1

Collaborative Dynamic Capabilities: The Dynamic Capabilities View

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1.1 The Need for Collaborative Dynamic Capabilities

Superior core technologies at the cutting edge of industries such as ICT, energy, cars, electronics, semiconductors, biotechnology, pharmaceuticals, and material science are dispersed among companies, organizations, and even individuals throughout the world. Innovation using these superior core technologies is a wellspring of new products and services. A strategic goal for hi-tech companies has been the development of products through ongoing innovation in individual technologies. However, a host of demands have been placed on manufacturing industry, including: demands for high-function, high-performance products; offers on low-priced products; extensive product lines; and short product development cycles (e.g., Kodama 2007c). At the same time, diversified customer

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requirements and values have created user needs arising from new product values such as "disruptive technology" (Christensen 1997).

In world markets, where demand from emerging countries is growing, new marketing and creative product strategies have become an urgent issue for global companies. Moreover, when developing new products and services, global hi-tech companies need to differentiate them based on the "convergence" of different technologies. This stems from the evidence of the cases where the integration of technology in one field with that of another has resulted in successful new products and services based on novel ideas. Therefore, there is a growing need for business strategies that provide for convergence, that is, the integration and consolidation of different technologies, the development of products and services that intersect different industries, and the construction of new business models.

Furthermore, the evolution of ICT has brought about temporal and spatial contractions in business processes and supply chains in all industries. In addition to enhancing management efficiency and accelerating decision-making, ICT has spawned new business models that crisscross and integrate wide range of industries, such as e-businesses, and new content (particularly for smartphones and tablet PCs, an area Google and Apple have dominated the world of ICT), and that have brought about business innovation in technical areas, such as the development of ICT and the creation of new markets through the integration of knowledge sourced from diverse players.

In addition, NTT DOCOMO's i-mode (the world's first mobile phone-internet business model, developed in Japan) (Kodama 2002), Sony's and Nintendo's game devices (PlayStation/DS/Wii and Pokemon Go using smart devices)(Kodama 2007c) and rapidly growing social networking services (SNS), such as Facebook and Twitter, and various kinds of social games, have brought about innovations in product development technology and service innovations through new marketing in newly created markets (for content, applications, game software). Moreover, these product and service innovations have facilitated co-creation and co-evolution across the ICT industry through the formation of dynamic "business ecosystems" as new value chains. Internet businesses, SNS, social games, and so on using mobile telephones and smartphones start out through the dynamic construction of business ecosystems developed through co-creation and co-evolution (e.g., Kodama 2001, 2007a, 2009b, 2012, 2014, 2015, 2017b).

The convergence of such different technologies and industries is progressing at a rapid pace in a wide range of hi-tech areas, including smartphones, radio-frequency identification (RFID), smart grids, solar cells, automotive computerization, environmental vehicles, semiconductors, biotechnology, and life sciences. Furthermore, the sophistication and diversity of these technologies, and the dramatic developments in ICT are forcing companies to come up with more complex business models.

In today's rapidly changing business environment—with its high-speed technological innovations and short product life cycles, mature markets in developed countries and expanding markets in emerging countries, progress in ICT and the search for new business models—it is essential for companies to explore the development of new technologies to construct new business models. Companies must also pursue business innovation to offer new value to customers through the integration of different technologies and the creation of ICT businesses across various industries. This requires more than just the integration and consolidation of different kinds of specialist knowledge within each company—a vital element is the integration of different kinds of knowledge from other companies.

For example, in Japan, where the mobile phone market has already reached saturation, mobile phone carriers such as NTT DOCOMO and SoftBank have been forced to search for new business. Therefore, these companies need strategies that enable them to transition from saturated markets like the mobile phone market to new business models.

Market saturation is due to a number of issues common to developed countries: (1) the number of mobile phone subscribers is close to that of the population; (2) cut-throat competition among carriers over user charges; (3) increases in handset prices (due to increased development costs); (4) penetration of number portability (lowering of the barrier to switching carriers); (5) entry of new operators (mobile virtual network operators); and (6) increase in communications traffic (increase in content accompanying the increased use of smartphones).

Therefore, mobile phone carriers have to develop new value for customers. For example, in response to changes in the business environment, NTT DOCOMO is aggressively developing new mobile phone businesses in the ICT industry as well as social support services that cross different industries. To achieve this, it is constructing a technology plat-

form to enhance the efficiency of information circulation via mobile devices, including smartphones and tablets, in areas such as ecology, safety and security, and healthcare; while Softbank is pursuing the acquisition of US companies to gain domination in world markets as it strives to make the transition into new service businesses.

The question then is: What kind of organizational strategies and actions should a company adopt to generate new products, services and business models through "convergence," that is, the creation of ICT businesses that integrate different technologies and span industries? In addition, what kind of leadership and management is required to achieve this? There are many issues for hi-tech and global corporations to consider in this regard.

While the detailed strategies of individual industries and companies vary, the key concept behind corporate activities for adapting to convergence lies in "asset orchestration" (or knowledge creation) through the demonstration of dynamic capabilities (DC) (Teece 2007, 2014). Furthermore, the corporate and organizational platforms that support this asset orchestration process are the formation of business communities which originate in the Japanese concept of *ba*, or place (Nonaka and Takeuchi 1995; Nonaka and Konno 1998; Kodama 2005) and those unique, inherent capabilities of their practitioners (leaders and managers) and organizations, which are difficult to replicate (see Fig. 1.1).

The asset orchestration process is not simply a process of integrating (orchestrating) diverse kinds of knowledge (assets) across different organizations and areas of specialization within a company. The most critical issue in this process is demonstrating DC for integrating (orchestrating) assets within a company and superior assets dispersed throughout the world by engaging in strategic collaboration with outstanding partners (ecosystem partners) via global networks. These unique corporate capabilities, which accelerate the asset orchestration process through strategic collaboration within and outside companies, and which are hard to replicate, are referred to as "collaborative dynamic capabilities" and are a key theoretical concept of the book. Collaborative DC developed through strategic collaboration among companies across the boundaries within and outside companies to promote the processes

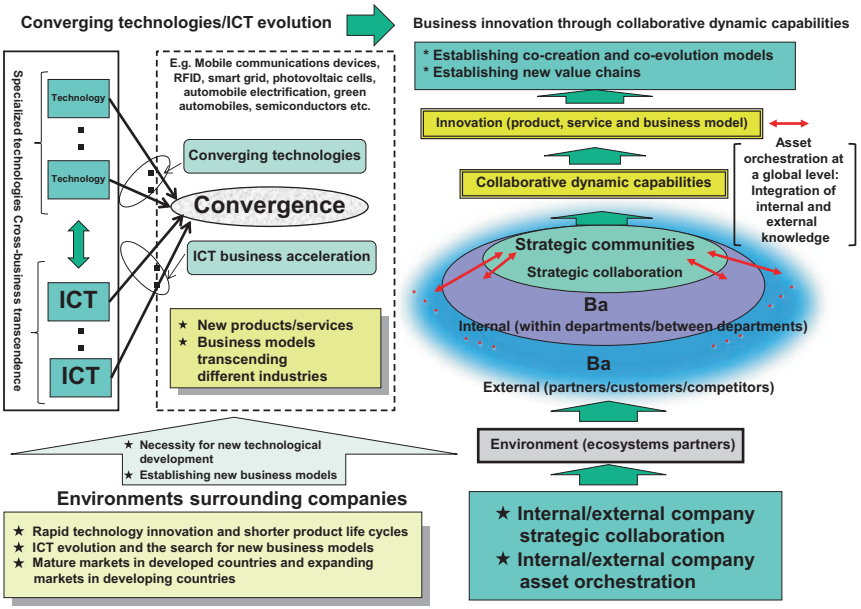

Fig. 1.1 Business innovation through collaborative DC

of co-creation and co-evolution and led to the creation of new business models and value chains (see Fig. 1.1).

1.2 The Central Concept of Collaborative Dynamic Capabilities

This book describes the theoretical concept of collaborative DC which consists of the following three main core theories:

(1) building enduring relationships of trust through strategic collaboration with ecosystem partners,
(2) realizing co-specialization with ecosystem partners, and
(3) realizing capabilities synthesis with ecosystem partners.

The first aspect of the core theory is the corporate action taken to build enduring relationships of trust for strategic collaboration through the discovery and cultivation of ecosystem partners. The second aspect is the achievement of co-specialization through the asset orchestration of the knowledge (intangible and tangible assets) of those ecosystem partners. Co-specialization exists in various forms, such as: between assets (e.g., technologies and techniques); of strategies and organizations; of strategies and processes (e.g., operations); between technologies; and co-specialization of technologies and other parts of value chains. In groups of companies that promote ecosystem strategies in particular, achieving co-specialization with the assets of the individual companies is of vital importance.

