual understanding, so that first confidence-building contacts can be followed by large projects and subsequent synergistic embedded ties (Rajkumar and Mani 2001: 71).

The example of Infosys demonstrates impressive customer retention rates and substantial percentage of repeat business revenue, while the business

growth and transformation from an offshore contractor to a generalist IT services organization helped reduce the dependency on several largest customers by diversifying the project portfolio. In 1998, Infosys' annual report stated that "the most valuable intangible asset of Infosys is its customer base. Marqué customers or image-enhancing customers contributed around 46% of revenue thid year. They reduce our marketing cost" (Infosys Annual Report 1998: 129). The dependence on large, well-known customers helped establish image of a reliable and skilled service provider, attracting other customers more effectively than by costly marketing campaigns. Through initial projects as contract software developer, Infosys was able to establish its brand name and target similar opportunities, but its ambitious growth plans called for access to broader market, moving from the subcontractor position towards an independent "full-service provider" (Infosys Annual Report 1999: 152). In the late 1990s, Infosys used specialist Year 2000 and Euro conversion projects to attract customers from outside the technology sector. These opportunities were used to deepen relations with clients, who afterwards were also buying other services (Infosys Annual Report 1999: 37), so that the company's customer base became diversified, reducing dependence on only a few large contracts (Infosys Annual Report 1999: 196). Subsequently, Infosys launched a brand awareness initiative with public relations activities and promotional events (Infosys Annual Report 2000: 33), gradually imitating the marketing strategies of leading IT services firms. As the number of active clients, geographical locations and projects increased rapidly, Infosys integrated various internal systems around customer-centric processes with a Six Sigma initiative and an own customer relationship management software (Infosys Annual Report 2003: 112).

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
active clients	115	194	273	293	345	393
new clients	39	99	122	116	92	119
% customer retention	81.7%	82.6%	77.8%	64.8%	86.3%	79.4%
% repeat business revenue	90.0%	87.0%	85.0%	88.0%	92.0%	93.0%
% sales from 5 largest customers	28.0%	30.2%	26.0%	24.1%	23.4%	22.6%
% sales from 10 largest customers	44.0%	45.7%	39.2%	39.4%	37.3%	36.0%

Table 14. Infosys sales metrics. Customer retention defined as the number of clients in the current year who were also active clients in the previous year. Repeat business revenue defined as revenue in the current year from customers who contributed to the revenue also in the previous year. Data source: Infosys annual reports

An interesting factor is the physical location of service provider: facing the recent popularity of offshore outsourcing, how can partners in a value chain manage their relations, especially if they are located in different geographies, cultures and time zones? Outsourcing literature warns of various risks arising, when projects require high levels of interaction (Amoribieta et al. 2001: 134), but in fact most projects implemented by the Indian firms were based on such a model. The communication was enabled by Internet technologies supporting remote work, and frequent visits to customer sites. Infosys annual reports document substantial increases in the number of U.S. visas of its employees, as well as the growing importance of onsite work, accounting for over half of the revenues, but only one third of the actual working time of consultants.

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
% revenue onsite	41.30%	48.50%	51.50%	50.80%	54.70%	53.00%
% revenue offshore	59.70%	51.50%	48.50%	49.20%	45.30%	47.00%
% person-month onsite	25.00%	32.50%	34.00%	30.70%	33.70%	31.60%
% person-month offshore	75.00%	67.50%	66.00%	69.30%	66.30%	68.40%
onsite work productivity (% person-month /% revenue)	0.61	0.67	0.66	0.60	0.62	0.60
offshore work productivity (% person-month /% revenue)	1.26	1.31	1.36	1.41	1.46	1.46
offshore/ onsite work productivity ratio	207.54%	195.59%	206.12%	233.07%	237.56%	244.09%
U.S. visa holders	425	963	1382	2027	NA	NA
sales and marketing offices	17	20	25	28	30	31
sales and marketing employees abroad	29	48	84	143	280	275
support and development ("*customer proximity*") centers abroad	0	3	8	8	10	14

Table 15. Infosys onsite and offshore projects metrics. Data sources: Infosys annual reports

Indian offshore software developers worked out a relationship and project management model with account managers, working in the customer's country, maintaining everyday contacts onsite, and offshore account managers located in India, responsible for coordination issues between project delivery teams, onshore account managers and customers (Rajkumar and Mani 2001: 65). This explains the growth in the number of sales and marketing personnel working in foreign subsidiaries of Infosys, establishment of new sales offices in key locations close to specific customers, as well as

opening of several *customer proximity* centers in the U.S., Canada and the U.K., providing onsite support to the largest clients, once the relations were developed to a level when such a closeness of contacts could not be avoided. Interestingly, Infosys' offshore model is nowadays imitated by the most large Western IT services firms, which maintain account and project management teams in home countries, while sending as much development work as possible offshore in order to reduce the actual programming or other specialist technical tasks done in the expensive locations.

Transformation from contract developers to independent IT services organizations was costly for the Indian firms so customers intimacy in their largest projects meant geographical proximity, even for companies classified as offshore specialists. Knowledge can easily "travel" across borders, so innovative conceptual tasks, generating the highest added value, can still be performed in corporate centers, whereas project execution involves also substantial amounts of technical or administrative work, delivered onsite or offshore depending on the project nature and financial limitations.

6.2.3 Operational excellence

Lower cost is an important argument when making make-or-buy decisions – but operational excellence does not only refer to relative cost advantages of low-wage countries, but also to process efficiencies and the quality of outputs. The value discipline proved critical for the success of Indian offshore firms – they were able to maintain the lead over competitors from countries such as China or Russia, capable of offering the respective services at even lower prices. The gradual rise in salaries of local IT professionals, accompanied by the appreciation of the rupee, gradually eroded the Indian low cost advantage, and the average margins of the largest Indian offshore firms dropped from 40% to 25% (Jayashankar 2004)[15], but the op-

[15] According to the consulting company McKinsey, Indian rates for the most expensive, advanced IT services were in 2000 40-60% lower than those in the United States (Amoribieta and Bhaumik 2001: 131). Infosys' own annual report quoted other estimations according to which the average annual wage for software professionals in India was approximately 15% of the corresponding U.S. rate in 1999 (Infosys Annual Report 2000: 138). Morgan Stanley reports average hourly rates for IT services and

erational excellence allowed major companies to position themselves as competing with global IT service providers rather than other offshore players.

Already in 2002, Infosys' annual report indicated the new direct competitors: EDS, Accenture, KPMG Consulting (now: BearingPoint), IBM and CSC (Infosys Annual Report 2002: 164). In order to compete with the largest market players, known for their professionalism and quality, Infosys had to achieve impressive results in its core domain, IT project management. Operational excellence, or rather its tangible proofs, such as references, procedures or certificates, promise customers better control and risk management, facilitating externalization decisions already justified by differences in costs.

Practical skills of a contract software developer, related to the value discipline, involve for example the ability to correctly estimate the required project efforts and project costs (Rajkumar, Mani 2001: 67), which is essential both for projects based on fixed prices (underestimation reduces profit margins or even renders projects unprofitable), as well as time-and-material (customers may feel deceived if the actual level of expenditures does not match the earlier forecasts of the contractor). Unrealistic bidding promises, dubbed "the winner's curse" (Kern et al. 2002) can put the firm's reputation and even liquidity at risk, particularly for large, long-term contracts.

Indian software developers were pioneers in organization-wide quality initiatives based on *Capability Maturity Model* (*CMM*). CMM was developed by Software Engineering Institute of Carnegie Mellon University and sponsored by U.S. Air Force as a benchmark for best practices in software development area, used to evaluate potential suppliers. CMM defines five levels of process maturity, with the highest level 5 describing the "excellent" organizations, where continuous process improvement led to more transparency, risk reduction and better project control. The compliance with CMM recommendations proved not only to reduce the number of bugs in the final software products, but also to radically increase productivity of

consulting in 2003 as: $111 globally and $25 for offshore locations (Gerhardy and Mahon 2004: 30).

programmers (Anthes, Vijayan 2001). The model became particularly popular when Indian offshore firms started approaching U.S. customers, emphasizing their superior project management skills confirmed by the upper CMM levels and outperforming most of American competitors.

Country	CMM Level 4 organizations	* IT services organizations		CMM Level 5 organizations	* IT services organizations	
United States	24	11	(46%)	29	10	(34%)
Canada	1	0	(0%)	1	0	(0%)
Western Europe	1	0	0%)	1	1	(100%)
Central and Eastern Europe	1	1	(100%)	2	0	(0%)
Japan	2	2	(100%)	1	1	(100%)
South Korea	2	2	(100%)	0	0	(0%)
India	61	56	(92%)	93	86	(92%)
South-East Asia	1	1	(100%)	3	1	(33%)
Latin America	2	2	(100%)	1	1	(10%)
Total	**96**	**77**	**(80%)**	**132**	**101**	**(76%)**

Table 16. Companies which have publicly announced their maturity levels after CMM appraisals. All information as of April 17, 2003. Data source: SEI Published Level 4/5 Organizations, http://seir.sei.cmu.edu/pml

Operational excellence is certainly important for any organization, constituting a long-lasting competitive advantage, and Indian offshore developers followed the earlier quality obsession of Japanese automobile manufacturers. For organizations pursuing the contractor orientation in the high-tech value chain, the issue of quality is additionally important for marketing reasons: proofs of quality are helpful in establishing relations with other partners in the value chain. Artifacts related to the process excellence, including certificates, diplomas, "branded" project management or software development methodologies, or impressive development and training facilities contribute to an image of a modern, innovative organization, create an *organizational façade* (Nystrom, Starbuck 1984). The artifacts can function as proxies, heuristics for decision makers, particularly important in the case of organizations providing services (intangible by definition), contractors who cannot be adequately evaluated before contracted project are actually completed.

Software Engineering Institute registered altogether 3360 CMM appraisals between 1987 and June 2004 (SEI 2004: 14), and Indian firms dominate the group of level 4 and level 5 compliant companies. Marketing

the group of level 4 and level 5 compliant companies. Marketing theories emphasize that selling intangible goods involves the exchange of promises, making customer impressions a critical factor in the successful sales process (Levitt 1981: 96-97). Service organizations were using the information about appraisals in marketing materials to attract partners, customers and investors, as CMM and its extensions CMMI and PCMM were important tangible evidence of their quality, and the appraisal plans were also defining contents of internal change management programs.

