

**DEMYSTIFYING PARADOX IN MODERN IT ORGANIZATIONS: A  
TRANSFORMATION TOWARD AMBIDEXTERITY**

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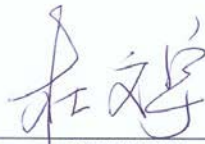
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## DECLARATION

I hereby declare that the thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously

A handwritten signature in black ink, appearing to be '杜文宇' (Du Wenyu), written over a horizontal line.

DU WENYU  
27 July 2012

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## SUMMARY

The scale of IT organizations and the dynamism of the IT industry have escalated dramatically over the past two decades. Information systems (IS) management issues faced by modern IT organizations have thus become so complicated and dynamic that extant management theories, which have been used to study them, have become somewhat simplistic and static. Such complexity and dynamism increasingly generate paradoxes which render ambidexterity a fruitful theoretical lens and make studies through this lens imperative. This thesis sets out to understand how IT organizations develop ambidexterity in order to cope with emerging paradoxes. Informed by the concepts from the ambidexterity literature, research was conducted in the context of IT-enabled Sustainability, Software-based New Product Development (SNPD) and IT Outsourcing (ITO).

Four case organizations were chosen for these three domains. The case study of China Mobile, which examines IT-enabled sustainability, unveils the paradox of profitability and sustainability. It further abstracts a four-phase process model and a four-stakeholder integrated model of how to develop ambidexterity to address the paradox. The former depicts an incremental and iterative process towards ambidexterity development; the latter delineates the collective actions of four major stakeholders in the development. The case study of Tencent, which looks at the SNPD, reveals the paradox between exploration and exploitation. It further abstracts a four-phase process model that features structured improvisation, and which balances the paradox via improvisational sensing and responding, and latent and salient structures. The comparative case study of Neusoft and SAP China, which examine the ITO, uncovers the paradox between technical and communication excellence, and unveils two alignment models through the perspective of boundary spanning. Following these two models, ambidexterity is developed, and paradoxes are effectively managed. We summarize the three studies by introducing an explorative typology of ambidexterity, which comprises

four types of ambidexterity. The typology raises four propositions that point to an interesting future research direction.

The theoretical models from the three studies, together with the typology, can help IS scholars understand ambidexterity in the focal context, and guide them in future exploration through this novel lens. The findings also contribute to the ambidexterity literature by offering process models on ambidexterity development, which complement the existing variance models and by extending the conceptualization of ambidexterity via the typology. Practitioners may also find the theoretical models relevant. First, IS managers can have a better understanding of the paradoxes faced in their organizations and use the ambidexterity models to cope with the challenge. Moreover, managers from non-IT organizations can also find our theoretical arguments relevant and helpful, but they need to look at the IT-nuanced concepts carefully and apply them discriminately.



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## **CHAPTER 1. INTRODUCTION**

### **1.1. Background and Motivation**

The scale and complexity of IT organizations have grown dramatically in the past two decades. Modern IT organizations have become much larger and more complex than they were in the 1990s. This phenomenon may easily be observed from the user base. In 1997, AT&T, the largest Telecommunication provider in the world, had a subscriber base of 13.6 million. Today, the largest Telecommunication provider, China Mobile, has a subscriber base of over 1.1 billion, not to mention the much more sophisticated service packages signed up to by these modern users. The company has also accumulated a total equity of \$188.5 billion, nearly ten times that of AT&T in the 90s.

The size of IT deals has also risen dramatically. In referring to examples in the IT Outsourcing (ITO) business, in 1992 the largest ITO deal, which is between IBM and Kodak, is worth \$500 million (Loh and Venkatraman 1992), while in today's context, deals above \$1 billion are not uncommon (Stamford 2009). Moreover, the complexity is also reflected in the global presence of IT organizations. In 1994, IBM as the largest IT Company had only a dozen offices located in major cities in Western Europe and the United States, and they were operating largely independently. By 2010, the company had positioned over 300 offices in more than 160 countries, all closely related for various cross-border collaborations. Whereas in the 90s, ITO projects were mostly carried out in one location, it is now common to find projects delivered by teams in every corner of the world, working around the clock (Metiu 2006).

An important implication of the information systems (IS) academia from this rapidly growing scale and complexity is that extant management theories adopted to examine IS management issues have failed to keep pace with changes in modern IT organizations. Some of them, such as contingency theory, institutional theory and innovation diffusion theory have been challenged as being somewhat simplistic or static (Suddaby et al. 2011). An important

manifestation of such complexity, some theorists argue, is the increasing tensions, contradictions and more significantly, paradoxes. For example, many IT organizations today are under pressure from shareholders to expand business operations and grow corporate wealth, and at the same time, remain pressurized by stakeholders to cut businesses that are harmful to the environment but are often highly lucrative (e.g. Melville 2010; Watson et al. 2010a). Given the prevalence of paradoxes, how to manage them emerges as a fruitful research direction (e.g. Andriopoulos and Lewis 2009; Smith and Tushman 2005).