The third aspect of the core theory is the achievement of capabilities synthesis through the asset orchestration process (see Box 1.1). Capabilities synthesis refers to the maximization of capabilities, including the company's own and those of its stakeholders (ecosystem partners), which creates a broad-based business ecosystem to achieve service innovation. Capabilities synthesis can be achieved through optimizing the asset orchestration process, the core function of DC.

The capabilities of companies and industries that realize these three main elements are collectively referred to as collaborative DC in this book. Furthermore, shedding light on the elements of macro and micro collaborative DC to create new services in the convergence era is one of the objectives of this study.

Existing research on DC focuses on the characteristics of sustainable competitiveness, mainly within the same industry, and maintaining this competitiveness, as well as the differences in competitiveness between companies. However, very little research has been done on DC within and among companies, and between industries, for creating business ecosystems through new service innovations and growing sustainably in convergence environments where the integration of technologies and services across different industries is moving ahead. On the other hand, collaborative DC form the foundation of the main core theoretical framework for achieving success in ecosystem strategies, and one of this book's core theories is the concept of "capabilities synthesis" between different companies and industries.

For example, IBM and P&G are typical examples of global corporations with innovation strategies based on collaborative DC. The formation of business communities that originate in *ba*, and community leaders who promote the sustainable growth of these business communities, are vital business elements for accelerating the asset orchestration process to realize new innovation in a convergence era through high-quality collaborative DC that intersect within and outside companies. *Ba* and business communities serve as important platforms for companies to evolve knowledge (intangible and tangible assets) at the same time as actively searching for excellent knowledge worldwide and promoting the integration (asset orchestration) of that knowledge with their own core knowledge (see Fig. 1.1).

One of the forms of business community described in this book is the "strategic community (SC)" (see Box 1.2). The authors, based on their research over a prolonged period, clarify that the formation of SCs begins in *ba* (see Fig. 1.1)

Box 1.1 "Capabilities Synthesis"—A New Theoretical Concept—The Synergy of Three Elements Based on Business Model Matching, Optimized Profit Structure Generation and Co-specialization

In considering capabilities synthesis, this book takes a close look at e-business ecosystems and presents case studies of service innovations they have achieved. First, the "multi-sided platform (two-sided platform) model" (Eisenmann et al. 2006) has at least two different types that can be clearly distinguished as business development models in which customers who play important and interdependent roles in those relationships simultaneously participate. Businesses that use this platform also provide high-value products and services to those customers. As well as saving transaction costs between different customers, these platforms also offer product and service diversity, and are typified by the online shopping systems used by eBay, Yahoo, Amazon, and so on (which match seeds and needs), advertising supported services like the Google search engine, and credit card services, such as Visa. More examples of this business model include newspapers that link advertisers with subscribers, and health maintenance organizations (a type of American health insurance system that links up patients with treatment organizations).

(*continued*)

Box 1.1 (continued)

In addition, convenience stores such as 7-Eleven use the business synergies of the multi-sided platform model formed from partnerships with different businesses to offer services such as financial services via ATM machines, distribution services like home delivery, and fee collection services for utility bills. Another example of the multi-sided platform model is Japan's JR, a rail and transport business that introduced Sony's non-contact FeliCa integrated circuit (IC) card into their train passes (Suica card), and installed Suica card readers in train stations and in surrounding convenience stores, restaurants, cafés, bookstores, and clothing stores. Thus encompassing a wide range of commercial entities and successfully creating new markets. Unlike online shopping, the convenience store and Suica card cases are examples of real-world shopping with a multi-sided platform model that created network effects among multiple clients (e.g., Shapiro and Varian 1998).

Ecosystem partners in this kind of multi-sided platform model position their businesses in various ways. For example, in the world of broadband and mobile telephone services, platform innovators such as telecommunications carriers and Internet service providers not only create information communications networks consisting of communications lines and nodes to transmit data, voice, and video, but also build systems that enable timely digital content delivery to end users in combination with the relevant financial transactions, authentication, and content searching capabilities necessary for information distribution. This type of information distribution platform makes use of application and content innovators to provide end users with a wide range of products and services—content innovators in broadband delivery services (for music, broadcast, video, books, games, corporate information, etc.) or value-added services (education, medical social welfare, etc.) offer a wide range of diverse applications.

Among the more prominent examples of success with this model are NTT DOCOMO's i-mode, Sony's and Nintendo's game businesses, the social networking website Facebook, and the online auction site eBay, but there are also web portals throughout the world that use this multi-sided platform model to provide a wealth of other e-commerce services. Most platforms in this model, such as Google and Amazon, offer open access to participants and external partners (the open, multi-sided platform model), although innovators offering platforms such as i-mode, or for games (such as Sony and Nintendo), or Apple's AppStore for its iPhone, engage in strict and thorough quality control of the services, applications, and content they provide on their platforms, and administer and regulate external partners. This book defines this semi-open multi-sided platform model by contrasting it with open platforms. Apple's AppStore is now an example of a semi-open multi-sided platform model, although it was initially a strongly vertically integrated organization that controlled its application and content innovators.

(*continued*)

Box 1.1 (continued)

Application and content innovators use the platforms (technology, products, services, etc.) provided by platform innovators to provide end users with products and services, such as B2B, B2C, and even B2B2C. However, fixed business rules exist in the semi-open multi-sided platform model between application, content, and platform innovators. In NTT DOCOMO's i-mode platform strategy of bundling various application services and content, co-ordination and collaboration based on fixed rules are very important.

In the multi-sided platform model, strategic collaboration between ecosystem partners is crucial because they require adequate communication, collaboration, and co-ordination to respond to platform innovators' technological improvements, product and service innovations, and changes to product and service specifications (or platform specifications). The process of platform users' strategic collaboration with platform innovators is also important, regardless of whether the platform is open or closed. Likewise, to invigorate a platform and maximize its network effects, platform innovators must engage in the important process of co-ordination and collaboration with external application and content innovators, who are important complementary players in this type of business process.

The multi-sided platform is also a core business model of the business ecosystem. The word "ecosystem" usually refers to biological systems but business ecosystems are similar in that they emerge from the mutual synergies between multiple corporate and organizational groups, while transactions between participants in the ecosystem influence other participants through network effects. In recent years, open platform ecosystem business models have become more widespread, such as open operating systems or Google's open social model. These enable profits from external partner innovation activities to be shared and promise profits from network effects while expanding the customer base. In contrast to the vertically integrated platform model, open platforms have the benefit of lower negotiation and adjustment costs with external partners.

In some cases, incorporating partially closed elements as a semi-open platform can serve to regulate access to the ecosystem (screening external partners, licensing, etc.) and can control the degree of ownership rights to the platform (for example, the level of external partner investment), which enables optimal advancement of innovation (quality and quantity), and quality control for the ecosystem.

Various business models require some elements of co-ordination and collaboration between individual ecosystem partners to bring about win-win business structures. The nature of strategic collaboration implies the creation of business models matched to create optimized profit structures for all involved. Platform innovators, who play an essential role in these business models in optimizing the profit structure, have to be mindful of corporate activities purely for their own profit (for example, overexpansion of

(*continued*)

Box 1.1 (continued)

the company's business domain through vertical integration of its platform, or giving favor to or ignoring certain application and content innovators). As mentioned, the most important element in maintaining and developing a business ecosystem is the deep strategic collaboration brought about by a resonance of values and trust building, which promotes the co-creation and co-evolution of these new business models.

Furthermore, there are three synergies that arise between ecosystem partners during the co-creation and co-evolution processes. The first is "business synergy." This refers to ecosystem partners working together for individual business model optimization through mutual creative assessment and alignment through matching processes. Importantly, ecosystem partners collaborate mutually and strategically to bring new and higher value to customers (target users and end users). Ecosystem partners must also be able to assess whether costs can be more efficiently reduced by using another company's knowledge (assets) instead of their own knowledge (asset). For example, the cases of convergence mentioned earlier are cases of business synergies arising from the mutual integration and optimization of business models with partner companies to create new markets through alliances with different businesses.

The second is "technology synergy," which decides whether ecosystem partners can mutually integrate technical knowledge to realize new products and services. An example of this is Google, a company that encouraged the merging of hardware and software technologies of its global device and mobile phone manufacturing partners with its Android OS. The collaboration of Google and Sony is a case of technology synergy using Android OS to develop next-generation Internet television with Sony's TV development capabilities and rich content (movies, music, etc.), combined with Google's software development capabilities.