Award / initiative	Appraisal	Details
ISO 9001	Yes	Generic quality system certification, defined by the International Organization for Standardization
TickIT	Yes	Specialized certification building on ISO 9001, addressing specific quality issues in IT firms, supported mainly by the U.K. software industry
CMM (Capability Maturity Model)	Yes	Model based on recommended best practices in software development and project management, appraisal for Levels 2-5, defined by Software Engineering Institute, Carnegie Mellon University
CMMI (Capability Maturity Model Integration)	Yes	Revised version of CMM, appraisal for Levels 2-5, defined by Software Engineering Institute, Carnegie Mellon University
PCMM (People Capability Maturity Model)	Yes	Counterpart of CMMI in the area of human resources development, appraisal for Levels 2-5, defined by Software Engineering Institute, Carnegie Mellon University
Malcolm Baldridge National Quality Award	Yes (only U.S.)	National award for outstanding organizations based on seven key management areas, established by the U.S. Congress (award not certification – only several nominees per year)
Six Sigma	No	Quality management and continuous improvement methodology (numerous consulting companies offer their own "certificates" in the area, and Motorola had registered and trademarked the phrase :Six Sigma")
U.S. GAAP	No	U.S. financial reporting standards (help evaluate financial performance of potential offshore partners by their Western clients)

Table 17. Initiatives and awards confirming operational excellence, popular among Indian offshore software developers

6.2.4 Innovation

Having established streams of recurring revenues from key projects, the Indian firms were able to mimic their competitors by pursuing multiple alli-

ances with leaders and complementors of various value chains, and building broad competence bases to implement projects for diverse technology platforms. In the late 1990s, Infosys started offering implementation services for packaged applications, and later used the close partnerships with selected vendors of enterprise solutions (including PeopleSoft, Siebel, JD Edwards and Manugistics) to bundle the systems with own, unique offerings for these platforms (Infosys Annual Report 2003: 111). The idea to balance partnerships and customer projects to establish proprietary, branded products and services, guided the strategies of offshore developers for many years. While still largely dependent only on a few large clients, Infosys stated that it "intends to convert a project opportunity into a product opportunity. Infosys is essentially a software services company. However, Infosys expects to create branded services, which will contribute substantial revenues. Thus, branded services and products are together expected to contribute 35% to 40% of the total revenues in near future" (Infosys Annual Report 1998: 142). These branded services accounted barely for 8% of revenues in 1997 (Infosys Annual Report 1998: 140), but they gained on importance in the following years, and finally only a small percentage of sales concerned non-branded, subcontracted projects such as custom software development, migration, testing and engineering services. Infosys' parallel entry into the IT outsourcing domain was not a logical extension of previous contracted software development – managed services and business process outsourcing require unique skills, dedicated infrastructure, and even a distinctive business model.

Interestingly, Infosys' local competitor Wipro was initially not successful in the transition from customer intimacy to product leadership and innovation. The company continued to rely on subcontract development and engineering projects, accounting for about 70% of its revenues in 1999 (Shekar 1999), what prevented it from growing as fast as Infosys. Another Wipro's decision, interpreted later as a strategic mistake, was the avoidance of Year 2000 projects. The company believed that such projects require familiarity with obsolete technologies used in legacy systems, which would not be useful for other purposes in the future. This actually was true, but Infosys used these projects to establish relations with new large clients, and Wipro

did not explore this opportunity (Jayashankar 2004)[16]. Nevertheless, remaining merely a contractor of other high-tech firms can still be very profitable. For example, testing services play a critical role in the software development process: in the year 2003-2004, the value of software testing market in India alone was about $200 million, demand for the services was far from being saturated, and leading offshore companies were dramatically increasing their dedicated departments – Wipro's testing unit grew from 300 people in 2002 to 1,700 in 2004 (Prasad 2004).

Innovativeness of Indian firms was directly linked to specific technology platforms and strategic partners – figures 22 and 23 present partnership networks of four major Indian firms, and analogous tendencies among major Western IT services providers. First partnerships with technology vendors were established from the initiative of the Indians, often resulting from software development contracts, but later potential technology partners from abroad were actively seeking cooperation opportunities with the offshore companies.

Successful strategies of contractors involve the element of innovation and knowledge development. Due to the intangible nature of services, companies can only promote their capabilities through published measures of knowledge resources, patents, publications or conference participation. Patents are primarily intended to prevent others from copying certain products – however, they can also indicate innovativeness and thus function as marketing tools, particularly in knowledge-intensive relations with other high-tech companies. IT service providers can claim patents for business methods from the project management domain, as well as for technology related inventions. Indian offshore firms use patents only in limited ways, but instead are very active in publishing papers in international magazines and attending international conferences. These activities are intended to match the levels achieved by their largest global competitors, inheriting extensive patent pools from their hardware-related businesses.

[16] Nowadays, Wipro matches the diversified portfolio of IT services offered by other firms such as Infosys, while still deriving significant revenues from product engineering and contract software development services.

Company	R&D expenditure (,000 USD) 2003/2004	R&D expenditure as % of revenues	Number of academic papers 1995-2004	Number of U.S. patents 1976-2004
EDS	NA	NA	42	10
HP	3,506,000	4.39%	253	13,206
Accenture	NA	NA	28	105
CSC	NA	NA	24	5
CapGemini	NA	NA	1	0
Unisys	294,300	0.51%	68	1,724
BearingPoint	NA	NA	1	2
Tata CS	6,923	0.42%	39	2
Wipro	5,346	0.40%	13	1
Infosys	10,262	0.94%	44	0
Satyam	670	0.11%	27	2

Table 18. Competence-related metrics of Western and Indian IT services companies. Data sources: financial data from corporate annual reports (most recent reports available in February 2005; exchange rate from March 31, 2004: 1 USD = 43.40Rs); published academic papers retrieved from Elsevier Compendex/Engineering Village, February 22, 2005, searches based on author affiliations; patent information retrieved from USPTO, February 22, 2005, searches based on assignee names

The limited use of patents in software and IT services sector contrasts with the patenting activities of ODM companies. They are aggressively patenting both underlying technology components, as well as industrial designs of devices and business methods, related e.g. to internal communication within supply chain, inventory control or cash flow management. Patenting in electronics is particularly important as U.S. patent holders could block import of assembled products (Nowotarski 2003), thus undermining

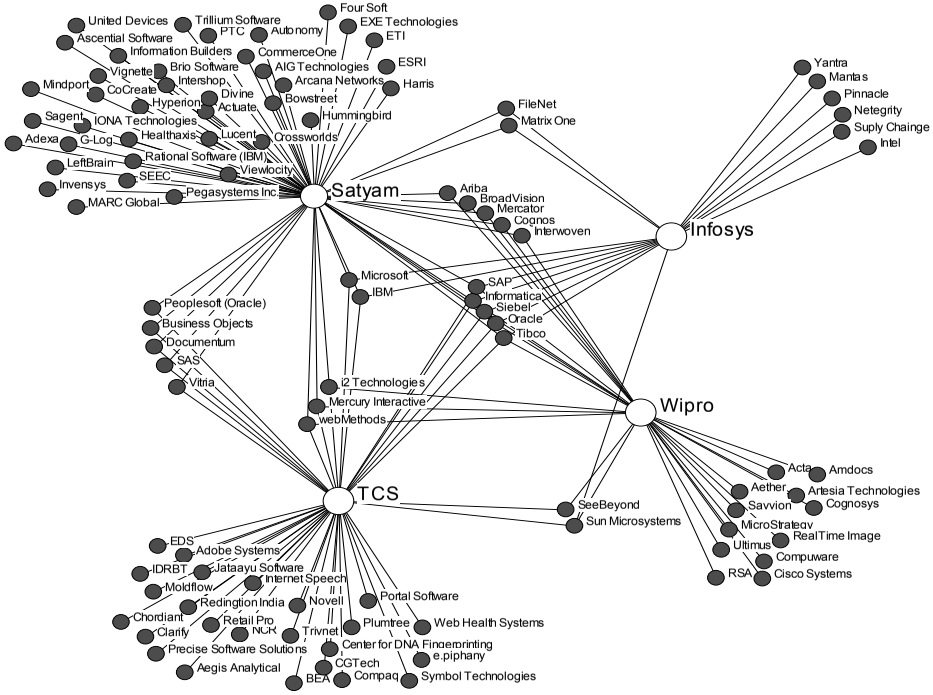

Fig. 22. Network of strategic partnerships of Indian IT services companies, 2004. Data sources: corporate websites and reports

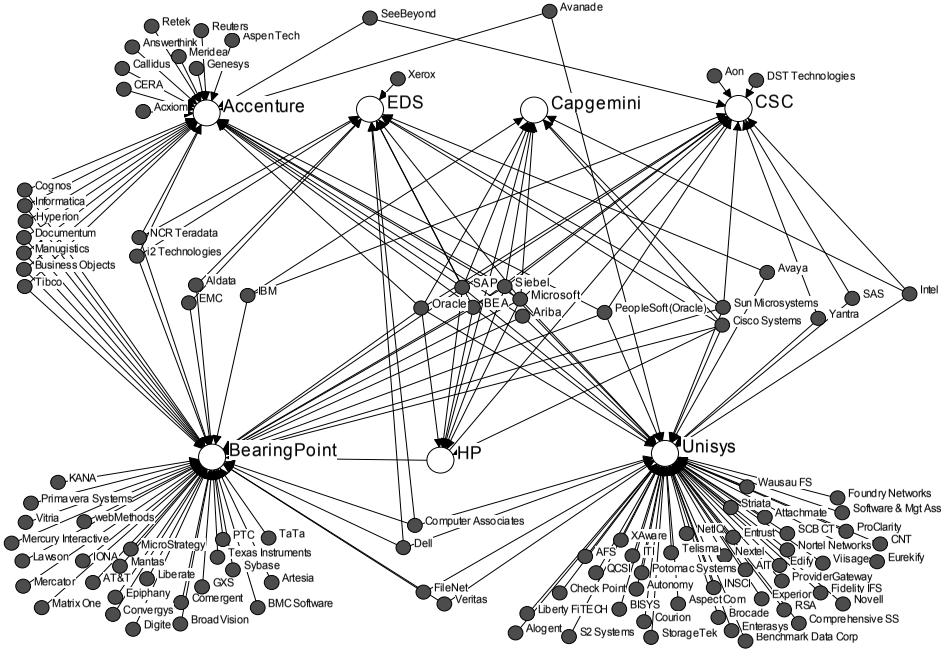

Fig. 23. Network of strategic partnerships of major global IT services companies, 2004. Data sources: corporate websites and reports

the business of foreign contractors. Academic publishing is in turn less important for ODMs, offering tangible products, not knowledge transferred through service projects.

	Company	Number of academic papers 1995-2004	Number of U.S. patents 1976-2004
EMS firms	Solectron	17	12
	Flextronics	37	8
	Celestica	38	15
	SCI Systems	1	53
	Jabil Circuit	1	11
ODM firms	Arima Computer	1	11
	ASUSTeK Computer	1	61
	AU Optronics	0	142
	BenQ Corporation	3	210
	Chi Mei Optoelectronics	1	57
	Compal Electronics	0	160
	HTC	0	1
	Inventec	1	203
	Lite-On Technology / GVC	7	59
	Quanta Computer	1	100
	Wistron Corporation	0	45

Table 19. Competence-related metrics of EMS and ODM firms. Data sources: published academic papers retrieved from Elsevier Compendex/Engineering Village, February 24, 2005, searches based on author affiliations; patent information retrieved from USPTO, February 24, 2005, searches based on assignee names.