Moreover, top performers in the IT industry are often found to be capable of managing paradoxes, balancing tensions and attaining synergies between them. This is indeed an important reason behind their competitive advantages and more than average returns over rivals (Tiwana 2008). However, the way in which these top performers manage to develop this balancing ability remains largely unknown. Informed by the concept of *ambidexterity*, the balancing ability of those top performers may be seen as an ambidextrous capability. The concept is adapted from the neuropsychology realm, as the ability of humans to use both hands equally, and as a metaphor for organizations, refers to organizations' ability to pursue two contradictory yet complementary agendas simultaneously.

## **1.2. Theoretical Background**

Research on organizational ambidexterity has gained significant momentum recently (Raisch et al. 2009, p.685). One reason behind this flourishing research, as we postulate, is that classic management theories such as core competence (Prahalad and Hamel 1990) and competitive position (Porter 1998) no longer fit with the new, dynamic market, which is constantly 'stormed' by fast changing customer needs and relentless technological changes (Eisenhardt and Martin 2000). In this case, undue focus on the core competence may inevitably form a trap, because when market conditions shift, the core competence may become obsolete, as well as the promise of above-average rents or competitive advantages

(Jansen et al. 2005). The most referenced failure case by ambidexterity scholars is Kodak (e.g. Andriopoulos and Lewis 2009; Smith and Tushman 2005), once the invincible camera giant and now filing for bankruptcy (McCarty and Jinks 2012). A key reason behind this epic fall is that despite being the first inventor of digital cameras, Kodak did not pursue this innovation actively. The management was afraid that this new innovation might cannibalize the company's core, lucrative film business. However, competitors such as Canon and Sony took the opportunity and through relentless innovation, soon overtook Kodak in the camera market. The popularity of digital cameras then rendered Kodak's film business irrelevant to customer needs.

This issue also exists in the discourse of competitive position (Porter 1998), which implicitly assumes that an organization can establish a long-lasting competitive position and continuously gain benefits from it. In a dynamic market, this assumption is not only unrealistic, but also risky, since imitation from aggressive competitors or the inception of new technologies can easily neutralize the competitive position or render it completely obsolete (Eisenhardt and Martin 2000; Teece et al. 1997). In summary, despite the valuable insights provided by conventional wisdom regarding core competence and competitive position, they may no longer be held as the Holy Grail. Organizations today, instead of gripping the core competence or entrenching the competitive positions, are advised to build up ambidexterity, in accordance with the dynamic market (Adner and Helfat 2003; Teece et al. 1997), and the balance of paradoxical agendas. For example exploitation and exploration has proved to be an effective means of responding to changes in the dynamic market (He and Wong 2004).

The IT industry, which is replete with hyper competition (Volberda 1996) and turbulence (Sambamurthy et al. 2003), is a dynamic market in nature. In fact, this dynamic nature of IT industry is another important reason, besides the complexity, that lands IT

organizations in the centre of paradoxes (e.g. Garud et al. 2006; Tschang 2007). Meanwhile, the dynamic context of the IT industry may in turn offer new insights into the ambidexterity literature, since ambidexterity studies in the IT context have been scarce, with a few exceptions (i.e. Im and Rai 2008; Tschang 2007) and the context has some unique characteristics as compared to conventional industries, where many ambidexterity studies have been conducted (e.g. Adler et al. 1999; Bigley and Roberts 2001).

First, IT organizations often need to confront extreme changes, survive unprecedented threats and capitalize on unexpected business opportunities (Prahalad and Krishnan 2002). A promising technology or product today may become obsolete tomorrow, even without being delivered. Indeed, there is a term, *Vaporware*, coined for this type of product, which is promised, hyped, but never delivered (Townsend 2008). Moreover, IT products are more pervasive, as compared to the rest. They are deeply embedded in the business operations and influence various parties, including individuals (Bélanger 1999), groups (Sia et al. 2002), organizations (Tan et al. 2010), societies (Melville 2010) and nations (Fjermestad and Hiltz 2000). IBM termed this product nature ‘Deep Computing’ and Microsoft referred to it as ‘Digital Nerve System’. In summary, the unique characteristics of IT organizations make the industry a fruitful research context for ambidexterity. Therefore, the objective of this thesis is extended to a two-way exchange of insights: 1) the insights into IS literature from the lens of ambidexterity; and 2) the insights into ambidexterity from the context of IT organizations.