The third is "partnership synergy." This synergistic element refers to ecosystem partners mutually and strategically collaborating to reinforce each other's strengths while supplementing each other's weaknesses to bring about higher levels of synergy and creativity. Long-term partnerships built on collaborative activities establish shared values and trust among all parties involved and contribute to the asset orchestration process; while partnership synergies can serve to improve the ecosystem partners' reputations. These three synergies are also the result of the co-specialization mentioned earlier.

Achieved through business model matching, the creation of optimal profit structures, and co-specialization, these synergistic elements result from capabilities synthesis within companies, between companies, and between industries. Underlying the realization of capabilities synthesis is the formation of business communities (SCs, discussed in Box 1.2), these are organizational platforms for maximizing the asset orchestration process, which makes their formation crucial (see Fig. 1.2).

(*continued*)

Box 1.1 (continued)

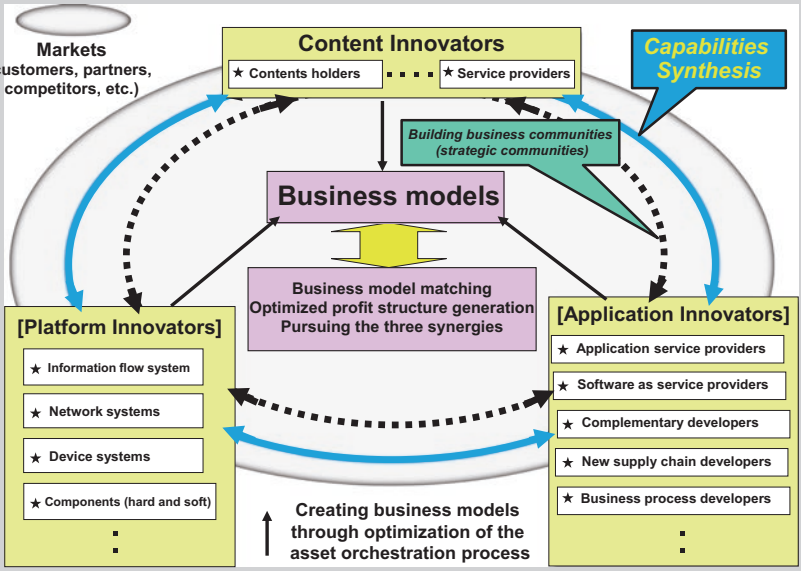

Fig. 1.2 Realization of synergies through "capabilities synthesis"

Box 1.2 Concept of Strategic Communities (SC)

SCs have characteristics of *ba* (Nonaka and Takeuchi 1995; Nonaka and Konno 1998) and are defined as follows (Kodama 2005, p. 28).

Strategic communities are based on the concept of *ba* as shared spaces for emerging relationships that serve as a foundation for knowledge creation. Participating in a *ba* means transcending one's own limited perspectives or boundaries and contributing to the dynamic process of knowledge creation. In strategic communities, members (including customers) with different values and knowledge consciously and strategically create *ba* in shared contexts that are always changing. New knowledge and competencies are formed by the organic merging and integration of communities to form *ba* to address multiple new eventualities. From a practical aspect, strategic communities are viewed as informal organizations with elements consistent with both the resource-based view of emergent shared-context learning and the planned strategic-based view of planning for a target market position.

(*continued*)

Box 1.2 (continued)

Furthermore, noting that SCs have characteristics of small-world structures in network theory, Kodama (2009a, p. 469) makes the following observation:

> SCs are groups forming small-world structures where practitioners in diverse specializations realize innovations aimed at solving the issues facing them and implement problem-solving and creative strategies. Short connections between nodes (people are the first unit nodes) and local clustering are features of small-world structures. For example, short paths among nodes of practitioners in different organizations enable easier access to other practitioners within a firm or based in other firms, including customers. Each node in a small-world structure is embedded in a local cluster. This clustering then enhances the possibility of fostering reliable accessibility. A small-world structure can be formed by either randomly rewiring a portion of an existing regular network or attaching each new node to a "neighborhood" that already exists.

In this way, SCs have characteristics of *ba* or small-world structures as networks, but in practice they also have characteristics of pragmatic boundaries (Carlile 2004). For example, Kodama (2005, p. 40) states that in actual business activities SCs actuate boundaries.

The third principle is that the SC provides pragmatic boundaries, allowing actors in different contexts to transform existing knowledge. A variety of problems or issues are posed within pragmatic boundaries, and actors are challenged with solving these problems and issues, and then creating new knowledge. The actors of an organization thus require practical yet creative confrontations or conflicts and also political negotiation skills. Hence, innovation or creativity emerges on the boundaries between the disciplines and specializations of different organizations.

On the other hand, Taifi and Passiante (2012, p. 2125), who discuss new products and service development through strategic community creation, note the following in regard to the importance of the formation of SCs in the automotive sector:

> The case study provides and analyzes the structural characteristics and success factors of an SC of after-sales services firms in the automotive sector. The study shows that it is important to have entities—more precisely SCs—dedicated to the after-sales services firms for the integration of their technical knowledge in the innovation process. The SC plays a key role, which is to contribute to the development of both the products and the services of the automaker. The paper contributes to the literature on the SC, and is an example of significant inter-organizational collaboration and innovation.

(*continued*)

Box 1.2 (continued)

In other words, knowledge integration (asset orchestration) through strategic collaboration between companies is important in service innovations.

The concept of SCs has been practiced in the healthcare sector with the following results: The SC has taken the form of a temporary inter-organizational collaboration structure composed of health professionals, first-level managers, general practitioners, specialized doctors, and non-profit representatives. The SC approach has appeared to be an efficient strategy for taking action. It has been appropriate for cases where inter-organizational collaboration has clearly declined, and where several other attempts had failed, and where the care trajectory involved vulnerable clients who had to travel between different service points for their required care.

From the perspective of previous research, it seems SCs are organizational platforms for developing core assets within and outside a company and actively searching for superior assets in the world to achieve asset orchestration of core assets within the company.

This book presents the theoretical concept of collaborative DC that achieve new service innovations in the convergence era and provides detailed case studies. The underlying questions are: What must a company do to generate new service innovations across different industries? What elements of collaborative DC generate new services and lead to sustainable corporate growth (as well as sustainability in relationships between companies and industries) in the convergence era? This book addresses these holistic research questions from the viewpoint of academic research in strategic and innovation management.

1.3 Theory Background: Dynamic Capabilities

The fundamentals of the theoretical model of collaborative DC in this book begin with a capabilities theory centered on the DC of existing research. The resource-based theories focused on independent capabilities for companies and organizations (e.g., Penrose 1959; Richardson 1972; Wernerfelt 1984; Rumelt 1984; Barney 1991) have developed as strategy theory frameworks from the viewpoints of microeconomics and

organizational economics. These resource-based theories and Porter's (1980) competition strategy theory enable a detailed analysis of strategic positioning and the relationship between competitive excellence and the internal resources already owned by companies in slowly changing environments and industries. However, it is difficult to analyze how companies in rapidly changing hi-tech industries within competitive environments, such as the ICT and digital sectors, create new competitive excellence.

The theory of DC has been developed and refined, and has become a fundamental theory that clarifies the mechanisms for sustainable growth through corporate strategic innovation (e.g., Teece et al. 1997; Teece 2007, 2014). Teece et al. (1997, p. 516) assert that DC are defined as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. DC thus reflect an organization's ability to achieve new and innovative forms of competitiveness given path dependencies and market positions (Leonard-Barton 1992). In addition, Teece (2014, p. 332) states that strong DC enable an enterprise to profitably build and renew its resources and assets, both within and beyond its boundaries, reconfiguring them as needed to innovate and respond to (or bring about) changes in markets and in business environments more generally.

As micro core functions these DC can usefully be broken down into three primary clusters: (1) identification, development, co-development, and assessment of technological opportunities in relationship to customer needs (sensing); (2) mobilization of resources to address needs and opportunities, and to capture value from doing so (seizing); and (3) continued renewal (transforming). Engagement in continuous or semi-continuous sensing, seizing, and transforming is essential if a company is to sustain itself as customers, competitors, and technologies change (Teece 2007, 2014).

Regarding the domain in which DC are applied, Teece et al. (1997) claimed that DC are important for sustainable company-level competitive advantage, especially in high-velocity markets. Strong DC enable an enterprise and its top management to develop conjectures about the evolution of consumer preferences, business problems, and technologies, to validate and fine tune them, and then to act on them by realigning assets and activities to enable continuous innovation and change (Teece 2014).