Expenditures related to competence building extend beyond the R&D figures documented in financial reports, as new knowledge is created by learning in practice: through project delivery, training and networking. Experiences with using a specific technology for multiple different contracted projects help develop flexibility in reconfiguring and using its components in innovative ways (Henderson and Clark 1990), while this opportunity is usually not available to traditional product companies. Table 20 presents selected Infosys competence metrics, showing the continuous growth in knowledge resource (measured as the education index of all employees), annual spending on books and periodicals, professional membership, seminars and internally used software. With the international growth of Infosys and the diversification of its businesses, the employee cost per capita almost tripled within several years. The scale of competence-related expenditures also confirms once again that the company did not regard lower labor costs as the source of its competitive

costs as the source of its competitive advantages, focusing instead on knowledge development and innovation.

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
R&D expenditures	981	823	1711	1486	1444	4454
R&D as % of revenues	1.91%	0.89%	0.87%	0.57%	0.40%	0.94%
Expenditure on books and periodicals	77	77	169	114	142	151
Expenditure on professional membership and seminars	NA	NA	217	220	355	357
Cost of software for internal use or service delivery	1665	1938	3756	4361	6774	8088
Number of employees	3766	5389	9831	10738	15356	25634
% of development employees	75.78%	79.64%	77.72%	87.59%	91.18%	93.06%
Average age of employees	26.14	26.14	25.67	26.60	26.60	26.00
Employee education index	10731	15544	28725	31385	44972	74057
Employee education per capita	2.85	2.88	2.92	2.92	2.93	2.89
Employee cost	16506	33456	71778	111787	167712	245096
Employee cost per capita	4.38	6.21	7.30	10.41	10.92	9.56

Table 20. Competence-related metrics of Infosys. Financial information in lakhs Rps (100,000 Rps). Employee education index calculated as aggregate measure of highest education levels completed by every employee (1: primary education, 2: secondary education, 3: tertiary education). Data sources: Infosys annual reports

Delivery of knowledge-based projects poses significant challenges in the area of intellectual property management: in theory, known-how generated through contracted R&D work is preserved by the client, but at the same time it is also inextricably linked with the knowledge created in other projects by the same contractor, so it is difficult to definitely agree who owns what (Pisano 1990: 159-160). In such situations, the contractor can derive significant benefits from the work by re-using components prepared once for a specific customer (a practice potentially infringing IPRs and non-disclosure agreements), or the tacit knowledge of employees, delegating them to similar projects. Officially, Infosys claimed not to retain IPRs for project deliverables, but in some cases the company tried to license its proprietary technologies instead of simply transferring their ownership to cli-

ents (Infosys Annual Report 1999: 158). While regularly accounting for R&D expenditures in annual reports, Infosys was also indicating, how the investments contributed to the establishment of branded offerings and methodologies, including e.g. proprietary requirement modeling methods and tools InFlux (Infosys Annual Report 2004: 25).

The tensions between the roles of contractor and complementor signalize the transformation of Infosys, becoming a self-sufficient organization working with end customers, not only other value chain participants. Treacy and Wiersema's (1993) framework adequately describes the challenges of service organizations, and the suggestion that the most competitive players try to excel in all three "value disciplines" seems to be relevant for the discussed example of IT services, as well as for EMS companies and other types of organizations, pursuing service-oriented strategies in the high-tech value chain.

6.3 Discussion

Contractors play important roles in high-tech value chains, and high-tech companies increasingly rely on service providers, ranging from contract semiconductor and hardware manufacturers to offshore software developers. The strategy of contractors is primarily dynamic, as opposed to other value chain actors, who focus on maintaining their existing positions in mutual relations and adopting to the changing environment. Service-oriented firms have an implicit goal of transforming into independent companies, which could control customer bases broader than several close clients-partners. They can accomplish this by focusing on knowledge creation and competence management, which help them shift from the initial stage of customer intimacy to operational excellence and innovation. Intimate relations with key partners enable them to move from basic assembly or development tasks towards knowledge-intensive projects, involving concept development and research. Contract manufacturers are becoming ODMs, with portfolios of patents and industrial designs, capable of offering ready-to-reuse products, and earning higher margins thanks to their increased bargaining power. Offshore software developers are turning into generalist

IT services companies, competing against established players, and capitalizing on the in-depth knowledge of certain technologies, reusable components developed for other projects, and relations with end customers in key markets. These transformations were carefully planned and operationalized through organizational competence building and process improvement programs, increased R&D investment, and marketing activities involving brand management and product-like packaging of intangible skills.

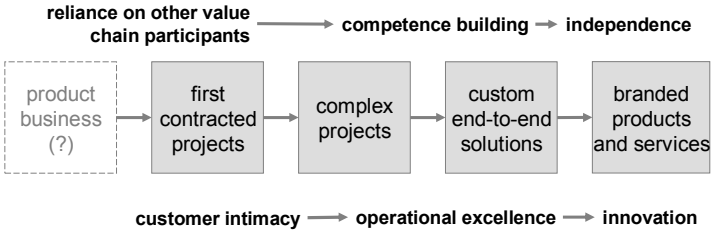

Fig. 24. Process of strategic transformation of contractor companies

Companies presented above as model examples of contractors are nowadays becoming complementors, niche players in the high-tech value chain. Infosys aggressively markets proprietary software solutions, including its highly successful Finacle banking solution, which nowadays is supported as industry standard even by large firms such as HP and Accenture. BenQ, an experienced ODM, started using own brand for high-end mobile phones, troubling its relations with Motorola, which decided to switch orders to Compal, another ODM contractor, not having similar ambitions and thus potentially more loyal. However, BenQ's own-brand sales accounted in 2004 for about 40% of the company's revenues (Wang 2004), and finally both its offended partner Motorola and the market leader Nokia decided to place new handset orders with the ODM.

Strategic skills help contractors lock in their partners – they start the business with a significant help of a strong partner, who is later abandoned, positioned as a competitor or forced to accept new, inconvenient commercial conditions. The scenario of self-created competition is best evidenced by the history of IBM PC, using processors produced by Intel and an operating system from a small contract developer Microsoft. Within several

years, the entire computing industry was transformed, when these two companies started offering their products to additional partners, competing with IBM. IBM carelessly deprived itself of important competencies in the subcontracted areas in order to shorten time-to-market, and ultimately lost control over the future of its core technology. Dependence on third-party intellectual property can be dangerous for high-tech companies. Not surprisingly, NTT DoCoMo decided to establish closer relations with selected handset, semiconductor and software providers, investing in their projects in return for partly owning their mobile technologies – the moves were intended to reduce potential risks of third-party reliance, which once undermined the position of IBM.

The growing importance of contractors in high-tech value chains facilitates also the emergence of virtual organizations, controlling merely brands and managerial skills, and relying on specialized suppliers in all other areas, particularly for technology development. Large software projects, primed by established IT services companies, are to often implemented and supported by smaller subcontracted services firms, using software and hardware delivered by other firms, so that only project management comes from the main company. A challenger of Apple in the portable digital media market, Virgin Electronics, employs only 10 people, and relies on ODMs to produce top-end gadgets, competing with iPods (Langberg 2004). Skype Technologies came out of nowhere to quickly emerge as the leading global telecom operator, not owning any traditional telecommunications infrastructure but using a sophisticated software solution to balance the publicly available Internet and fixed telephony platforms in all countries.

Contracted service providers form an important and frequently overlooked group of companies, with strategies based on rules different from those followed by chain leaders and complementors. They offer impressive partnership opportunities for other value chain participants, but at the same time present serious strategic threats as potential competitors of established players.

7 Open source movement

7.1 Overview

7.1.1 Origins of the open source movement

The relevance of the high-tech value chain model and three generic strategies, outlined in previous chapters, could be challenged by critics, pointing to recent market developments, particularly the growing popularity of the open source movement. The idea that computer software could be free and available without copyright restrictions is not new, but in the recent years it became actively supported by major industry players. The present chapter will analyze the impact of this phenomenon on value chain strategies to verify, if open source has the potential to radically change the operations for high-tech companies and establish a new underlying industry logic.

In the 1950s, software source code was freely distributed without any licensing restrictions by users of IBM and DEC computers. Code of Unix was also initially available for free, until AT&T decided to restrict the availability of the system. Antitrust decisions forced companies to unbundle hardware and software layers and standardize them, leading to code closing and software commercialization. Turning previously widely available components into proprietary packages was disappointing for many programmers. Richard Stallman founded in 1985 the *Free Software Foundation*, focused on promoting software freely available to all interested parties for non-commercial purposes, based on the concept of *copyleft* (the opposite of copyright, with everybody entitled to use the intellectual property without restrictions). The model evolved later into open source movement, focused on the public access to the source code of applications and ability to collectively improve them, with a unique licensing scheme defined by the *General Public License* (GPL). GPL enabled everybody to freely use, distribute and modify the concerned software, requiring however to release the modified code. GPL did not prohibit charging fees for distributed soft-

ware - in the pre-Internet era, distribution involved costs of media, recording and distribution. Importantly, any software developed from a GPL-licensed code must also be released under GPL, constituting the "viral" nature of the licensing scheme, criticized by some commercial developers.

Prominent early open source projects were Apache web server and Sendmail e-mail program, but the real popularity came with the development of Linux, free version of Unix. The initially chaotic, but later well-organized development work Linux involved thousands of programmers worldwide, attracting the attention of market analysts and companies. In 1998 Eric Raymond wrote the movement's manifesto, "*The Cathedral and the Bazaar*" (Raymond 2000a), introducing a dichotomy between anarchic, community-driven development efforts and formalized practices of established software companies. Later the same year, Raymond published on its website a copy of an internal document (later referred to as "*Halloween memo*"), written by Microsoft employees, analyzing the threats, which the open source model posed to Microsoft's own products (Microsoft 1998), and admitting that some community projects achieved quality compared with commercial solutions.

The success of open source encouraged the professionalization of projects – they became managed with widely-accepted development methodologies, and often associated with commercial start-up companies. In 1999, open source company Red Hat Software, developing an own version of Linux, entered the stock exchange, and was quickly followed by several other players. In parallel, established I.C.T. companies were adopting some elements of the open source movement. Netscape decided to open the source code of its web browser based on a new form of license, called Netscape Public License (NPL): any changes to the software had to be documented on the Internet and freely available, while Netscape as the founding organization was allowed to incorporate the code from third-parties in its own versions of products. Apple Computer, HP, SGI and IBM publicly released code of numerous solutions, attempting to form independent communities around the respective projects and benefit from the collective development model. Major companies started investing in the open source - IBM founded a project called Eclipse, focused on the creation of open

source development tools, and contributed to Eclipse over $40M worth source code of own products, and the move was followed by BEA Systems and Computer Associates. Sun Microsystems acquired a German company StarDivision, releasing its software package as OpenOffice, an open source competitor of Sun's major enemy's product Microsoft Office.