### **1.3. Research Focus and Potential Contributions**

To achieve the twofold objective, three in-depth case studies were conducted, each focusing on an important IS research domain (see Table 1-1). The reason for selecting these three domains is that they are ubiquitous in contemporary IT organizations, and that the paradoxes they represent are becoming intensive, as with the need for ambidexterity. In the domain of IT-enabled Sustainability, the prevalent paradox is between profitability and

sustainability (e.g. Melville 2010; Watson et al. 2010a). IT organizations are now under pressure for sustainable development, in addition to enduring financial pressure, which is no less significant because of the hypercompetitive nature of the IT industry (Volberda 1996). In line with the nature of paradox, sustainable and profitable developments are both contradictory and complementary (Andriopoulos and Lewis 2009; Smith and Lewis 2011). On the one hand, business operations that maximize financial returns inevitably consume more energy, while energy reduction naturally constrains business development (Starkey and Crane 2003). On the other hand, sustainable development can improve the competitive context of the organization, which may bring in more profits in the future (Porter and Kramer 2006), while profitability-driven business development can fund sustainable development, which is fundamentally driven by non-financial imperatives (Sarkis and Rasheed 1995).

Second, the prevalent paradox in the context of Software-based New Product Development (SNPD) is between exploration and exploitation. Frequent exploration is needed to satisfy consumers' continually evolving tastes, while exploitation must also be put in place to satisfy the company's rationalizing desire, such as revenue and profits (Birkinshaw and Gibson 2004; O'Reilly and Tushman 2004). The two practices conflict because while exploitation hones and extends current product advantages, exploration breaks from existing products and seeks new products. They also complement each other, given that exploitation provides resources for exploration ventures while exploration, in turn, establishes new products for organizations to exploit (He and Wong 2004; Tschang 2007).

Third, the paradox in the context of ITO concerns vendors' technical and communication excellence. Today, clients in the ITO business are no longer satisfied with only technical solutions. They demand services with higher business value, such as system integration (Gopal and Gosain 2009) and IT strategy formation (Levina and Vaast 2005). Since these services require an in-depth understanding of the clients' industries and

businesses, modern ITO vendors need to possess excellent communication expertise, in addition to technical excellence. However, technical and communication expertise in general do not agree with each other. For instance, the former requires training in science and engineering disciplines, whereas the latter emphasizes trainings in business and social science disciplines (Tushman and Scanlan 1981a). These two disciplines are intrinsically different. While one emphasizes solitary efforts, the other values public effort. Frequently, the development of one aspect diverts and disrupts the development of the other. These disagreements, nevertheless, cannot overshadow the significant synergies between them; for instance, technical excellence can help ITO vendors gain credibility and trust from the clients so that they can access advanced business knowledge and social capital (Levina and Vaast 2008), while communication excellence, in turn, can help ITO vendors exhibit their technical excellence more effectively (Garud et al. 2006).

These three paradoxes, along with their contradictions and complementations, form the preliminary understanding and direction for the explorations in our research. To carry out the exploration, three case studies were conducted, each covering an IS management domain. All case organizations were selected from top performers in their respective fields, since top performers were more capable of managing paradoxes (e.g. He and Wong 2004; Meeks and Chen 2011). The first study, through the case of China Mobile, examines ambidexterity in IT-enabled Sustainability. The company is the largest telecommunication provider in China, and in the past 5 years, it has successfully balanced profitability and sustainability in its growth. Because of this balance, it became the first Chinese company to be selected into the Dow Jones sustainability index. The second study, through the case of Tencent, explores ambidexterity in Software-based New Product Development (SNPD). The company is the largest Internet software provider in China, and has managed to successfully expand into nearly every product category of the Internet, while maintaining competitiveness in its



existing product portfolio. The third study, in comparing Neusoft and SAP China extends the ambidexterity concept to the ITO context. These two leading IT Outsourcing (ITO) vendors in China have demonstrated a strong balance of technical and communication excellence in their services, and as a result, they are treated by many clients as strategic partners.

Table 1-1: Three Important Paradoxes in IT Organizations				
Paradoxes	IS Research Domains	Contradiction	Complementation	Sample Reference
Profitability Vs. Sustainability	IT-enabled Sustainability	Profitability maximizes and extends existing business processes, while sustainability breaks from existing processes and seeks to reduce the number of business processes	Profitability provides financial resources for sustainable initiatives while sustainability, in turn, improves the competitive environment of the organization so that it can bring more long-term profits	(Watson et al. 2010a), (Melville 2010)
Exploitation Vs. Exploration	Software-based New Product Development (SNPD)	Exploitation hones and extends current product advantages, while exploration breaks from existing products and seeks new products	Exploitation provides resources for exploration ventures while exploration, in turn, establishes new product vantage points for organizations to exploit	(He and Wong 2004; Tschang 2007)
Technical Vs. Communication Excellence	IT Outsourcing (ITO)	Technical excellence stresses the engineering and natural science training, while communication excellence emphasizes more on business and social science training	Technical excellence awards ITO vendors credibility to access advanced business knowledge and more social capital, while communication excellence, in turn, helps them effectively demonstrate technical excellence	(Gopal and Gosain 2009), (Levina and Vaast 2005)

Together, these four organizations also deliver a comprehensive view of the IT industry, from infrastructure providers (China Mobile) to product providers (Tencent) and to service providers (Neusoft and SAP China). All four organizations are based in China, the world's fastest growing economy, a country populated with modern, world-class IT

companies, and a research context that has yet been well understood in IS. The same research context also minimizes the geographical or cultural variances among the case studies.