From this perspective, and as a subtheme of this book, by achieving the creation of new services in the convergence era, DC can be considered as dynamic business processes that should be demonstrated in the convergence era with its rapidly changing business environments and/or high levels of uncertainty.

In the dynamic environments of "hypercompetition" (D'Aveni 1994) or "next-generation competition" (Teece 2012a, b) in the convergence era that has been gaining attention, the theoretical concept of DC is crucial for companies to drive "ecosystems strategies" (Teece 2014). Moreover, asset orchestration (see Teece 2007), a core function of DC, is reinforced by the organizational processes of: (1) co-ordination/integration; (2) learning; and (3) reconfiguration (Teece et al. 1997). This asset orchestration has a major influence on processes and outcomes for service innovations.

However, there is scant existing theoretical and practical research (qualitative and/or quantitative) on the relationship between DC and ecosystems strategies, or on the details of optimizing the asset orchestration process, which functions at the core of DC in the convergence era. Therefore, this book presents new practical and theoretical knowledge of collaborative DC, and makes novel contributions to the research on innovation and technology management for new services in the convergence era, an area that looks set for rapid growth.

1.4 Literature Review and Theory Background: Capabilities Map Concept

Resource-based theories focused on independent capabilities for companies and organizations have developed as strategy theory frameworks from the viewpoints of microeconomics and organizational economics (e.g., Penrose 1959; Richardson 1972; Wernerfelt 1984; Rumelt 1984; Barney 1991). These resource-based theories and Porter's (1980) competition strategy theory enable a detailed analysis of strategic positioning and the relationship between competitive excellence and a company's internal resources in slowly changing environments and industries.

However, this analysis is difficult in rapidly changing hi-tech industries within competitive environments, such as the ICT and digital sectors.

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On the other hand, regarding the domain in which DC are applied, Teece et al. (1997) claimed that DC are important for sustainable company-level competitive advantage, especially in high-velocity markets. In addition, strong DC allow an enterprise and its top management to develop conjectures about the evolution of consumer preferences, business problems, and technology, to validate and fine tune them, and then to act on them by realigning assets and activities to enable continuous innovation and change (Teece 2014). From this perspective DC can be considered as important dynamic business processes that should be demonstrated in business environments that are rapidly changing and/or have a high degree of uncertainty, as seen in Domains I, II, and III in the Capabilities Map in Fig. 1.3 described in Sect. 1.5.

In the dynamic environments of "hypercompetition" (D'Aveni 1994) or "next-generation competition" (Teece 2012a, b), the theoretical concept of DC is crucial for companies to drive "ecosystems strategies" (Teece 2014). Moreover, asset orchestration (Teece 2007), a core function of DC, is reinforced by the organizational processes of: (1) co-ordination/integration; (2) learning; and (3) reconfiguration (Teece et al. 1997). Asset orchestration has effects on performance in the individual domains of the Capabilities Map (see Fig. 1.3).

Teece (2007, 2014) clearly distinguishes these DC from "ordinary capabilities" (OC hereinafter). Teece (2014, p. 330) states that "Ordinary capabilities have also been called static (Collis 1994), zero-level (Winter 2003), first order (Danneels 2002), and substantive (Zahra et al. (2006). The zero-, first-, and second- typology is used by Easterby-Smith and Prieto (2008) and Schilke (2014). The more common usage seems to be equating first-order with ordinary." Hence, these OC generally fall into three categories: administration, operations, and governance. As specific details of corporate activity, OC enable a company to perform an activity on an ongoing basis, using more or less the same techniques on the same scale to support existing products and services for the same customer population. Such a capability is ordinary in the sense of maintaining the *status quo* (that is, not out of the ordinary; Winter [2003]) (Helfat and Winter 2011).

Nevertheless, OC which pursue efficiency in terms of a company's best practices and "doing things right," are not to be underestimated—they are often fundamental and can support competitive advantage for decade-long periods (Teece 2014). In other words, OC are valid functions in relatively stable and gently changing environments with low levels of uncertainty, but they cannot ensure corporate sustainability over the long term. However, in large traditional companies running many businesses, there will always be some business domains in which these OC must be demonstrated. It is crucial to demonstrate OC in businesses in relatively stable environments where environmental change is gradual and there are low levels of uncertainty. OC are particularly important in Domain IV (see Fig. 1.3, low uncertainty, slow environmental change).

Accordingly, companies must apply OC and systematically and analytically formulate and implement strategies under relatively stable or

slow-moving conditions with little business uncertainty. "Learning before doing" (Pisano 1994), that is, formulating and implementing detailed strategy planning and policies, is a key element of OC in market structures with clear corporate boundaries to capture/place into the players in value chains.

In contrast, DC have been reinterpreted by many researchers, including Eisenhardt and Martine (2000), who present them as

> The firm's processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to match and even create market change. DC thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die (p. 1107)

These scholars recursively derived the concept of corporate DC required for both slow and high-speed environments. They went on to suggest the importance of "learning by doing" with simple rules to emphasize results rather than prior training and implementation processes, especially in fast-moving environments, where uncertainty arises and an industry's corporate borders become vague (Eisenhardt and Sull 2001). However, Eisenhardt and Martin (2000) claimed that DC are inherently unsuited to creating sustainable advantage and that they are likely to break down in high-velocity markets.

Nevertheless, regarding the Eisenhardt and Martin (2000) statement that "dynamic capabilities would break down in high-velocity environments because of the instability of the simple rules (basically, semi-improvised managerial actions)," Teece (2014, p. 339) argued from a rational perspective on the real business environment, that:

> In high-velocity environments, the business enterprise may well be particularly reliant on the sensing and seizing instincts and actions of the CEO and the top management team. To the extent that this is so, the capabilities will, of course suffer from a degree of instability because their longevity depends logically on the tenure of entrepreneurs/managers/leaders.

In rapidly changing environments that require the dynamic spiral of thought and action, not only should top management but also project leaders and their team members be agile enough to show/use DC in front line processes to create new business, as they engage regularly in trial and error towards their strategic objectives (both prudent and bold—these are deliberate but sometimes emergent) (e.g., Kodama 2005). The concept of "simple rules" is one standard of judgment that should be considered by business practitioners in some complex dynamic business processes, depending on the situation.

In contrast to Eisenhardt and Martins' theory (2000), Teece (2014, p. 432) asserts that

> Eisenhardt and Martin's (2000) article misinterpreted (or reframed) the DC framework by claiming that all capabilities, including DC, can ultimately be characterized by best practice and hence imitated. In essence, Eisenhardt and Martin conflated two concepts that benefit from being analytically separated, namely OC and DC. OC and DC are quite distinct, both analytically and in practice.

This interpretation of DC has attracted differing opinions among researchers.

According to some researchers, this interest in strategy theory has evolved toward a dynamic structure that reflects current corporate activity. For example, O'Connor (2008) respects the DC theory of Eisenhardt and Martine (2000), and mentions that a large number of major innovations, including radical ones, developed gradually from slow (or very slow) market environments, and were implemented over a period of years to decades. Thus. the concept of DC is described as a theory that can be evaluated and applied to both market speed and business uncertainty (including risk) characterized by radical innovation.

Helfat and Winter (2011) assert that slow changes, projects currently in progress, and relatively peaceful external environments should be incorporated into research on DC. This is because DC should not be limited to brand new businesses, environments moving rapidly, or radical changes. There are plenty of cases of new product development, such as Intel's MPU, that are essentially cases of DC derived from ongoing businesses in

relatively peaceful environments. Many of these businesses seem to be demonstrating routine OC, expanding the size and scope of their corporate resources at the same time as forming business ecosystems to achieve major economic effects through radical innovation. Technological innovations, as for the MPU, involve many scientists, engineers, and business partners in a wide range of different fields (electronic design automation (EDA) vendors, semiconductor manufacturing equipment manufacturers, etc.), and are driven by R&D processes in conditions of high business uncertainty (including risk) and novelty. In other words, in these environments, demonstrating DC is of particular importance in the Domain I → II shift (business environment with high uncertainty), as described in the Capabilities Map in Fig. 1.3.

O'Connor (2008) used the term "MI (major innovation) dynamic capability" for capabilities that promote the "exploration" process (March 1991) to achieve major innovation (radical and really new innovation) under conditions of uncertainty and high risk. MI DC differs from other capability theories that emphasize the evolution of the original exploitation activity process (e.g., King and Tucci 2002; Nelson and Winter 1982; Winter 2000) (March 1991). MI DC responds to highly uncertain situations, regardless of the speed of market movement, and embraces the concept of DC in high-speed (and high uncertainty) markets as mentioned by Eisenhardt and Martine (2000).