The nature of licenses and development of open source products created two-tier software architectures, with componentized common platforms (*source trees*), available freely and maintained by the developer community, and final packaged applications (*full distributions*), released by non-profit communities or commercial organizations (Henkel 2003: 14). Nowadays, most Linux implementations consist of the underlying system *kernel*, graphical user interface (with options including GNOME and KDE), and thousands of open and proprietary packages, all available to end users in the form of Linux distributions such as Debian, Red Hat, Mandrake or SuSE. The mechanism of creating final products, based on open source components, resembles the semi-walled gardens of NTT DoCoMo and Microsoft: companies use standardized, publicly available components, adding new features which could potentially attract and lock-in customers. Linux is nowadays perceived as a reliable competitor of Microsoft Windows and Unix, supported by major I.C.T. companies, and many established commercial products have open source alternatives.

7.1.2 Ideologies, myths and reality

The model of open source is surrounded by many myths – its characteristics, particularly the commercial aspects, are frequently misunderstood, with people still thinking of it as of community-driven projects not packaged, commercial products. The commercialization of open source means actually that the software is distributed and priced like other commercial products – even though there still are free or low cost options, they do not always offer all the features of solutions from the best known open source vendors. These companies are still committed to the principles of open source and GPL licensing schemes, but some of them disclose the source code only to customers, who actually pay for the products, thus actively protecting own intellectual property and undermining the ideals of open

source movement. At the same time, open source offers egalitarian ideology, emphasizing the freedom of access to intellectual goods, and strengthening the sense of community among developers, who voluntarily contribute to non-commercial software projects, sharing their knowledge and source code. Its popularity is also linked to an anti-globalist atmosphere of the 1990s, and the popular "Microsoft-bashing" attitude of IT specialists.

Uncontrolled knowledge spillovers, enabled by open source software licences, turn any contribution into a public good (von Hippel and von Krogh 2003: 213). Similar knowledge spillovers in the case of commercial companies would mean that their proprietary technologies and skills could easily be imitated at low cost by other players, disadvantaging the pioneers. Traditional systems of economic distribution are subject to the dilemma of collective action, characterized as the *tragedy of commons* (Hardin 1968), where free riders exploit shared, scarce resources without contributing anything in return, and reducing the resources' availability for other members of a particular group or society. In the community-driven open source movement, the dilemma seems to be overcome (von Hippel and von Krogh 2003) – free riders are encouraged to use the collectively developed products, even without feeding back their own developments or technical advice, as their interest stimulates the diffusion of products and increases the probability of detecting and reporting flaws to further improve the software. The intangible nature of information goods with no variable costs (Shapiro and Varian 1999: 21) and extremely low costs of web-based software distribution changes the underlying economic rationale for collective action: distributed goods are not scarce, and the system is anti-rival (Weber 2004: 154). Open source community is presented as *gift culture*, where social relations do not need to be regulated by the possession or exchange of resources (Raymond 2000b; Bergquist and Ljungberg 2001: 308).

Open source movement is presented as a unique user-only innovation system (Lakhani and von Hippel 2000), based on mutual support and participative design. This resembles the notion of *prosumption*, put forward by Alvin Toffler in his vision of the postindustrial society: *prosumers* blur the boundaries between consumers and producers, being able to specify and satisfy own requirements (Toffler 1990). Strategic management literature

refers to the phenomenon as value co-production, ongoing interactions between producers and customers, jointly innovating, developing and delivering products and services (Ramirez 1999).

The widely-cited article "*The Cathedral and the Bazaar*" (Raymond 2000a) used the two metaphors to differentiate between hierarchically structured software development processes by large commercial companies and community-driven, chaotic, but more innovative open source practices. Bazaar is not based on detailed plans, but structured by community dynamics, offering opportunities to assimilate good ideas from others and incorporate them in the software code. Open source projects are presented as typical examples of the effectiveness of virtual organizations, with distributed work, ad hoc collaboration, high flexibility (Gallivan 2001), and unique coordination mechanisms of *communities of creation*, not present in traditional markets or hierarchies (Sawhney and Prandelli 2000). Characteristics of the projects are unfortunately often generalized by academic and popular publications, and not necessarily matching the status quo. Open source involves both spontaneous communities and institutionalized forms of cooperation. The movement offers also revenue opportunities for commercial organizations, and this explains why projects became professionalized, and current developments differ from the initial directions.

Companies using open source components in own products are not required to reveal all proprietary information - empirical research confirms different levels of involvement and patterns of revealing among firms, with small firms usually revealing more, expecting also more in return from the community, and large firms restricting their contributions thanks to their greater self-sufficiency (Henkel 2004: 2)[17]. The community-driven development offers many opportunities for "parasites", firms bundling freely available components and selling them to end customers, there also is substantial demand for commercial services related to the free software prod-

[17] Open source licenses such as GPL and relevant copyright regulations distinguish between derivative work (modifying the original open source code and thus being subject to the same revealing requirements as the code) and linked programs (interacting with the open source software through published interfaces not code). Authors of linked programs may keep them proprietary without infringing on the GPL, if the free components are not embedded in their products, but installed on the same computer.

ucts. Similarly, the analogy of gift culture is flawed, as it does not take into account other, non-financial interdependencies between givers and receivers, for example implicit obligations (Bergquist and Ljungberg 2001: 313). Gifts in form of releasing open source code of proprietary products or sponsoring the community can also be a way of showing own status (Bergquist and Ljungberg 2001: 313), as usually such sponsorship decisions are linked to the marketing strategies and regarded as investments.

Open source projects are not as egalitarian as their earlier characterization would suggest – decision making processes are usually structured, with only a small group of authorized developers deciding about the inclusion of certain code in official product releases (von Krogh et al. 2003: 1225). Major software development projects are stable, as opposed to the idealistic model of virtual organization - some people are even involved on a full-time basis thanks to commercial project sponsors. Linux development is not a chaotic bazaar, but a structured process of problem solving and decision making, with conflicts of interests and hierarchies of gatekeepers (Weber 2004: 63-64). Similarly, the development of Mozilla browser is divided into distinctive modules, with decision making responsibility for each of them delegated to an experienced individual, appointed by the Mozilla Foundation (Mockus et al. 2002: 332), and decisions about the content of new product releases and future development directions of Apache web server are based on e-mail voting by members of a small coordinating group (Fielding 1999: 42-43). Mature open source projects are thus not governed by *invisible hand*, neither are they *self-organizing systems* (Weber 2004: 82) – they rather function around established institutions: licensing schemes (promoting and restricting certain actions), technologies (particularly Internet as a communication medium, supporting remote work) and existing architectures of software products (Weber 2004: 83-88), with procedures, structures and designs matching the traditional software development practices. Many projects are managed by a central organization (non-profit foundation, as in the case of Mozilla browser or Apache web server - or commercial company, e.g. MySQL AB or IBM-driven Eclipse project), and some are conducted entirely by commercial companies, developing software internally and releasing its code to general

public (Henkel 2003: 2-3). The most important of them were initiated by commercial companies' decisions to open proprietary source code (Lerner and Tirole 2001: 824), and empirical findings demonstrated that in 2002, 14% of the most mature open source projects were maintained by revenue-earning firms (Krishnamurthy 2002: 8).

The architectural metaphors of cathedral and bazaar were criticized for their simplifications and modified with the concept of public library, listing components for public use without modifications, representing stabilization of the constantly changing bazaars - as with certain core elements of Linux and other open source projects, which nowadays function as open standards and should not be modified in order to maintain compatibility among derived products (Krechmer 2002: 1053). Typical characteristics of a bazaar are: limited availability of information, due to which people either engage in a long-term search for the best opportunities or stick to one preferred supplier, and bargaining for the lowest price (Geertz 1978) - both suggest a rather unfortunate use of the metaphor to describe the open source community. Moreover, one of the first public replies to Raymond's (2000a) article indicated potential corruptions of the idealistic community process: commercial companies may use ideologies and "religions" to change their *cathedrals* and promote own products within the open source community (Turner 1998). Indeed, established firms learned to use customer communities in software development processes, effectively combining the *cathedral* and *bazaar* models (Chan and Lee 2004: 2). Microsoft's early reaction to the success of open source software was its focus on building developer community, offering opportunities to interact and influence development plans (Microsoft 1998), later also sharing code of Windows system with selected, most experienced developers (but not allowing them to make modifications or use the code in own solutions) (Fried 2003). IBM adopted open source-alike processes across 100 major internally conducted software development projects and 2,000 developers: proprietary source code (not disclosed to general public) alongside detailed development plans, requirements and bug information is shared by employees working on various products, thus stimulating active reuse and eliminating situations, when

people developing separate products “reinvent the wheel” instead of benefiting from solutions already worked out by their colleagues (Taft 2005).

7.1.3 Motives for participation

The literature was constantly seeking explanations of the voluntary participation of developers in non-paid open source projects – reasons range from emotional (including pleasure and enjoyment of the work itself), direct needs for specific software or its improvement, expected reciprocity (thanks to the specialization of development work, one could rely on other people to offer similar inputs to other parts of the project), to possible effects on reputation (Lakhani and von Hippel 2003: 3, 11), constituting a mixture of altruism and incentive-driven behavior.

In the development projects of many products intended for enterprise not individual use, lead actors are commercial organizations, with minor roles played by hobbyist developers. It was demonstrated in the literature using the case of embedded Linux: dedicated system version for non-computing electronics devices such as VCRs, mobile phones or machine controls (Henkel 2004: 6). Interestingly, even for the Linux kernel, major open source project attracting hobbyists, the largest number of code contributions over years was coming from developers, whose e-mail addresses were ending with “.com”, standing form commercial organizations (Weber 2004: 72), suggesting that at least some of them were contributing code, developed as part of their product strategies. Similarly, the role of commercial companies as providers of necessary complementary goods is often underestimated (von Hippel and von Krogh 2003: 214), while the support of established semiconductor, hardware and services companies facilitates the development and diffusion of open source solutions, combining them with other value chain segments to offer end-to-end solutions. IBM invested approximately $1 billion in open source community in 2001, and confirmed having nearly recouped the entire investment during the same year from the sales of open source-based solutions (Shankland 2002). Two years later, HP's revenues from Linux-related products and services for 2003 reached the level of $2.5 billion (Shankland 2004a).

I.C.T. companies promoting open source software are not dependent on pricing and licensing policies of powerful partners (Rossi and Bonaccorsi 2005: 9), while corporate absorptive capacity can be enhanced through the incorporation of the open source experience base (Lerner and Tirole 2001: 284), so that smaller firms can benefit from the collective R&D activities at a low cost (Rossi and Bonaccorsi 2005: 9). Finally, collaboration with developer communities helps preempt the development of alternative standards by competitors (Lerner and Tirole 2001: 824), and freely distributed software innovations tend to diffuse at much faster paces than those embedded in commercial products (Harhoff et al. 2003: 1757).