Table 1-2: Summary of the Three Case Studies				
	<u>Study 1</u> China Mobile	<u>Study 2</u> Tencent	<u>Study 3</u> Neusoft	SAP China
Research Domain	IT-enabled Sustainability	Software-based New Product Development	IT Outsourcing	IT Outsourcing
Industrial Sector	Infrastructure Provider	Software Provider	Service Provider (System Development Vendor)	Service Provider (System Support Vendor)
Evidence of Balance	Reduced energy consumption by 40%, while increasing profits by 33% in 3 years	Maintained competitiveness in existing product portfolio while constantly launching successful new products	Received frequent appraisals from clients for both cutting-edge technical solutions and good understanding of clients' business and requirements	Increased customer satisfaction to an outstanding level, because of efficient handling of the technical issues and effective customer interaction
Number of Informants (Total 66)	Total: 25 -TM <sup>1</sup> : 6 -MM:11 -JS: 8	Total: 16 -TM:5 -MM:7 -JS:4	Total: 11 -TM:3 -MM:5 -JS:3	Total: 14 -TM:2 -MM:5 -JS:7
Total Duration of the Interview	34 Hours	21 Hours	17 Hours	19 Hours
Other Data Sources	Archival data: summarized to a document of 305 pages  Direct observation: 80 photos and 16 videos	Archival data: summarized to a document of 510 pages  Direct observation: 60 photos and 12 videos	Archival data: summarized to a document of 120 pages  Direct observation: 30 photos and 5 videos	Archival data: summarized to a document of 80 pages  Direct observation: 20 photos and 5 videos

Explorative theoretical models and rich findings are uncovered through the three case studies. Together, they provide IS researchers with a better understanding of the paradoxes in the focal context and a fresh perspective for examining IS management issues. Through the dynamic context of IT organizations, the thesis also bridges several theoretical gaps in the

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<sup>1</sup>TM stands for Top Management, MM stands for Middle Management, and JS stands for Junior Staff. This combination of members from different levels provides a balanced view of the paradoxical phenomenon.

ambidexterity literature, for example the lack of process model in ambidexterity development and the lack of typology.

IT managers can use these models to develop ambidexterity in their organizations. In particular, managers responsible for IT-enabled sustainability, Software-based New Product Development and IT Outsourcing may find the models especially relevant, since the findings are embedded in their contexts. Non-IT organizations operating in a dynamic market or facing pressing paradoxical challenges as the IT organizations may also find the models relevant, but they need to adjust the IT-nuanced elements before applying the models. Following this introduction chapter are the three chapters relating to the three case studies. They are later summarized by introducing an emergent ambidexterity typology.

## **CHAPTER 2. STUDY I: HOW TO BALANCE SUSTAINABILITY AND PROFITABILITY IN TECHNOLOGY ORGANIZATIONS: AN AMBIDEXTROUS PERSPECTIVE <sup>2</sup>**

### **2.1. Motivation**

The environment is deteriorating rapidly, and no generation has viewed the survival of human species as seriously as we have (Watson et al. 2010a). The concept of sustainable development was first introduced at the World Convention on Environment and Development 1987. Defined as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (Brundtland 1987), it soon became a development paradigm expected for organizations (Sarkis 2006). Presently, sustainable development is no longer optional for many organizations, because of stringent government policies and more importantly, the emerging breed of social-minded customers, workers, and investors, who are closely watching their actions (IBM 2008). A business that fails to have sustainable development as one of its top priorities could receive considerable public criticism and subsequently lose market legitimacy (Porter and Kramer 2006). Pressure can also be applied within an industry, as in the case of industry leaders such as Wal-Mart and General Electric, who are actively pushing a green agenda and raising the bar for this (Epstein and Leonard 2008).