Realistically speaking (and drawing on the author's practical experience as a project leader), many radical innovations are established during the stages of discovery or invention in slow- and very slow-moving basic scientific research and technological development environments. The developed core technologies and provisional business models based on discovered or invented ideas are later adopted and exploited in products and services through improvisation and trial and error processes (including weeding-out processes) involving trial manufacture, experiment, and incubation. Product and service markets are gradually established. Then new products and services anticipated or forecast for the growth markets become the competitive markets for other companies (the timing of other companies entering the market depends on individual businesses). The market environment becomes fast-moving, and companies accelerate their investment in the necessary resources.

O'Connor and DeMartino (2006) undertook long-term observation and analysis of radical innovation in major US corporations, and indicated the importance of three-phase management (discovery, incubation, and acceleration) as a radical innovation development framework. They then named the ability to implement these processes the "breakthrough innovation capability," and suggested that building this capability into a company is a key management system that leads to successful radical innovation (O'Connor et al. 2008).

This three-phase management (discovery, incubation, and acceleration) is used in projects in large corporations (and venture enterprises) to develop new products, services, and businesses. Different capabilities are required from practitioners (and organizations such as project teams) in the business processes in each of the three phases, depending on the degree of business uncertainty and environmental change being faced. DC function robustly in response to the externalities of uncertainty and environmental change, and are also a framework for demonstrating difficult-to-imitate competitiveness. Hence, managing these three phases with "MI dynamic capability" (O'Connor 2008) and "Breakthrough Innovation Capability (the three phases of discovery, incubation, and acceleration)" (O'Connor et al. 2008) can be described with the three DC functions (sensing, seizing, transforming), which can be applied in highly uncertain and rapidly changing environments.

Previous research, such as Teece's DC framework and O'Connor's MI innovation capability, and so on, positioned around the two axes of uncertainty and change led to the situation illustrated by the Capabilities Map in Fig. 1.3, which shows the relationship between previous research and the three development phases of O'Connor and DeMartino (2006).

This chapter names these three management phases of discovery, incubation, and acceleration as Domains I, II, and III, to describe the stages leading from invention or proposal to the commercialization of new technologies and businesses. These three domains are business fields in which DC are demonstrated (and OC also need to be demonstrated in Domain III, see Sec. 1.5.3). In contrast, OC function in pursuit of best practices in stable environments with low uncertainty and slow change (Domain IV) (Teece 2007, 2014). Here there is stra-

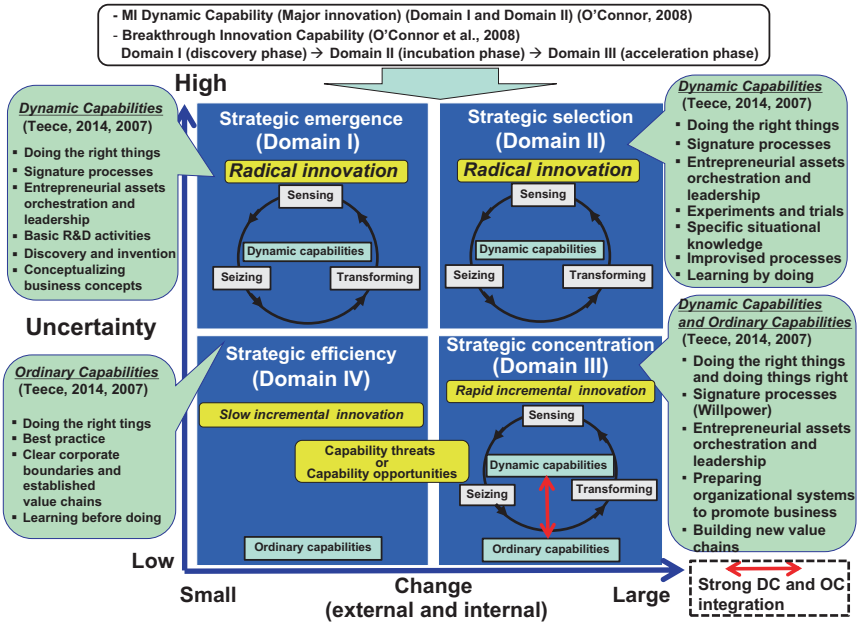

Fig. 1.3 The Capabilities Map: the DC and OC view

tegic uncertainty beyond the four elements of markets, technology, organization, and resources mentioned by Leifer et al. (2000); and change is not only limited to the external elements of market speed and industrial technology speeds, but it also corresponds to the internal elements of a company's own strategy, organization (organizational revamping), technology, operation, and leadership. Section 1.5 describes the characteristics of capabilities in each of the domains, and a capabilities system that integrates these domains.

1.5 Strategic Innovation Systems: DC and OC

In light of the theoretical concepts in the existing research, and from the perspective of DC and OC, this section analyzes the various capabilities required of diverse divisions in corporations (R&D, new business devel-

opment, project teams, existing line organizations, etc.) as they face a range of business contexts daily. It also presents a "strategic innovation system" as a new theoretical framework, which includes a framework for building DC to achieve service innovations through strategic collaborations with stakeholders, such as partnering corporate players.

1.5.1 DC in Domain I

Slow or very slow environmental change with high uncertainty (Domain I) observed at the initial stage of radical innovation is the technology creation stage that arises from new ideas, business concepts, discoveries, and inventions, and corresponds to the "discovery phase" of O'Connor and DeMartino (2006). In this domain, the exploration process is advanced through the MI dynamic (or breakthrough innovation) capability mentioned above. The role of sensing in this domain is significant. To achieve radical innovation, R&D in large corporations (research laboratories, development centers, new business development organizations, etc.) must seek out and detect latent market potential with sensing, and continuously or semi-continuously set down and execute medium- to long-term R&D plans through the seizing and transforming processes.

The basic research and creation of ideas at the source of new strategic innovation will take longer as the ratio of scientific elements and degree of technological difficulty rises (depending on the field). Achievements in Domain I are largely due to the creative thinking and actions of middle managers and staff in company R&D and business development divisions (Nonaka 1988; Kodama 2005), but substantial commitment and strategic engagement needs to be made by top- and upper-level managers based on a policy of "doing the right things" (Teece 2014). Moreover, there are important "signature processes" (Bruch and Ghoshal 2004) in large traditional (leading) corporations that are difficult for other companies to copy and that raise the quality of R&D, which this author calls "strategic emergence."

In the asset orchestration process in Domain I, practitioners need to pursue reconfiguration/transformation through learning via hypotheses verification in line with R&D objectives and the co-ordination/integra-

tion of a wide range of intangible assets. Hence, there are diverse patterns for asset orchestration. There are still many cases of traditional companies with conventional hierarchical systems for closed innovation centered on internal laboratories and development divisions (Japanese manufacturing is a typical example) (e.g., Kodama 2009b). To develop incremental innovation or to sustain innovation through accumulated path-dependent knowledge closed innovation is still an important process (Christensen 1997). Closed innovation also plays a critical role in traditional hi-tech fields such as heavy electrical, nuclear power generation, aviation, vehicle equipment, machine tool, medical equipment, and semiconductor manufacturing equipment.

In contrast, in industries in which technologies are rapidly advancing, such as ICT, the best technical achievements and know-how are spreading across the globe. In these fast-moving environments open innovation is adopted (Chesbrough 2003), partial core intangible assets are incorporated from externalities, and hence processes to merge and integrate these assets with intangible assets, both within and outside of companies, are critical (e.g., Kodama 2009b). In these processes it is particularly important that the co-ordination and integration of various resources (as in asset orchestration) is performed by top and leading middle managers in an entrepreneurial fashion (Teece 2007).

In Domain I companies must consider what business model they should choose. Should they adopt a vertical integration model with the aim of finally bringing about core technologies, such as components, or completed items, such as products and services? Or should they focus on an area of specialization through a horizontal disintegration-type industrial structure? Or should they reinforce technologies while searching out strategic alliances (strong or weak ties) with other companies? Or should they build a new value chain through the co-ordination and integration of intangible assets, which are the strengths of this and other companies, via a strategic collaboration across different types of business? Thus, practitioners have to allow for an expanded diversification of asset orchestration and concentrate on learning through trial and error activities.

In Domain I companies have to hypothetically test their corporate boundaries in response to strategic objectives or business environments and attempt to reconfigure/transform entrepreneurial asset orchestration

through trial and error processes. If it is advantageous to develop or manufacture in-house, then it is better to configure a vertical value chain model with a focus on creativity (Kodama 2009b). In contrast, there are many cases in which a company should abandon its in-house development efforts and focus on efficiency, not only through strategic outsourcing but also through strategic alliances, joint developments, and M&A to acquire and access external intangible assets. The important thing in this kind of asset orchestration process is "co-specialization" (Teece 2007), which raises levels of synergies of business elements, such as core technologies. The process of co-specialized asset orchestration is an important factor in raising a company's dynamic internal and external congruence in capabilities (Kodama 2018).