7.2 Business models and open source

7.2.1 Open source start-ups

Researchers identified numerous revenue sources for open source companies – their common element is the protection of own intellectual property, radically different from the unrestricted freedom and *copyleft* ideologies. Some firms even use patents to protect their own development – the best known example is FSMLabs, developer of embedded RTLinux, which patented a generic technical method, demanding royalties from other embedded Linux developers (Henkel 2003: 6). Open source companies usually supplement publicly available software with proprietary extensions or other assets (e.g. brand name, dedicated hardware and services) (Henkel 2004: 4). Empirical evidence counters the common assumptions that open source is free and open – companies involved in projects often adopt *selective revealing* (Henkel 2004: 17), as far as the licensing conditions allow, or learn from the GPL-protected software and later redesign own products to replace the open code with entirely proprietary programs (Henkel 2004: 9). As one of open source analysts noted in 2001, "the ideological purity of open-source software business is being diluted by a new era of pragmatism as start-ups adjust to the economic slump" (Shankland 2001b).

Open source companies strive for differentiation, using both technical and marketing arguments – numerous commercial Linux distributions are

rooted in the same kernel code, but differ in the graphical interface design, include additional proprietary applications, and are positioned for specific groups of customers. The use of marketing is paralleled by management methods, typical for established firms, including partnerships and acquisitions. Many start-ups actively pursue commercial relations with large I.C.T. companies, using them as sales channels or customers for their services - this resembles strategies of contractors in the high-tech value chain. In the first annual report after its successful IPO, Red Hat Software emphasized the importance of strategic relationships with key vendors "to increase the market acceptance of open source technologies" (Red Hat 10K Form, 2000: 4). Companies like Intel, Sun Microsystems, SAP and even Microsoft[18] were contracting open source specialist to develop specific software, who integrated proprietary solutions with popular open source standards. Witnessing the growing popularity of Linux as a server platform, major U.S. hardware companies decided to offer dedicated technical support services, initially channeling the support calls to subcontracted partners, such as the once best known Linux services company Linuxcare. In many cases governments turned out to be important customers and supporters – for example, the German government sponsored the development of Kroupware, a Linux-based alternative for Microsoft groupware client (Shankland 2003), the French Ministry of Defense funded a 7M EUR project to improve Linux security by Mandrake Software (Shankland 2004b), and the governments of Japan, South Korea and China were holding talks about a unified open source platform development. Finally, the strongest open source companies were able to acquire, invest or partner with other open source players.

[18] Microsoft contracted in 1999 an open source developer firm Active State Tool Corporation to improve the popular open version of Perl programming language for Windows (Shankland 1999), even though Microsoft was opposing by that time the community.

Marketing and technology alliances	Contract development	Technical support services
1999 Red Hat Software – Compaq	1999 Intel contracts Sygnus to develop Linux tools supporting Pentium MMX	1999 HP offers Linux support services from Red Hat Software
1999 Red Hat Software – SAP	1999 Microsoft contracts ActiveState Tool Corporation to improve programming language Perl for Windows	1999 Dell offers Linux support services from Linuxcare and Turbolinux
1999 Fujitsu - Caldera	2000 Sun Microsystems contracts Linuxcare to port Linux to its T3 storage system	1999 Compaq offers Linux support services from Red Hat Software
1999 Red Hat Software – Oracle	2001 HP, Network Appliance, Maxtor, Tricord and SGI contract Linuxcare to port Linux to their storage products	
1999 Red Hat Software – Computer Associates	2003 SAP contracts MySQL AB to maintain SAP database product	
1999 Caldera – IBM	2004 Nokia contracts Mozilla Foundation to develop Minimo web browser for embedded devices	
1999 SuSE – IBM		
1999 MandrakeSoft – IBM		
2001 Covalent Technologies – Compaq		
2002 Red Hat Software – IBM		
2003 MySQL AB – SAP		
2003 Red Flag Software – IBM		
2003 SuSE – Veritas Software		
2003 SuSE – Sun Microsystems		
2003 Red Flag Software – Dell		

Table 21. Examples of alliances, contracted development and technical support services involving commercial and open source companies

Minority shareholding		IPOs
1998 Intel and Netscape Communications invest in Red Hat Software	2000 Intel, Motorola and Turbolinux invest in Lynx Real-Time-Systems (later: LynuxWorks)	August 1999 Red Hat Software
1999 Intel invests in VA Linux Systems	2000 VA Linux Systems and Progress Software invest in MySQL AB	December 1999 VA Linux Systems
1999 SAP, Compaq, IBM, Novell, Oracle and Dell invest in Red Hat Software	2000 Intel invests in MontaVista Software	December 1999 Androver.Net
1999 Intel invests in Turbolinux	2002 IBM, Sony, Toshiba, Yamaha, Panasonic and NEC invest in MontaVista Software	March 2000 Caldera
1999 Motorola invests in Lineo	2003 Intel invests in Jabber	July 2001 Mandrakesoft
1999 Intel invests in SuSE	2004 Oracle invests in Miracle Linux	**Suspended IPO plans due to the market downturn:**
1999 Sun Microsystems, Dell, Oracle and Motorola invest in Linuxcare	2004 Intel invests in JBoss	Lineo
1999 Adobe Systems and Texas Instruments invest in Covalent Technologies	2004 NTT DoCoMo invests in MontaVista Software	Linuxcare
		LinuxOne
		LynuxWorks
		Turbolinux

Table 22. Examples of corporate investment in open source companies and their IPOs

Successful open source companies do not differ significantly from other high-tech firms, mainly due to the use of dual licensing. A company releasing own products as open source, is also able to offer the same software with another, commercial license to customers interested in premium service or specific proprietary extensions. Customers paying for commercial licenses of the same software, which other users can use under GPL, may for example be allowed to modify the source code without revealing the modifications to the community, and the additional protection of intellectual property may be essential for some user organizations (Dahlander 2004: 16). The strategy is described as *loss leadership*, as potential losses from giving away software help gain market share and later establish de-

mand for the paid product version (OpenSource.org 2005). The split helps maintain low development costs by establishing developer community around the product (Pal and Madanmohan 2002: 12), while proprietary, complementary elements differentiate the commercial offering. The idea of bundling open source and proprietary components were fiercely opposed by the activists in the 1990s[19], but became a standard practice when most established software companies started releasing Linux versions of their commercial packages, often as free software, but provided without source code.

Firms offering products based mainly on third-party components can use proprietary modifications to add value to commoditized technology platforms: multiple commercial Linux distributions resemble nowadays traditional semi-walled gardens, established by companies like NTT DoCoMo or Microsoft, and the source code for known Linux distributions such as Red Hat or Turbolinux is actually available to paying customers only. The revenue models are however diverse, and some companies pursue exactly opposite scenarios - Swedish database company MySQL AB releases even the source code of technologies, which it acquires from commercial sources, e.g. expensive database clustering technology purchased from Ericsson (Weiss 2003). Table 23 summarizes revenue models of selected popular open source companies, varying in sources of revenue (software platform, software add-ins, support and professional services such as implementation, migration from other technologies, design of dedicated applications and specialized training), approaches to open source community and code sharing patterns.

[19] Yggdrasil Computing was one of first companies publicly criticized for commercializing open source by offering packaged Linux kernel with a commercial graphical user interface tool Motif (Weber 2004: 107).

Company	Products	Free versus commercial	Key partners and investors	Bundled free open source components
Red Hat Software	Red Hat Enterprise Linux clients ($179-) and servers ($349-) with clustering, database, application server and developer tools; web and phone support, professional services	No free version (Red Hat contributed in 2003 its source code to free Fedora Linux project)	BEA Systems, CA, IBM, Oracle, Sybase, Veritas Software, VMware	Linux kernel, desktop (GNOME/KDE), OpenOffice, web browser (Mozilla/Firefox/Opera), e-mail (Evolution/Mozilla), Real Player and others
Mandriva	Mandriva Linux clients ($110-) and servers ($370-), firewall ($550) and clustering server; support	Free version the same as entry-level commercial product, but delayed	EMC, HP, IBM, Sun Microsystems	
Turbolinux	Turbolinux clients ($29-) and servers ($299-), 10F multimedia client supporting Microsoft formats ($69), clustering server	No free version	BEA Systems, Dell, Fujitsu, HP, NEC, NTT, Oracle, Toshiba	
Xandros	Xandros Linux client ($49-)	Free version limited in functionality (e.g. slow CD burning), download only through P2P network	CodeWeavers, Opera, Skype	
Linspire	Linspire Linux client ($50-)	No free version		
Canonical	Ubuntu Linux client and server (free); support	Free version only		
FSMLabs	RTLinux Pro (embedded Linux) support, professional services	RTLinux Free only for free software development, based on code released in 2001 to the open source community (different functionality and hardware support, no development kit)		elements of Linux kernel and other components
LynuxWorks	LynxOS and BlueCat Linux (embedded Linux) support, professional services	No free version	Intel, Motorola	elements of Linux kernel and other components
MontaVista Software	MontaVista Linux (embedded Linux) support, professional services	No free version	IBM, Intel, NTT DoCoMo, Matsushita, Samsung, Siemens, Sony, Toshiba, Yamaha	elements of Linux kernel and other components

Company	Products	Free versus commercial	Key partners and investors	Bundled free open source components
MySQL AB	MySQL database server (EUR250-) support and professional services	The same product, but code of applications developed for commercial version does not need to be revealed	Agilent, Cisco, Hyperion, Motorola, NEC, Novell, SAP, Veritas Software	
JBoss.org	JBoss Application Server (free) support, professional services	Free version only		
Covalent Technologies	Covalent Enterprise Ready Servers (web, application, FTP and authentication servers); support, services	No free software	Accenture, BEA Systems, Computer Associates, HP, IBM, Intel, JBoss.org, Lucent Technologies, Sun Microsystems	Apache web server, Tomcat application server
Sendmail	Sendmail Advanced Message Server (corporate e-mail platform), related anti-spam, anti-virus, reporting and other products, Sendmail Mobile Message Server; support, services	No free version	Adobe Systems, HP, Intel, Novell	Sendmail (basic mail server)
SpikeSource	SpikeSource CoreStack - web, application and database server (free); support	Free version only – paid automatic updates		JBoss, Apache web server, Python, PHP, MySQL
Code Weavers	CrossOver Office Standard ($40) and Professional ($75) (enables running popular Windows applications on Linux); support, services	No free version	Mandriva, Novell, Xandros	WINE (Windows APIs for Linux) – Code Weavers only add installers
SugarCRM	CRM application Sugar Professional ($239- per user), Sugar On-Demand (application hosting, $39.95 per user per month), MS Outlook plug-in ($39.95 per user); support, services	The same product (but without MS Outlook integration)		

Table 23. Different revenue models among open source companies

There are cases of open source companies, which decided to close their source code, moving to entirely proprietary solutions. Licensing schemes allowed them to stop releasing code for new product versions, but the previously released code remained public and usually was later maintained by non-profit developer communities. One of the first such cases was SSH Communications Security, developer of popular data encryption tools, which in 1995 switched to commercial licensing mode, restricting the use of SSH trademark and later even suing the open source community for referring to it in the free OpenSSH project (Weber 2004: 178). Once an open source icon, evidencing the commercial viability of the movement's ideology, Red Hat Software decided to restrict access to its source code in 2003, focusing on high-end customers and spinning off an independent, free Linux project Fedora (Legard 2003). As Red Hat Enterprise Linux was still strongly based on third-party components released under GPL[20], many non-profit and commercial organizations were able to clone the new Red Hat releases, offering most of the functionality – but Red Hat threatened the most visible clone, CentOS, with a trademark infringement suit. CentOS website was informing that the offered system is a Red Hat's clone - in March 2005, Red Hat Enterprise Linux was priced at $2,499 per server, while CentOS was charging only $12 for every download of the system, which could legally be installed on multiple computers (Shankland 2005)). This demonstrates the competitive nature of open source environment: even freely available technology platforms are often developed by two or more competing communities (e.g. alternative Linux graphical user interfaces GNOME and KDE), software projects may split into competing versions (through *code base forking*, when a group of developers opposes product development directions and decides to use the existing code for an own, potentially incompatible project (Weber 2004: 64)), and companies commercializing open source software fight legal battles, competing on product features and brands, or even headhunting key developers of competitors.