While sustainable development used to be regarded as a burden that organizations avoided carrying, it has recently acquired a positive image. According to a global IBM survey in 2008, 47% of organizations have started to redesign their business models based on sustainability (IBM 2008). This finding has surprised many analysts who had predicted that organizations would devote less attention to sustainability because of the recent economic crisis. On the contrary, many organizations have, in fact, begun treating sustainable

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<sup>2</sup> The following manuscript has been accepted as forthcoming in the IEEE Transactions on Engineering Management. The manuscript was submitted on 31<sup>st</sup> July 2011 and with the author for 10 months and 2 revisions.

development as a new source of innovation, a new opportunity for cutting costs (Watson et al. 2010b), and a new mechanism for gaining competitive advantages (Sarkis and Rasheed 1995), all of which can be summarized under the concept of ‘strategic sustainability’ introduced by Sroufe and Sarkis (2007).

To pursue strategic sustainability, technology remains the central focus. First, technology is an important tool for assisting organizations in tackling environmental issues. As examples, web conferences supported by Information and Communication Technology (ICT) significantly reduce business travel, which is an important source of carbon footprints (Watson et al. 2010a). On the other hand, technology is often held responsible for major environmental degradation. For example, massive amounts of energy are consumed by complicated engineering processes to manufacture modern technical products that often come alongside environment waste (Melville 2010). This mixed role places technology organizations under tremendous conflicting pressures. Internally, they are pressed to transform existing engineering processes to be more environmentally friendly, and externally, they are expected to design new products that improve the sustainability of society at large. Such issues crisscross technology, organizations and the environment, and are questions that engineering management scholars are equipped to analyze.

Among the many challenges faced by technology companies in pursuing sustainability, few can be as crucial as the balance between sustainable development and conventional profit-driven development. The pressure on profitability is no less forceful than that of sustainability, especially when most technology companies operate in a hyper-competitive market with aggressive competitors and impatient shareholders demanding rapid financial returns (Volberda 1996). However, past research has implicitly assumed that the two developments coexist with few tensions. This assumption was superficial, however, because tensions between sustainability and profitability are not only unavoidable, but

substantial as well. They are part of a classic dilemma which Stark and Crane (2003, p233) refer to as “*the dilemma of enhancing wealth while managing sustainability*”. On the other hand, should limited tensions exist, the sustainable development is likely to be superficial, e.g. limited to media campaigns (Porter and Kramer 2006).

Our study seeks to bridge the gap between sustainability and profitability by elucidating how organizations balance the two in the presence of significant tensions by adopting *ambidexterity* as our theoretical lens. The word ambidexterity is derived from its original reference to the ability of humans to use both hands equally. As a metaphor for organizations, the concept refers to the organization’s ability to balance two conflicting tasks (Benner and Tushman 2003; Birkinshaw and Gibson 2004). Since this concept aptly fits the context of sustainable development, we posit that technology organizations need to develop ambidexterity to achieve balance, and from there, we derive our research question: “*How do technology organizations develop ambidexterity in the context of sustainable development?*”

To answer the question, a case study was conducted at China Mobile, the world’s largest Telecommunication provider and the first Chinese company to be listed on the Dow Jones Sustainability Index. China Mobile launched a company-wide Green-IT programme in 2007, and has since made significant progress towards sustainable development. Drawing on its experience, we reveal a process model and an integrated model. The process model consists of four phases (i.e. sensing, designing, implementing, and institutionalizing), through which ambidexterity may be developed. Instead of a radical, one-off transformation (e.g. Andriopoulos and Lewis 2009; Benner and Tushman 2003), the process model suggests that an organization can ingrain the balance of sustainability and profitability in an incremental and iterative manner. The integrated model, on the other hand, depicts collaboration among four major stakeholders (i.e. Top Management Team, Business Units, Supplier Network and Customer Network) in the ambidexterity development. Instead of focusing on one individual

stakeholder (e.g. Adler et al. 1999; Cao et al. 2010), the integrated model suggests a multilevel approach with which internal and external stakeholders can balance sustainability and profitability collectively. Both models have significant theoretical and practical implications.

## **2.2. Literature Review**

### **2.2.1. Ambidexterity: an Ability to Balance Sustainable and Profitable Developments**

The study of organizational ambidexterity has gained significant momentum recently (Raisch et al. 2009). After reviewing ambidexterity papers in the past two decades, we have recognized two streams of studies<sup>3</sup>. The first, dealt with in earlier studies, focuses on conceptualizing ambidexterity and has resulted in various pairs to balance. The second, dealt with in most recent studies, focuses on developing ambidexterity and has resulted in multiple mechanisms. The second stream gained acceptance after it had been empirically verified that ambidexterity, indeed, led to better performance (e.g. Cao et al. 2009; He and Wong 2004). Although both streams are highly relevant to our study, neither is easily applicable to the new context of sustainability, owing to some non-trivial theoretical gaps.