1.5.2 DC in Domain II

As core technologies and business concepts migrate from the slow-moving environment of Domain I to rapidly changing in-house (or occasionally external) acquisition of human resources, and the maintenance and upgrading of organizations for business incubation, there is a shift to a dramatically transforming Domain II environment that sustains speed of change and uncertainty. This domain promotes DC for exploration processes (MI dynamic or breakthrough innovation) (O'Connor 2008). It corresponds to the incubation phase of hypothetical setups, experiments, and assessments mentioned by O'Connor and DeMartino (2006). Learning through trials and experiments also leads to less risk and uncertainty in markets and technologies, and to a greater probability of success for incubation for radical innovation (O'Connor et al. 2008). Then top and middle management make decisions to select and bring to market rigorously tested and evaluated products, services, and business models.

In Domain II (the incubation phase), the role of seizing is important in commercial development divisions on the business side for achieving radical innovation. Commercialization divisions must use the sensing function to match technical innovations with markets (latent customer needs, etc.), while engaging in seizing and transforming radical innovations for the commercial development of new businesses, new technologies, and new processes. Thus, practitioners must pursue entrepreneurial strategies

(Minzberg 1978), demonstrate commitment, and make strategic contributions based on the basic policy of "doing the right things." Moreover, the quality of signature processes unique to a company that were required in Domain I are more strongly reflected in this domain. This is because of the, so-called, "valley of death" (Branscomb et al. 2001; Markham 2002; Merrifield 1995), which can be a serious impediment to commercializing the outcomes of R&D. The capability to surmount these hurdles is largely down to these rarefied signature processes unique to companies.

O'Connor et al. (2008) confine this incubation domain to trial experiment and assessment models, but in many cases business activities go beyond trial experiments in uncertain and dramatically changing, fast-moving environments and commercial businesses are launched, where companies may boldly take up risky challenges. In this domain, there are often cases where the excessive trust and commitment of leaders and managers lead to strategies to create business through trial and error while it is still unclear whether newly developed ideas or prototypes have the potential for building new business models and value chains. These are typified by cases in the new online business world where products are both trialed and launched in dramatically changing domains of general high risk and uncertainty. Hence, the key is to select and implement promising, valuable businesses. The author calls this domain "strategic selection."

In Domain II the asset orchestration process entails selecting and narrowing down the diverse intangible and tangible assets trialed and experimented on in the strategic emergence domain. The level of completeness of asset orchestration of products, services, and business models is raised through: (1) co-ordination/integration; (2) learning; and (3) reconfiguration. Depending on circumstances, there are cases where it is necessary for a corporation to rethink its corporate boundaries (both vertical and horizontal) or its relationships with other companies, such as partnerships, and to realign or reconfigure its assets.

1.5.3 DC and OC in Domain III

If the new businesses (products and services) chosen through strategic selection in Domain II have prospects for the future and somewhat reduced uncertainty, they shift to Domain III, a domain of lower uncer-

tainty, although external (environmental) and internal change is ongoing. Domain III is the stage in which the radical innovations incubated (or partially commercialized) in Domain II enter a growth trajectory; it corresponds to the "acceleration phase" mentioned by O'Connor and DeMartino (2006). According to O'Connor et al. (2008), this is where the exploitation process is promoted by breakthrough innovation capability, and the building and optimizing of processes and value chains for the selected new businesses are achieved.

New business functions are then wholly or partially transferred to the appropriate business divisions to accelerate commercialization (or else new business divisions are established, or made independent as external ventures), and further resources are invested in through the strategic commitment of top and middle management to "doing the right things." The author calls this domain "strategic concentration." A large number of product and service development projects for major corporations have invested management resources through asset orchestration in commercialization through this kind of shift from strategic selection to strategic concentration (e.g., Kodama 2005, 2007d).

In Domain III, where environmental change is very fast and competition with other companies is fierce, the role of transforming the business side is important for surviving the so-called "Darwinian Sea" (e.g., Dismukes 2004). The "Darwinian Sea" metaphor illustrates a burgeoning of new organisms in competition with each other in rough seas and being culled and implies evolution in business. As time passes, newly developed products and businesses burst into competitive environments with other companies with this shift into Domain III. Nevertheless, while the degree of shift into a competitive environment depends on the industry or the features of a product, the actual birth of a competitive market means that uncertainty in the environment, in other words the market, becomes low. Divisions that are positioned upstream of the value chain at the business side (such as product planning and technical development) also function to sense and detect changes in newly created markets and to establish robust value chains through seizing and transforming for upgrades and improvements through quick and incremental innovation (sustainably advancing technologies) of new products and businesses that have been successfully

commercialized. For this purpose, practitioners pursue entrepreneurial strategies (including deliberate and emergent strategies), to demonstrate commitment and strategic engagement based on the basic policy of "doing the right things."

In Domain III there is significant dependence on the "willpower" (Bruch and Ghoshal 2004) of the unique signature processes of a company to win out over the competition. Willpower is the energy and concentration in the thinking and actions that come with a sense of purpose. Energy means vigor, and concentration directs energy toward a particular outcome. For practitioners the most important factor is to paint a clear scenario of their intended strategy in their minds and to then dedicate themselves to planning so as to bring their strategy into being in the midst of stiff competition.

In this domain, much of the burden is carried by the unique and highly rarefied signature processes of a company through willpower. A strategy can be defined as "a coherent set of analyses, concepts, policies, arguments and actions that respond to a high-stakes challenge" (Rumelt 2011, p. 6), just as Teece (2014, p. 314) argued. The best strategic activities require: (1) a diagnosis; (2) a guiding policy; and (3) coherent action brought about by the unique signature processes of a company based on willpower (Rumelt 2011). At the time of writing the smartphone market is in the Domain III stage, as the completion level of products and services is raised for commercialization, and upgrades, improvements, and new versions as rapid incremental innovation, through the processes of asset orchestration are promoted and concentrated to complete value chains.

However, in Domain III, to get new products, services, and businesses off the ground, win out over the competition, and survive the Darwinian Sea, robust value chains must be configured. Organization supervisors and staff in product planning and technical development divisions upstream of the business side in the value chain must demonstrate strong DC. In contrast, leaders and staff in routine divisions downstream in the value chain (sales, technical management, procurement, manufacturing, after support, etc.) need to thoroughly reinforce operations management through strong OC. These downstream divisions require strong OC to get their current products (and their successor upgraded and improved

versions) on the market, win out amid stiff competition, and turn a profit. Thus, the capabilities required in Domain III are essentially different to those required in Domains I and II since the strong integration of DC and OC is of particular importance (see Fig. 1.3).

1.5.4 OC in Domain IV

A great deal of existing business is positioned in Domain IV, in slow-moving market environments with low uncertainty and low rates of change. Incremental innovation is promoted to systematically enhance business efficiency through the exploitation process, which comprises activities to improve existing business by using mainstream organizations that demonstrate inherent OC (Teece 2007, 2014).

In Domain IV, the weight on DC diminishes, and the focus shifts to the demonstration of best practice through OC. In existing traditional line organizations (business units, etc.) slow changes in existing markets are observed, existing operations in formal organizations are executed through path-dependent, planned, carefully considered, and deliberate strategies in business divisions, and they demonstrate strict, top-down, centralized leadership (Kodama 2004). In Domain IV, to drive slow incremental innovation through strengthened OC, high performance must be brought about by evolving routines through higher-order learning to generate short-term profits in response to internal and external changes (King and Tucci 2002; Benner and Tushman 2003; Winter 2000; Amburgey et al. 1993; Nelson and Winter 1982). Promoting Domain IV process management accelerates an organization's speed of response to achieve incremental innovation (Benner and Tushman 2003). However, there is always a danger that product lineups in Domain IV could be threatened by emergent technical innovations. The author calls this domain "strategic efficiency."

Many businesses in Domain IV (products and services) are those that have survived the competitive environment of Domain III and that have come into Domain IV later, which entails the conversion of old and new businesses over long periods of time (Markides 2001). In other words, this means replacing the strategic concentration from Domain III, arrived

at through the path of radical innovation (Domain I → Domain II → Domain III), with the strategic efficiency of Domain IV (in other words, conversion of new and old business). The simultaneous management of existing and new strategic positions discussed by Markides (2001) is combined in Domains III and IV, and in shifting from an old position to a new one, existing businesses initially positioned in Domain III are replaced by new businesses that have grown and accelerated in Domain III (through the Domain I → Domain II → Domain III shift), which means existing businesses in Domain III shift to Domain IV.