[20] In 1999, only about 13% of Red Hat Linux code lines were developed by Red Hat (Red Hat 424B1 Form, 1999: 6).

Project name	Type	Support availability
Asianux http://www.asianux.com	commercial (free underlying distribution for packaged products by Miracle Linux, Red Flag Software and Haansoft)	paid support for packaged Linux versions purchased from the developing companies
Debian http://www.debian.org	community	no formal support options, but a list of 599 consultants in 54 countries available on the website
Fedora http://fedora.redhat.com	community (hosted on Red Hat Software servers and derived from original Red Hat Linux's code but not maintained by the company)	no formal support options
Gentoo http://www.gentoo.org	community	no formal support options
Knoppix http://www.knopper.net	community	no formal support options
Mandriva (Mandrake) http://www.mandriva.com	commercial (free full version of product published several weeks after its commercial release)	paid support for commercial version purchased from Mandriva
Slackware http://www.slackware.com	community	no formal support options, but a list of 9 technical support organizations in 5 countries available on the website
Ubuntu http://www.ubuntulinux.org	community (sponsored by Cannonical Ltd)	paid support from Canonical Ltd, available to all users of the free Ununtu distribution
Xandros http://www.xandros.com	commercial (free version with restricted functionality available only through P2P network, not as Internet download)	paid support only for packaged Linux version purchased from Xandros

Table 24. Major free Linux distributions, 2005[21]

1999 VA Linux Systems criticized for using 'LNUX' ticker in its IPO and using open source developer lists to send e-mail invitations to buy its shares
2000 Caldera takes over a key Turbolinux developer
2001 Red Hat Software embeds ProgreSQL database in its Linux distribution, bypassing PostgreSQL vendor Great Bridge which closes its operations
2002 MontaVista Software accuses Lineo (later: Embedix) of having illegally copied its source code
2002 SSH Communications threatens OpenSSH developers with trademark infringement lawsuit
2003 SCO Group (formerly: Caldera) accuses Linux developers of having illegally copied code lines of Unix, owned by SCO, sues IBM and sends letter to corporate Linux users asking for licensing fees
2003 JBoss accuses Apache Software Foundation of having illegally copied its source code
2004 Red Hat Software threatens to sue Red Hat Linux-clone maker CentOS for trademark-infringing use of Red Hat's brand name

Table 25. Examples of conflicts among open source companies

Market for commercial open source software represents most of standard software market characteristics. Facing the high-tech industry depression in 2001, Turbolinux' CEO Ly-Huong Pham suggested that “the development model of open-source software is wonderful. But let's not confuse a development model with a business model. Basic business principles were forgotten by some” (Shankland 2001b). Red Hat Software is a very good example of this disillusionment, especially as it was the first publicly listed open source company. Its initial focus on implementation services accompanying Linux version was later replaced by software license sales to the largest enterprise customers. Looking for new revenue streams, it was often forced to abandon previous solution partners – for example, Oracle played

[21] The website www.linux.org listed in April 2005 altogether 396 free Linux distributions, most developed by hobbyists and offered for download without any professional support. Only 352 distributions were classified as still actively maintained. Many Linux versions were derived from other projects, sometimes changes concerned only repackaging some components – 47 distributions were based on Debian, 41 on Red Hat (previous freely available code), 25 on Slackware and 7 on Mandrake, there were also 30 embedded Linux distributions, with architecture different from the system designed for personal computers (www.linux.org/dist/list.html). Other websites listing the most popular free Linux distributions include: www.distrowatch.com and www.linuxISO.org

an important role in Red Hat's offering as a provider of a scalable enterprise-class database, but was substituted by an open source alternative PostgreSQL. Interestingly, Red Hat surpassed the intermediary, PostgreSQL specialist firm Great Bridge, and simply used the freely available database source code – Great Bridge management decided to liquidate the firm, seeing no possibilities to compete with the powerful open source company (Shankland 2001a).

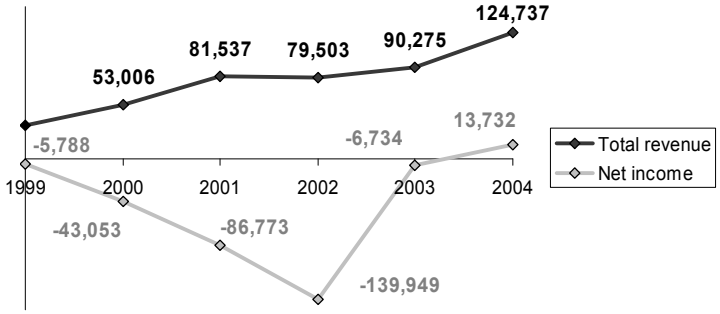

Fig. 25. Sales and profits of Red Hat Software, 1999-2004. Financial data in thousands USD. Data sources: corporate annual reports

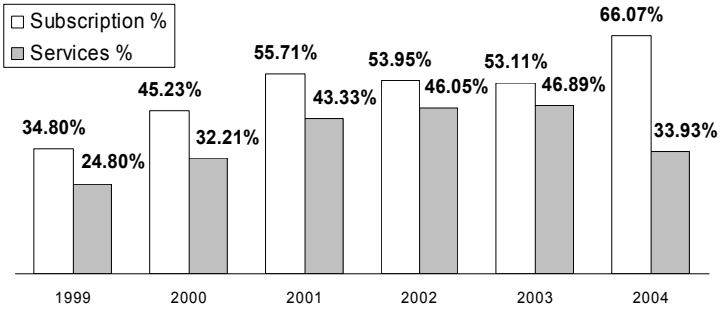

Fig. 26. Software subscription and services sales of Red Hat Software, 1999-2004. Data sources: corporate annual reports

Another important open source firm, Linuxcare, specializing in technical services for Linux and other open source platforms, was a desired partner of the largest IT companies such as Dell, subcontracting Linuxcare to provide support for their own customers, but the largest IT services companies soon established own Linux expertise centers. IBM might be the most active commercial supporter of the open source community, but its strategy was directly targeting Red Hat Software and Linuxcare as main competitors in the area of enterprise services. Dramatically losing its market share under attack from past partners, Linuxcare unsuccessfully tried to merge with a Linux vendor Turbolinux, and in 2002 switched the business model to software sales, focusing on data consolidation software Levanta, complementing IBM mainframe platform.

Open source companies face the same challenges as commercial software companies, and their strategies and partnership patterns are surprisingly similar even when an open source code forms the basis of offered products. In many cases, heavy reliance on third-party components, available freely on the Internet, additionally motivates open source start-ups to pursue actively alliances with key established players.

7.2.2 Involvement of established companies

In the late 1990s, the largest established high-tech companies joined the open source efforts, adding credibility, but also irreversibly changing their directions. This dynamics can be explained through an analogy with other collective developments, where interests of altruistic individuals and self-interested companies clash. Research on management fashions offers valuable insights into this phenomenon (Klincewicz 2005). Management fashions are short-lasting swings in popularity of certain management concepts, such as *business process reengineering* or *knowledge management*, and sales of related solutions: management books, consulting services, or software systems. Fashions establish commercial opportunities: initial concepts, proposed by management bestsellers, are quickly turned into buzzwords and sales arguments by consulting or IT services companies, which *hitchhike* on the fashion bandwagon, and later can even *hijack* a particular management fashion by distorting the initial messages, and adjusting them

to own products (Klincewicz 2005). This professionalization and commercialization of management concepts is an example of a more general mechanism of *hitchhiking* on and *hijacking* of collective movements, observed also in the case of the open source community.

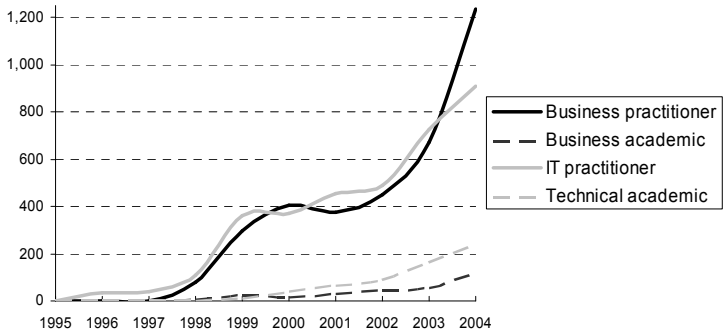

Fig. 27. Popularity of open source in English-language periodicals. Data sources: annual article counts based on "open source" search in EBSCO Business Source Corporate (business academic: peer-reviewed articles, business practitioner: remaining articles), CNET News.com (IT practitioner) and Compendex (technical academic), queries from April 12, 2005

Figure 27 presents changes in the popularity of open source, based on the annual counts of articles, referring to the model in academic and practitioner journals. The dramatic growth in 1999 was correlated with decisions of major I.C.T. companies about involvement in the community by opening source code of previously proprietary products or supporting the Linux platform. They decided to join the bandwagon as soon as they've spotted new revenue opportunities, and were able to capitalize on own proprietary technology base, products, patents, and of course financial resources, which privileged them over previously described open source start-ups. Their approaches and justifications for involvement can be divided into four broad types:

- sales of products and services complementary to the open source software;

- *widget frosting* - hardware makers allying with independent developers to support new devices in the open source software;
- *sell it, free it* - when source code is opened and handed over to the open source community, which continues the development and maintenance efforts;
- *hijacking* – when a company capitalizes on the open source movement, using it for purposes different from the community member expectations.