The first stream, whilst having contributed various pairs that help in conceptualizing ambidexterity, has failed to reach a consensus as to an undisputed definition. This conceptual gap results in individual findings being constrained within their specific contexts, and consequently the convergence of findings proves impossible (Simsek 2009, p.598). Our objective, hence, is to derive an overarching definition by synthesizing divergent definitions of prior literature (see Table 2-1). Our synthesis first reveals three main perspectives, from which one common characteristic emerges: the two tasks to be balanced, despite their indigenous forms, are simultaneously **contradictory** and **complementary**. In other words, to

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<sup>3</sup> The search keywords include “*Ambidextrous*”, “*Ambidexterity*”, “*Paradox*” “*Exploration vs. Exploitation*”, “*Efficiency vs. Alignment*” et al. The searched journals include “*Organization Science*”, “*Administrative Science Quarterly*”, “*Academy of Management Journal*”, “*Academy of Management Review*”, “*Journal of Management Studies*” et al.

qualify a balancing ability ambidextrous, intensive conflicts and abundant synergies should coexist between the pair. This definition aptly fits the sustainability context. First, the two developments are often contradictory; for example, business processes tailored to maximize profits often function badly in terms of energy conservation (Sekerka and Stimel 2010; Watson et al. 2010a). Second, the two developments also complement each other significantly; for example, sustainable development improves the competitive contexts of the organization, which can in turn result in more future profits (Sarkis and Rasheed 1995).

Moreover, the concept of ambidexterity is not only relevant, but also critical to sustainable development. Without ambidexterity, organizations will naturally succumb to homogenous development that focuses on either sustainability or profitability. This tendency is rooted in the organizational nature of favoring consistency over inconsistency (Smith and Tushman 2005). However, in the long term, this focus is counterproductive and can trap organizations in difficult situations. A profitability focus may create a wealth trap: over-harvesting of environmental resources for profit, although creating short-term financial success, attracts massive criticism or even the boycotting of their products in the long run (Sarkis 1995). A sustainability focus, on the other hand, may build a fame trap: gravitating towards radical social and environmental improvement, while gaining goodwill and enhancing companies' social status, engenders irrational investments and operations (Starkey and Crane 2003). While ambidexterity is relevant and critical, achieving it is challenging, and management intervention is constantly needed to prevent the natural tendency for polarized development (O'Reilly and Tushman 2008). Therefore, many researchers have embraced the second stream to explore effective mechanisms for ambidextrous development. Although yielding significant insights, prior findings are not readily applicable to the sustainability context, due to the lack of process and integrated models.



Table 2-1: Three Mainstream Conceptualizations of Ambidexterity

	Grounding Level	Contradiction	Complementation	Exemplars
<i>Exploitation Vs. Exploration</i>	Organizational Strategy	Exploitation hones and extends current knowledge, while exploration breaks from existing knowledge and seeks the far reaching knowledge	Exploitation provides resources for exploration ventures while exploration, in turn, builds new strengths for organizations to exploit	(Benner and Tushman 2003; Cao et al. 2009; He and Wong 2004; March 1991; O'Reilly and Tushman 2004)
<i>Efficiency Vs. Flexibility</i>	Project Management	Efficiency values quick, economical, and mistake-free execution, while flexibility values fluid and extemporaneous execution	Efficiency prevents waste and unleashes the full potential created by flexibility while flexibility, in turn, prevents myopia and functional inertia imposed by efficiency	(Adler et al. 1999; Bigley and Roberts 2001; Sarkees and Hulland 2009)
<i>Sustaining Vs. Disruptive Innovation</i>	Innovation	Sustaining innovation stresses needs, constraints and stable revenue, while disruptive innovation stresses possibilities, freedom and high-profile success	Sustaining innovation extracts and sustains profitability created by disruptive innovation while disruptive innovation, in turn, prevents obsolete enhancement and bottlenecks in sustaining innovation	(Christensen et al. 2008; Markides and Oyon 2010; Taylor and Helfat 2009)

Table 2-2: Three Mainstream Mechanisms of Ambidexterity Development

	Core Tenets	Opportunities	Risks	Exemplars
<i>Structure Mechanism</i>	Organizations can achieve ambidexterity by setting up two subunits with different foci	The structure can differentiate two tasks thoroughly, without one being overshadowed by the other; it can also minimize conflicts and maintain expertise accumulation for each task	The structure may limit integration between two tasks and thus lower the synergy; it may also demand additional overhead management to coordinate the two tasks and resolve conflicts	(Andriopoulos and Lewis 2009; Benner and Tushman 2003; O'Reilly and Tushman 2008)
<i>Context Mechanism</i>	Organizations can achieve ambidexterity by creating a context that enables individuals to pursue two tasks simultaneously	The context can integrate two tasks in individuals' daily routines and thus, minimize coordination costs	The field integration may create polarized development, since both tasks tap into the same experience and it is difficult for the same individual to excel within two paradoxical tasks	(Adler et al. 1999; Birkinshaw and Gibson 2004; Gibson and Birkinshaw 2004)
<i>Coordination Mechanism</i>	Organizations can achieve ambidexterity by establishing an integrated top management team (TMT)	The coordination stresses the leadership role and the strategic direction of the balancing act; it can also confine tensions at the TMT level, without confusing the operational units	The focus on TMT may overlook the operational aspects of the balancing act and induce polarized opinions, since TMT tends to have similar mindsets when feedback from operational units is scanty	(Cao et al. 2010; Jansen et al. 2009; Lubatkin et al. 2006)