In describing the dynamics of the shifts between domains in the Capabilities Map, of particular importance are the strategic actions in Domains III and IV that aim for sustainable corporate growth through ongoing strategic innovation. According to the "capabilities lifecycles" framework of Helfat and Peteraf (2003), to uncover capabilities opportunities to achieve further radical innovation, and to handle capability threats as they arise, companies drive new DC in Domains III and IV, and

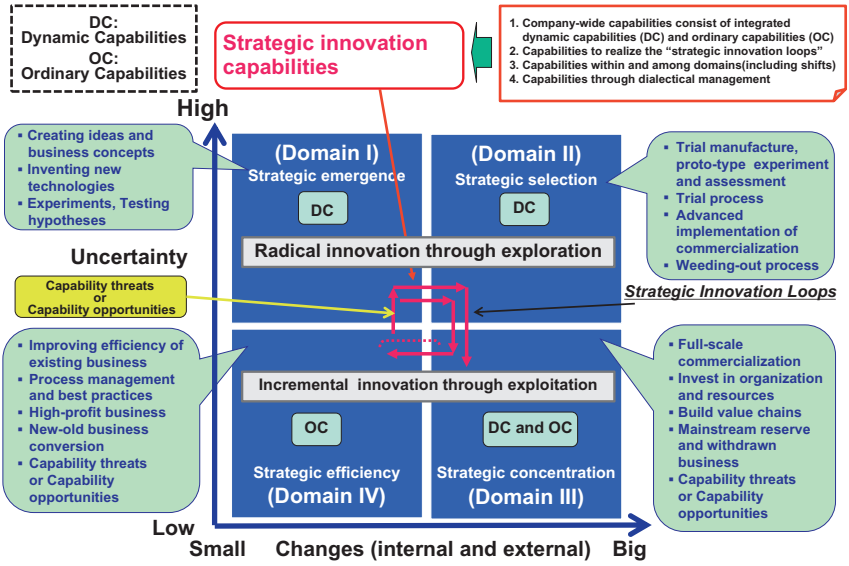

Fig. 1.4 The strategic innovation system

then shift into Domain I (see Figs. 1.3 and 1.4). In other words, as discussed in Sec. 1.6, leading corporations engage in a spiraling of strategic activities between these four domains (Domain I → Domain II → Domain III → Domain IV → Domain I and/or Domain III → Domain I …) to achieve strategic innovation through interaction with dynamic changes in the environment. The author calls this corporate system of achieving strategic innovation a "strategic innovation system." The following section describes the strategic innovation loop and strategic innovation capability that make up this strategic innovation system.

1.6 "Strategic Innovation Loop" and "Strategic Innovation Capability"

When considered from the viewpoints of corporate exploration and exploitation processes based on radical and incremental innovations, and the time axis in a business context, the four domains form a continuous loop (see Fig. 1.2). The strategic emergence (Domain I) and selection (Domain II) domains, which are exploratory processes through DC (asset orchestration), are the core processes for radical innovation processes. "Strategic concentration (Domain III)" is the acceleration phase indicated by O'Connor and DeMartino (2006). This phase rapidly sets up new product, service, and business models or market strategies through the exploratory processes of strategic emergence and selection, and shifts the domain from one of exploration to one of exploitation. Strategic concentration initiates paths to newly generated radical innovations that differ from the existing business of the strategic efficiency domain (Domain IV).

In the strategic concentration domain, newly generated business always undergoes major internal or external change in its initial phase. At this stage, businesses transform their internal elements aimed at building optimal value and supply chains in response to external change. This is the strategic concentration domain in which strong integration of DC and OC are required, as described above.

Businesses that succeed in establishing themselves in markets from among these strategically concentrated businesses, which are subject to major

change, achieve stability as mainstream operations shift to the slow-moving (or small) "strategic efficiency" domain, while promoting still greater operational and business process efficiency measures, either become part of the existing mainstream lineup or undergo business integration (which promotes still greater business process efficiency through strong OC).

However, businesses subject to major external changes in markets and technologies following mainstream growth, and major internal changes in areas such as strategy, organization, technology, operations, and leadership (for example, ICT industries in broadband and smartphones, online businesses, or digital consumer electronics) always become positioned in this strategic concentration domain. Put another way, businesses growing in a mainstream direction become deployed in one or both of the strategic concentration and efficiency domains. Although new business in the strategic concentration domain is the "mainstream reserve," this does not mean that all business can grow in a changing mainstream environment, and some businesses have to withdraw. This is especially true of the ICT industry.

In this way, the flow of radical innovation for major corporations shifts from Domain I to Domain II, then to Domain III (where some businesses undergoing major changes maintain their position), and finally to Domain IV (see Fig. 1.4). Many businesses in Domain IV (products and services) are those that have survived the competitive environment of Domain III, which entails the conversion of old and new businesses over long periods of time (Markides 2001). In other words, this means the replacement of strategic concentration businesses in Domain III, arrived at through the path of radical innovation (Domain I → Domain II → Domain III), with existing strategic efficiency businesses in Domain IV (the conversion of new and old business). As described above, the simultaneous management of existing and new strategic positions discussed by Markides (2001) is combined in Domains III and IV, and in shifting from an old position to a new one, existing businesses initially positioned in Domain III are replaced by new businesses that have grown and accelerated in Domain III (though the Domain I → Domain II → Domain III shift), which means existing businesses in Domain III shift to Domain IV.

Realistically however, although major corporations promote strategically innovative projects, only some survive to become success stories

through the natural selection process involved in the shift from Domains I to III. Amabile and Khaire (2008) note a number of cases where outstanding ideas and business models born in Domain I have been diluted and ended in failure after a major corporation employed a different management organization to commercialize them. This is one issue associated with radical innovation that major corporations face. As the domain shifts can be observed within organizations at the micro level, and because there is feedback through the interactions between each domain and spiral feedback loops at the macro level, this model also includes the chain-linked model of Kline (1985).

The most important inter-domain shift is that from III and/or IV to I. This is the path that creates radical new innovations (see Fig. 1.4). In the Capabilities Lifecycles of Helfat and Peteraf (2003), large corporations involved in businesses in Domains III and IV that are seeking out new capability opportunities and directly facing capability threats also need to take strategic action through the demonstration of DC. This is characterized by accelerated environmental and internal interactions and the creation of new ideas, technological inventions, and discoveries based on high-quality tacit knowledge (Nonaka and Takeuchi 1995). This knowledge is cultivated through the practice of researchers, engineers, marketers, and strategy specialists in shifting from Domains I through IV (accumulating and integrating new practice through existing business practice and incremental and radical innovation) via the "transformational experience" of shifting from previously existing business routines with strategic innovation (King and Tucci 2002; Amburgey et al. 1993). King and Tucci (2002) suggested that the transformational experience of practitioners involved in continual (Katz and Allen 1982) and large-scale (Tushman and Romanelli 1985; Amburgey et al. 1993) organizational innovation in product development teams leads to continuous new product innovation and can overcome rigid organizational inertia. Put another way, it enhances the potential for embedding new DC in organization members to create new strategic non-routines that transform organizations and achieve radical innovation.

While excessive adherence to existing knowledge (e.g., Kodama 2009b) can become a hindrance, the absorption of knowledge from different sectors and industries, and from scientific, technological, and marketing

viewpoints, and the knowledge integration process can trigger new radical innovations. Various innovation theories, including the importance of shedding the "mental model" (e.g., Spender 1990), the focus on "peripheral vision" and "boundary vision" (Kodama 2011; Kodama and Shibata 2016), the challenge of achieving "cross innovation" (Johansson 2004), and "destructive innovation" (Christensen 1997) confer precious insights into innovation processes, but more detailed theory building is yet to be undertaken. The author proposes that the evolution and diversification of high-level, strategic non-routines, through the formation of strategic communities (see Box 1.2) in Domains III and IV, fundamentally promote DC (asset orchestration) while inducing the shift to Domain I arising from the incremental innovation and integration of new knowledge (assets) inside and outside the company (Kodama 2009b), and increase the probability of achieving new knowledge integration as radical innovation.

The author would like to explain the *three new insights* obtained from this framework and use them as a basis for explaining strategic innovation capabilities. The first insight is that outstanding companies deliberately hold a dynamic view of capabilities (including some emergent elements) and drive the loops in continuous shifts (strategic innovation loops, see Fig. 1.2) from Domain I → Domain II → Domain III → Domain IV → Domain I and/or Domain III → Domain I. This dynamic view of capabilities co-establishes the different modes of the exploratory and exploitative processes and can secure long-term corporate growth (e.g., March 1996; Benner and Tushman 2003; Tushman and O'Reilley 1997). These two processes (March 1991; Holland 1975) do not employ opposing strategic activities; rather, companies must implement a strategy while skillfully balancing their strategic activities in a mutually complementary way (He and Wong 2004).