Each approach has its distinctive economic and strategic rationale. The most obvious orientation, sales of complementary goods, is rooted in the high-tech value chain model, where commoditization of a particular value chain segment offers commercial opportunities for companies from other segments, delivering complex solutions for end customers. Hardware companies spotted the commercial opportunity early on – DEC was the first established company supporting Linux development, already in 1994 encouraging the community to port the new system to its 64-bit Alpha processor (Weber 2004: 105-106). Interestingly, when in 2000 Microsoft decided to stop supporting Alpha in next Windows releases, Compaq (having in the meantime acquired DEC) was still able to sell the platform running the newest Linux versions. Intel was similarly involved in the open source community, actively investing in start-up companies, sponsoring development projects and releasing own toolkits to make sure all newly released Intel-based computer architectures can be supported by Linux developers.

Widget frosting (OpenSource.org 2005) is a particularly attractive solution for semiconductor and hardware companies, which need dedicated drivers and software for their devices. Under the proprietary software regime, they internally develop them, shipping with the physical products and releasing on support websites at no additional charge – the software development and maintenance constitute costs not profits. Open source development could significantly reduce these expenditures, and this explains why consumer electronics companies willingly use embedded Linux components. The scenario resembles the earlier described situation, when large server vendors welcomed Microsoft's initiative to substitute their clustering software solutions with a standardized, Windows-based alternative – even though the new product was reducing software sales of these companies

and potential revenues from proprietary services, they no longer needed to cover substantial costs of technology development and maintenance in an area, what was only an enabler for the hardware sales.

Similar cost concerns may motivate companies to open source code of products, which have reached mature or decline stage in their product life-cycles. Model characterized as *sell it, free it* (Weber 2004: 196) recommends to free such ageing technologies in order to reduce maintenance costs, while still being able to maintain the installed base and potentially use community-develop enhancements in own proprietary platforms. The code opening may also spell a renaissance of the product, when open source developers discover new product uses or redesign its architecture – the releasing company usually reserves itself the rights to incorporate new developments into the commercial product, so the code opening may also positively influence future product revenues and market penetration. Moreover, opening code of obsolete or non-key technologies does not endanger the owner's competitive position – companies participating in open source tend to reveal more generic code, while protecting critical components from competitors and imitators (Henkel 2004: 15-16). The first significant code opening was made by Netscape Communications for its web browser, which had lost the battle of standards against Microsoft, and had already been distributed for free. Apple's decision to open source code of its operating system turned out not to be as courageous as initially thought, as the company revealed only the underlying software layer, not useful for other projects, and more importantly based on another open source project FreeBSD (West 2003: 1272). Even the most active "code opener" IBM is sharing only code and patents for underlying generic technologies, maintaining proprietary control over its real sources of revenue: technologies related to mainframe computers, databases and business applications (Lohr 2005). The source code opening symbolizes an open dialog with the developer community and customers – this explains, why even Microsoft decided to offer code preview to selected third-parties under its "shared source" program.

Release of commercial products for Linux platform	Opening of source code
1998 Corel – WordPerfect suite	1998 Netscape Communications – Netscape Communicator web browser
1998 Oracle – Oracle8 database	1999 Apple Computer – parts of Mac OS X operating system
1999 Lotus IBM – Lotus Domino	1999 SGI – XFS file system and other technologies
1999 SAP – SAP R/3	1999 HP – e-speak web services platform
1999 Computer Associates – Unicenter TNG, Ingres database	1999 IBM – JFS file system and other technologies
2000 Novell – NDS eDirectory	2000 Apple Computer – QuickTime multimedia streaming software
2000 HP – main server product lines	2000 Sun Microsystems – NetBeans, OpenOffice (StarOffice)
2002 Veritas Software – storage solutions	2000 Nokia – mobile web browser
Release of free products for Linux platform	2001 IBM – Eclipse development tools, developerWorks web services tools
1998 InterBase Software (Inprise/Borland) - database	2001 HP – Cooltown interconnecting peripherals technology
1998 Corel – developer tools and WordPerfect suite	2001 Sun Microsystems – Grid engine for distributed computing
1998 Informix – database	2001 Microsoft - Shared Source program initiated: preview of product code for selected developers and customers (code cannot be re-used)
1998 Sybase – database	2002 Symbian – mobile operating system (code cannot be re-used)
1998 IBM – DB2 database	2002 RealNetwork – Helix multimedia streaming client
1999 Sun Microsystems – StarOffice	2003 Bitstream – free fonts for Linux
2000 Corel – Photo Paint	2004 Novell – YAST for installing and configuring Linux
	2004 Microsoft – several Windows developer tools
	2004 BEA Systems – Beehive
	2004 Computer Associates – Ingres database
	2005 Sun Microsystems – Solaris 10 operating system

Table 26. Examples of commercial, free and open software releases by established commercial companies active in the open source community

The fourth option is hijacking: the open source movement could be exploited for own purposes by arriving commercial vendors. They are welcome by the community for bringing the *feature gifts*, specialized code, developed outside of the open source projects (von Krogh et al. 2003: 1233-1234), releasing free low-end products for open source (without revealing their source code), and offering complementary products and services. The

participation may however be rooted in strategic considerations other than the interest in selling complementary goods or reducing software development costs. Hijacking the collective movement may help establish own dominant position, better targeting key competitors with not only commercial but also ideological "weapons". IBM's involvement in the Linux world was feared by Microsoft already in the "*Halloween memo*" (Microsoft 1998) – IBM, which used to be a symbol of a closed, proprietary platform, restricting collaboration opportunities for third-parties to benefit from cover all segments of the value chain with own offering, is nowadays publicly praised as the main open source supporter. There is no radically new industry logic behind IBM's involvement – the company managed to established an own semi-walled garden, switching to Linux as a community-supported platform and supplementing it with proprietary extensions to keep customers locked-in. In 2000, IBM decided to standardize all hardware lines with Linux and to phase out own Unix clone AIX, even though by that time, AIX offered more advanced features than Linux. The commoditization of operating system software was a useful way to make the IBM-driven value chain cost competitive, compared with alternatives from Microsoft or other Unix vendors. Further open source commitments, including the handover of the $40M worth source code of developer tools to the non-profit Eclipse Foundation in 2001, were both enhancing the corporate image, as well as reducing internal maintenance costs of non-core components. IBM was later able to reuse Eclipse-derived code in commercial products, especially after it acquired a specialist programmer tool company Rational, and to promote web services standards through the community. Finally, the open source involvement supported IBM's business transformation – over several years, the company disposed of non-core hardware operations and gave away developer software to focus on large enterprise customers, keeping strict control over key technologies (mainframe hardware, databases and business applications) and growing its internal IT service competences. IBM wasn't the only company, which made open source key to its strategy, as two other Microsoft's arch-enemies followed the lead, Corel invested in Linux as the underlying platform for all its products in 1999, but later abandoned the plans due to financial prob-

lems. Novell acquired in 2003 two Linux companies Ximian and SuSE, and revitalized its networking competences in the new technological environment, becoming the leading Linux vendor. The text is not intended as a criticism of the above-mentioned companies for being hypocritical or instrumental in their exploitation of the open source movement – it rather reminds of the usefulness of value chain analysis in strategies of established high-tech companies. While supporting the open source movement, IBM pursued its own value chain leader strategy, establishing a semi-walled garden just like other companies described earlier in this book, enriching its commercial solutions with publicly available software. Technology platforms evolved from entirely proprietary, vertically integrated systems like IBS S/360 through multi-layered solutions including Microsoft Windows towards open standards, not sponsored by any single company (West 2003: 1280) – but the openness concerns only one segment of the value chain, operating system software, and still offers commercial opportunities for complementors, able to appropriate profits from the Linux-related value chain.

7.3 Discussion

The chapter described the early emergence of open source start-up companies, which started putting price tags on free components, developing proprietary product extensions or closing previously public source code. The open source community is nowadays professionalized and does no longer resemble the metaphorical chaotic *bazaar*. Participants adopted software development practices of the initially criticized *cathedrals*, no longer opposing the use of proprietary components, promoting competition between projects, distinguishing their own ones by brand names, and putting an increased emphasis on the strategic alliances with commercial vendors of hardware, software systems and providers of IT services. Critical for the direction of changes was however the participation of established commercial firms, which *hitchhiked* on the open source hype and later managed to *hijack* the community of developers and users, melting non-proprietary open

source software with own, protected technologies, deriving substantial revenues from the newly established market.

The movement did not establish new underlying industry logic, merely modifying the previous arrangements, quickly assimilated by major high-tech companies. The important difference between proprietary and open source software businesses is related to the property rights protection mechanisms, not in corporate strategies. Open software is free in ways analogous to "free speech" (unrestricted) but not necessarily to "free beer" (costing nothing) (Weber 2004: 5), and even if the software is actually available at no cost, hidden costs may arise in other segments of the value chain, justifying the interests of established high-tech companies, capitalizing on complementary products and services. While the use of open source software in many cases reduces the overall costs of deploying I.C.T. solutions, it does not radically differ from the logic of the high-tech value chain. One chain segment becomes commoditized - but the focus of corporate strategies shifts to neighboring segments, which still offer opportunities for chain leaders, complementors and contractors.

A model of shared ownership of intellectual property and commoditization is possible also for other value chain segments. It seems particularly interesting for open content projects, community-driven development of public knowledge - an excellent example is Wikipedia, a web-based encyclopedia with entries created and extended by Internet users. Even in the semiconductor and hardware segments, similar opportunities exist - Sun experimented in 1999 with loosening IPR control by making publicly available the basic designs for chip architectures Sparc and PicoJava (Crothers 1999), but the company guaranteed itself rights to conduct compatibility tests and charge royalties for every commercial shipment based on the designs. The open source model is easy to adopt for information goods, which are not scarce and could be distributed at low costs thanks to new technologies such as the Internet - but would not be feasible for physical, tangible products, characterized by relatively high variable costs. Moreover, the model can be applied to other industries and domains - “open science” concerns situations, when companies make their scientific discoveries publicly available (Lerner, Tirole 2001: 1999), establishing

shared knowledge platforms on which everybody can build proprietary solutions. Paybacks from a mutual IP disclosure among competitors are demonstrated by cross-licensing agreements or initiatives such as the earlier described establishment of a shared patent pool by Japanese electronics companies, working on 3G phones for NTT DoCoMo. Such arrangements are not intended to privilege any party, and generally lower entry barriers to the market, boosting technology diffusion – however, interested companies always find ways to differentiate themselves by proprietary extensions, brand names or complementary technologies.

Weber in his seminal analysis of the open source movement claims that the control over the source code was the source of competitive advantage in the traditional business model, which changed with the advent of the open source (Weber 2004: 192). The above presented analysis suggests that not the control of code is key to the success, but rather the control of complementary products and partner relations, translating itself into the ability to offer end-to-end solutions and a compelling vision for customers. The concluding section should also contain a more general remark concerning the dynamics of the high-tech industry: IBM used to be a symbol of proprietary architecture, disliked by most players and clients, and this image faded in the recent years, so that now the company is perceived as the main open source supporter, no longer mentioning the proprietary character of technologies, which still remain its key sources of revenue. Maybe a time will come, when the name Microsoft would stand at the forefront of another community-driven movement, symbolizing openness and fairness? Open source does not bring revolutionary industry changes, neither is it a passing fad – but its impact is merely restricted to the regulation of intellectual property rights to use information goods.