### 2.2.2. Process Model: a Step-by-Step Guideline to Ambidexterity Development

Three mainstream mechanisms were intensively studied in the past literature, each with its own tenets, opportunities and risks (see Table 2-2). For example, the structure mechanism suggests setting up two subunits with different foci. This mechanism, while strong in confining contradictions, is challenged in terms of synergies (Benner and Tushman 2003; Raisch et al. 2009). Being the earliest attempts, studies of this mechanism are mainly qualitative (e.g. Andriopoulos and Lewis 2009; O'Reilly and Tushman 2008), unlike those on the context and coordination mechanisms, which emerge later and consist mainly of quantitative studies. The latter two mechanisms can be further conceptualized under a one high-level mechanism, the culture mechanism, as both leverage implicit value and norms instead of specific rules, as compared to the structure mechanism.

Despite the insightful findings, prior research has only investigated the antecedents of ambidexterity development, while overlooking the development process (Eisenhardt et al. 2010). While antecedents are important, processes are equally if not more so in this context of sustainable development. Given that development is new to engineering managers and is a high-stake issue for organizations, due to its sheer size (Eisenhardt et al. 2010), a proven, step-by-step guideline is highly desirable. To examine the process, we need a focused perspectives, one of which is **boundary management**, a concept that frequently appears in, or is implied in ambidexterity studies (e.g. Eisenhardt et al. 2010; Raisch et al. 2009).

According to the theory of practice, boundaries are rooted in different practices (Bourdieu and Wacquant 1992), which aptly fit this context of two contradictory developments. Boundaries are also necessary artifacts that need to be created so that one development would not be affected by the other, and the knowledge accumulation within each would not be disrupted (Carlile 2002). However, boundaries should not be left isolated. According to Gilbert (2006), the mere coexistence of two practices within their boundaries is insufficient for ambidexterity, and boundaries need to be integrated for synergies to unleash.

Therefore, we postulate that the process of ambidexterity development can be divided into two major phases: boundary creation and boundary integration. Each can be further divided into two phases and consequently, four phases emerge (see Table 2-1).

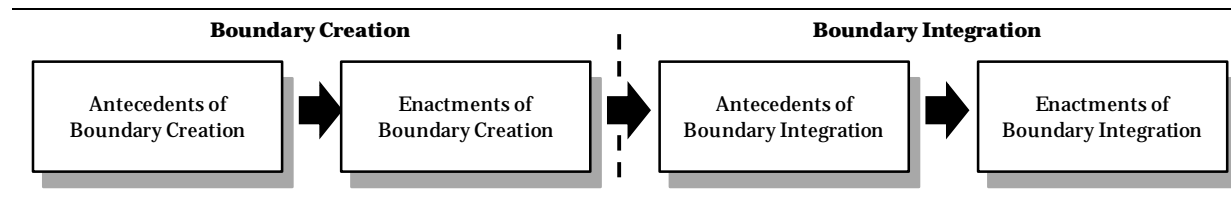


Figure 2-1: Four Generic Phases of Ambidexterity Development through Boundary Management

First, boundaries can only be created with certain antecedents and enactments. Antecedents, such as belief differences (Hedstrom 2005), resource discrepancies (Metiu 2006) and culture gaps (Levina and Kane 2009) are the root causes of different practices. Later, when subcultures (Mayasandra et al. 2010), local identities (Ravishankar and Pan 2008) and indigenous knowledge (Pan et al. 2007a) are developed, different practices are enacted and bring about the boundaries (Bourdieu and Wacquant 1992). The same logic applies to boundary integration. Antecedents, such as boundary strategies formulated (Fennell and Alexander 1987), boundary capability emerged (Ravishankar and Pan 2008), and relevant organizational contexts cultivated (Gibson and Birkinshaw 2004), prepare owners of different practices for cross-boundary engagement. Later, when boundary strategies are executed (Ancona and Caldwell 1992), boundary activities are orchestrated based on capability (Ancona and Caldwell 1992), and boundary objects are formed (Carlile 2002), collective actions are enacted and integrate the boundaries (Levina and Vaast 2005). We use these four generic phases to guide our exploration of the process. However, they are not fixed, and may be strengthened or refuted by empirical data.