Zollo and Winter (2002) propose a knowledge evolution process based on adjusted evolutionary theory. The continuous routine activity seen within this process can trigger a shift from the exploitation to the exploration process, while experiential knowledge accumulated from learning activities can also be an element in creating new DC (corresponding to a shift from Domain III and/or Domain IV to Domain I). The author

explains how the recursive processes and co-evolution of these different modes simultaneously challenge corporations and drive process routines.

Furthermore, regarding short- and long-term strategies and organizational reform, Dixon et al. present a theoretical framework of the "dynamic capabilities cycle" derived from an in-depth longitudinal case study on a Russian oil company. They cite two capabilities to be demonstrated by the company in its short- and long-term development processes: the first is "adaption dynamic capabilities" as exploitation activities to regularly polish its extant knowledge (i.e., OC) to respond to environmental changes, and gain a temporal, short term competitive edge; the second capability is "innovation dynamic capabilities" as exploration activities to acquire sustainable, long-term competitiveness through unique new creative ideas and action (i.e., DC). These researchers named these patterns for strategy execution the "dynamic capabilities cycle" in which leading companies cyclically demonstrate these two different capabilities through time (both asynchronously and synchronously).

In contrast to the DC theory of dynamic resources reconfiguration, divestment, and integration to handle environmental changes (Teece et al. 1997), the DC cycle offers a model that takes into account capability factors to further achieve radical new innovation, such as exploration (March 1991) or path creation (Graud and Karne 2001).

The second insight is that observing large corporations at selected times reveals the constant presence of each of the four domains with their different business contexts. In large corporations, multiple projects oriented to strategic innovation function as layered strategic innovation loops on different time axes. Top and middle management must therefore manage appropriately within each domain and it is key that they smoothly implement the domain shift through a strategic innovation loop. Different strategies, organizational structures, technology, operations, and leadership are required within each domain.

In this discussion one especially important question is how the asset orchestration process can create the skills and expertise for strategic emergence (Domain I, the new discovery and invention domain), using accumulated experiential knowledge (which arises from diverse high-level strategic non-routines through DC via continuous strategic innovation loops) and then absorb and integrate new knowledge outside the com-

pany. Regardless, learning through higher-order routines (Amburgey et al. 1993; Nelson and Winter 1982; Winter 2000) alone does not make it easy to shift from Domain III and/or Domain IV to Domain I.

Teece (2014, p. 338) said "First, I reject the notion that dynamic capabilities reside *only* in high-level routines," and continued that "creative managerial and entrepreneurial acts (e.g., creating new markets) are, by their nature, often non-routine." In the same vein Teece (2014, p. 332) quotes Steve Jobs, the late CEO of Apple, who said "Innovation has nothing to do with how many R&D dollars you have. When Apple came up with the Mac, IBM was spending at least one hundred times more on R&D. 'It's … about … how much you get it'."

In another interview about product development at Apple (Burrows 2004), Jobs described it as a blend of routine and creative acts: "Apple is a very disciplined company, and we have great processes. But that's not what it's about. Process makes you more efficient. But innovation comes from people meeting up in the hallways or calling each other at 10:30 at night with a new idea, or because they realized something that shoots holes in how we've been thinking about a problem."

That means Apple's processes are based in OC. However, even if a new product development entails a number of routine components, Jobs said that at least one thing has to be different. Those different things are the non-routine establishment of strategies and activities by entrepreneurs. Hence, new product development projects at Apple, through the prioritization of the future, based on a deep market understanding gained through Jobs' own sensing and his insatiable obsession to achieve easy-to-use products with attractive designs and advanced technologies (co-specialization through asset orchestration integrating hardware, software, applications, and contents) was a driving force in the company's success. The creative acts of seizing and transforming brought about through diverse strategic non-routine activities at Apple also hint at the secret of what Jobs described as "getting it" (Teece 2012a, b). Thus, as a chain of creative actions, asset orchestration itself can be described through the demonstration of DC.

From the research conducted into the divisions in corporations that achieve innovations as new products or businesses (including the authors' direct and indirect involvement) (e.g., Kodama 2002, 2005, 2006,

2007a, b, c, d, e), the authors would like to present the hypothesis that DC are generally demonstrated by practitioners through strategic non-routine activities via the configuration of informal organizations (or informal networks, which are also strategic communities), whereas OC are mainly demonstrated by practitioners through routine business in formal organizations.

Our accumulated research to date clarifies that, depending on the characteristics of a business and the environmental circumstances, the characteristics of informal organizations change in accordance with changes of characteristics in boundaries (knowledge and organizational boundaries) in and between organizations (between practitioners at the micro level) (Carlile 2002, 2004; Kodama and Shibata 2014a, b). As detailed in case studies in this book, absorbing and integrating new knowledge (assets) or capabilities, in other words promoting asset orchestration through DC, entails the formation of strategic communities with pragmatic boundaries to promote strategic non-routing activities (see Box 1.2).

The third insight is that the analysis of in-depth longitudinal case studies in this book suggests that the exploration and exploitation processes are especially interactive. It has been argued that organizations within major corporations undertaking radical innovation should either be isolated physically and organizationally from the mainstream organization, or they should operate as independent venture companies (e.g., Hill and Rothaermel 2003; Benner and Tushman 2003; Burgelman and Sayles 1988; Kanter 1985). But an appropriate interface with existing organizations is also potentially significant for accelerating radical innovation from the viewpoint of strategy and resource integration (e.g., Heller 1999; Kodama 2003). Questions of organizational design are arguably more important in achieving strategic innovation, such as: How much should a new business integrate with, or separate from, existing businesses? Is it better to have complete separation, complete integration, or something in between? (e.g., Christensen 1997; Burgelman and Sayles 1988; Good and Campbell 2002; Tushman and O'Reilley 1997).

Much previous research discussed management processes and organizational divisions, such as: the two distinct archetypes of exploratory and exploitative, or incremental or radical (e.g., Greenwood and Hinings 1993; Tushman and O'Reilley 1997); and the ambidextrous organization

(e.g., O'Reilley and Tushman 2004). However, little detailed analysis has been done on the interfaces and interactions between management elements, such as strategy, organizational structure, technology, operation, and leadership, which differ in each archetype (e.g., Kodama 2003, 2004). Nevertheless, the co-establishment and co-existence of these two archetypes within the same large corporation, and the skillful management of strategic contradiction (Smith and Tushman 2005), creative abrasion (Leonard-Barton 1995), and productive friction (Hagel III and Brown 2005) to create synergies are also important elements of successful strategic innovation. The co-existence of contradictions highlights the important roles not just of the top management (Smith and Tushman 2005; Tushman and O'Reilley 1997), but also of middle management and staff (Govindarajan and Trimble 2005). The author calls this "dialectical management" (Kodama 2003, 2004, 2017a).

Based on these three insights above, strategic innovation capabilities is a concept that embraces the following *four capabilities*: The (1) all the capabilities of a company integrating DC and OC; (2) the capabilities to implement spiral strategic innovation loops; (3) capabilities within and among domains, including shifts; (4) and capabilities to achieve the co-existence of two the different archetypes through dialectic management (see Fig. 1.4). Moreover, strategic innovation capabilities embrace the existing dynamic and MI DC (or breakthrough innovation capability) concepts mapped in Fig. 1.3, while aiming to expand the concept of DC and OC for individual product development projects in large corporations in the direction of innovation capabilities for the corporate or management system. This book calls the kind of management system that uses strategic innovation capabilities to activate spiraling strategic innovation loops and to maintain the existing business while establishing strategic innovation business the "strategic innovation system" (see Fig. 1.4).

From the concepts of the Capabilities Map, DC and OC, strategic innovation capabilities, and the strategic innovation loop, Chap. 2 discusses a framework for collaborative DC, the core theory of this book, from the perspective of a systems approach.

1.7 Chapter Summary

This chapter has presented an overview of the theoretical concept of collaborative DC, an important corporate capability within and between companies and industries aimed at building business ecosystems. The chapter also introduced the concept of a Capabilities Map of corporate capabilities to handle uncertainty and speed of change in environments; it observed and analyzed the characteristics of capabilities in the map from the perspective of DC and OC; and presented a "strategic innovation system" as a dynamic theoretical framework for maintaining sustainable corporate competitiveness.

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