8 Implications for corporate strategies and government policies

The book presented an overview of the underlying business logic, specific for the high-tech industry. It focused in particular on the importance of strategic alliances in establishing the value for customers. The proposed model of high-tech value chain is a novel way of analyzing technology markets and interorganizational partnerships, resulting from the technical features of Information and Communication Technologies and defining the industry structure. Complementary alliances among companies from various value chain segments stimulate innovation and diffusion of new technologies. According to the model, the importance of specific chain segments depends on creative strategies of involved companies – semiconductor, software or content firms may equally succeed in building end-to-end solutions for end customers and assembling a partnership network around their underlying technologies.

The analytical framework helps also identify three distinctive strategic positions, available for high-tech industry participants. These value chain roles are linked to strategic intents, objectives, as well as political and partnering skills. The typology offers new ways of interpreting own company's industry position and designing corporate strategies, revealing hidden and sometimes counterintuitive aspects of the business. Table 27 summarizes the three strategic value chain orientations – by structuring the roles in alliance network, partners benefit from synergies and specialization effects.

Table 27. Three alternative orientations in the high-tech value chain. Used symbols: *(***) significant, (**) medium, (*) insignificant, (-) non-existent*

	Value chain leader	**Complementor**	**Contractor**
Deliverables	technological platform	products	services
Customers	mass market	product niche(s)	competence niche(s)
Sources of competitive advantage	installed base end-to-end solution with complementary products from partners	installed base unique technologies and products, focus relations with value chain leader seamless integration with technological platform	unique skills operational excellence relations with other value chain companies cost advantages flexibility
Strategic objectives	maintaining leading position in the value chain	maintaining stable relations with value chain leader	extending the scope of services, gaining independence with own branded products
Partners	all value chain segments	close segments in the value chain	paying clients from a selected segment
Dynamics of strategy	incentives and deterrents ("*divide et impera*")	substitution and innovation patterns ("*partner dance*")	partner dependence and betrayal ("*Eve Harrington*")
Scope of technologies and skills	generalist	specialist	specialist
Sales model	direct/indirect sales to end customers	direct/indirect sales to end customers	services for partners-clients
Risk and investment	***	**	*
Technological dependence on other parties	*	***	*
Financial dependence on other parties	-	*	***
Ownership of IPRs	***	**	-

High-tech value chain leaders bridge various chain segments, assembling complete solutions and supporting businesses of partners. The strategy differs from previously discussed platform leadership (focused merely on promoting own underlying technologies), involves foresight and responsibility. Not many software companies get as deeply involved in their value chains as Microsoft, partnering closely with semiconductor, hardware and telecommunications companies. NTT DoCoMo case demonstrated in turn the role of an insightful value chain leader in establishing new technology markets by pursuing cooperation with software and content providers, who themselves would probably be too small to gain critical mass for their innovative offerings. Thanks to chain leaders, alliance networks are streamlined around specific value propositions, and diverse industry segments converge to form solutions, addressing customer problems. The companies need to be skilled politicians, using "stick and carrot" to keep other partners motivated.

Complementors are important partners, valued by the chain leader as long as they focus and complement their technological solutions. The book discussed the dynamics of substitution and innovation, demonstrating the inevitable commoditization and standardization of areas, which once used to form major streams of revenue for complementors. The tensions between chain leader and complementor do not justify decisions to compete. For substituted complementors, it is wiser to concentrate on new product generations, and continue penetrating the installed base of a value chain, instead of potentially fatal competitive struggles or strives for chain leadership.

Contractors play the archetypical role of Eve Harrington[22], beginning as trusted partners of other high-tech companies, and later building skills, technologies and contacts bases, enabling them to offer own products, competing with their past partners. The strategy is potentially the most rewarding one, requiring only limited financial inputs and reducing risk of

[22] Eve Harrington was a character from Joseph Mankiewicz's Oscar-crowned movie "*All About Eve*" (1950) – the young aspiring actress gained trust of Broadway star Margo Channing, working as her personal aid and learning to imitate her acting skills only to betray her and start own acting career at her cost.

product development and sales – however, its key precondition is the existence of close relations with potential clients-partners.

Even though companies from any chain segment may pursue each of these strategies, their options are restricted by financial requirements, possessed specialist knowledge and contact networks. Strategic analysis helps identify own strengths and weaknesses, and the model of value chain can subsequently be used to work out specific recommendations.

The book presented the underlying logic of the high-tech industry, symbolized by the concept of value chain – it is therefore important to examine the existence of alternative logics, as other ways of understanding the market might lead to different strategic recommendations. The following section will overview four possible alternatives – domination, chain virtualization, community-driven and government-driven efforts.

The "do-it-yourself" attitude, described also as strategy of a dominator (Iansiti and Levien 2004: 69) is no longer feasible in nowadays markets. Literature discussed examples of companies, focused on internal development and maintaining no or only few alliances. Gomes-Casseres (1996: 42) listed in 1996 IBM, DEC, Intel and Sony as firms, which were avoiding alliances, hoping to dominate their value chains – nowadays, all of these companies (or they corporate successors) are active value chain players.

Value chain virtualization is a theoretical concept, emphasizing the short-lasting, ad hoc nature of linkages among companies: instead of partnerships, they would pursue market-based governance mechanisms. "Plug-and-play" architectures facilitate interchangeability of partners (Veryard 2002), but real virtualization would only be possible with entirely open standards – while even the open source community demonstrates the existence of path dependence and technological lock-ins. Openness of one segment of the value chain – for example operating system software, as in the case of Linux – does not change the proprietary character of hardware, business solutions or specialist services, used by companies to build semi-walled gardens and control the market. The current virtualization scenarios are restricted to the availability of contractors, but end customer solutions are delivered within specific value chains. Internet reduces transaction costs within markets – but it does not motivate companies to replace hier-

archies by markets, as the same Internet technology lowers also coordination costs within organizations, thus helping increase efficiency in multiple ways, through networks of suppliers, partners and own departments (Carr 2004: 12).

Community-driven development scenario was thoroughly discussed in the chapter concerning the open source software. The initial ideology of decentralized and chaotic "bazaars" was gradually supplemented by institutionalized forms of cooperation, establishment of commercial startup companies, and attempts to hijack the community by large high-tech firms. Instead of alternative industry logic, open source modified merely project management techniques and perspectives on intellectual property management.

Finally, involvement of government could be interpreted as a challenge to the proposed framework - national and regional cluster initiatives, as well as government-driven technological standardization may potentially change the roles of chain leaders, aligning firms around political not business objectives. This conclusion is however not justified – cluster initiatives are pursued to promote alliance formation among local companies and stimulate internal dynamics of the industrial system, ultimately establishing high-tech value chains. Government standardization efforts are in turn focused on commoditizing a specific value chain segment, especially to facilitate the business of local companies – European governments decided in the 1990s to embark on a common mobile telephony standard GSM, Japanese government stimulated in the 1980s the (ultimately failed) TRON operating system to help local companies compete with Microsoft (Takahashi and Namiki 2003: 1594-1596), and Chinese ministries took the lead role in establishing TD-SCDMA as national 3G mobile standard to limit the dependence on Western technology providers. In each of these cases, the commercial success of specific technologies was however dependent on the availability of solutions compliant with the promoted standard, delivered through complex value chains of local high-tech companies. Even the Chinese TD-SCDMA initiative, initially interpreted by analysts as protectionist government project, turned out to be driven by an association of firms led by Datang, co-opting local and foreign partners from other value chain

segments, including semiconductors, infrastructure, handsets and software. Regardless of possible nationalist or anti-liberal motivations for government funding, successful initiatives will sooner or later adopt the high-tech value chain structure, where leading roles are played by commercial companies.

The high-tech value chain is the currently prevalent underlying logic of the industry, witnessed in different cultural environments and various segments of the high-tech market. The book proposed an analytical framework for corporate strategies, alongside examples of multiple useful techniques, such as: partner network mapping, distinction between close and distant value chain segments, differentiation of intellectual property ownerships by alliance partners, metaphorical dynamic "dance" of complementor and chain leader or strategic transformation from partner intimacy towards independent innovation. The presented examples of firms, following the described strategic principles, will certainly offer a useful contribution to the strategies of both incumbents and start-ups, helping them learn from mistakes and experiences of leading technology companies.

The author believes that the presented model of high-tech value chain is a useful framework for setting corporate strategies, not merely a technical description of product and technology portfolios. It helps decompose partnership networks in high-tech markets, identify existing and intended positions of own company and target potential partners in an effort to offer a comprehensive solution for end users. New strategic insights include the awareness of technological and strategic interdependencies between technologically advanced companies and of the partnership imperative. As the book demonstrated, most companies do not need to (or even should rather not) strive for leadership positions in the value chain, as it involves substantial investments and business risk. Instead, they should identify and cooperate with leaders of specific value chains. Aligning own strategies with them could help optimize the efforts – but consequently, often requires also giving up certain ambitious objectives, and the companies need to understand the underlying logic of the market to know, when their own strategies might be endangered by the dominant partner.

The findings can be used by startup companies to maximize investments and impact of technology strategies, especially by evolving from contractors to complementors, as it was demonstrated by the case of Indian offshore specialists. Established market players might want to reexamine their positions and definitions of chain segments, facing the industry convergence – the book demonstrated how NTT DoCoMo and Microsoft creatively reacted to market changes and the growing importance of content segment. The three identified strategies of: value chain leader, complementor and contractor are relevant also for markets based on different advanced technological platforms, for example biotechnology.

The framework is additionally useful in directing government science and technology policies, which should be based on a sound understanding of domestic sectors' strategic positions in global high-tech value chains. Only in this way, governments can set realistic economic and technological objectives, deciding whether national industries should strive for self-sufficiency or rather synergistic co-operation with specific chain leaders. The model helps also direct sectoral investments and policies, as well as opportunities for foreign direct investment.

Finally, the book presented new ethical and legal dimensions of the interorganizational politics, as many of the discussed techniques, employed particularly by value chain leaders, seem questionable. For example, the cooption of partners thanks to technology investments is strikingly similar to the payola practice, declared illegal in the multimedia domain, but not regulated with reference to the high-tech industry. Numerous litigations and court cases involving leading technology companies demonstrated the questionability of wide-spread practices, as well as imperfections of existing legal frameworks. The author did not intend to evaluate the conflicting ethical and legal opinions, focusing instead on a detailed description of the interorganizational politics and believing that companies have to act within the confines of the underlying industry logic, but they should also be aware of its deficiencies and have the courage to organize themselves and change the rules, if they were challenged for ethical reasons.

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