### 2.2.3. Integrated Model: an Overall Guideline to Ambidexterity Development

A further gap in ambidexterity development is the lack of an integrated view that involves multiple stakeholders, as an observation made by Raisch et al: “*studies spanning*

*multiple levels of analysis are scarce*” (Raisch et al. 2009, p.9). Prior literature has devoted most attention to internal stakeholders, focusing mostly on Top Management Team (TMT) (e.g. Cao et al. 2010; Lubatkin et al. 2006) and some on business units (e.g. Adler et al. 1999; Birkinshaw and Gibson 2004). This focus is not only incomplete, but also misleading, especially in the context of sustainable development, the scope of which goes far beyond one organization. External stakeholders such as suppliers and customers play an equally important, if not more important role (Sarkis 1995). For example, customers’ GHG (i.e. Greenhouse Gas) reduction enabled by a technology organization often involves much more than its own reduction (e.g. Watson et al. 2010a; Watson et al. 2010b). Furthermore, in the past literature, stakeholders have been researched separately. This separation limits our understanding of how they collaborate. Since all stakeholders, internal or external, are systematically interconnected in sustainable development, an overall guideline supported by an integrated model is strongly desirable (Gladwin et al. 1995).

A long-standing challenge for managing multiple stakeholders on such a large-scale collaboration is to incorporate effective **governance** and **control**. Governance, centering on decision rights and accountability (Xue et al. 2008), needs to ensure that stakeholders are sufficiently close to coordinate activities and share resources, but not so accessible that one’s action is heavily affected by the rest (Im and Rai 2008). Common governance forms include centralized and decentralized governance (Sambamurthy and Zmud 1999). Control, centering on conflict resolution and resource mobilization, is needed to ensure that all stakeholders are working in the same direction despite their intrinsic objectives (Kirsch 1997). Common control modes include formal and informal control (Choudhury and Sabherwal 2003). Given the scale and complexity of the collaboration, we anticipate a mix of governance forms and control modes.

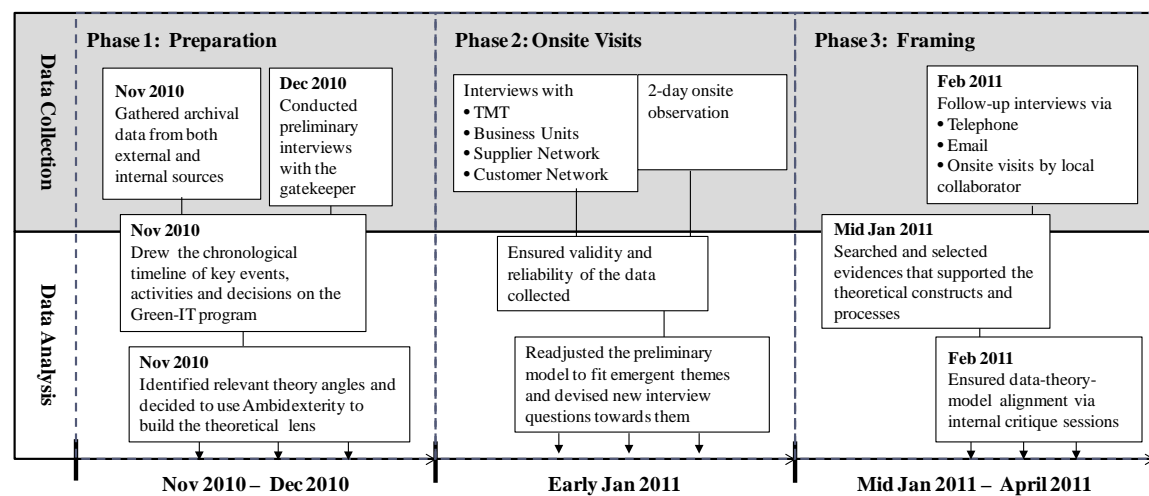
### **2.3. Methodology**

We chose a case study as the research methodology for two reasons. First, the research concerns a ‘how’ question, and is thus better answered through inductive methods (Walsham 1995). Second, since the study aims to break new grounds on sustainability research (e.g. unearthing the balancing act), a case study is more effective because of its strength in exploring new conceptual arguments (Siggelkow 2007). China Mobile was selected as the case organization for several reasons. First, as a telecommunication company, it provides us with a great opportunity to discover nuances that are special to technology organizations. For example, the company is under heavy pressure to establish low-carbon telecommunication, and is expected to influence upstream equipment suppliers to adopt green standards (e.g. ISO 50001), and bears a critical social responsibility to build a ‘Green-informationalized Society’ (Yang et al. 2009). China Mobile has also achieved outstanding progress in a company-wide Green-IT programme, commencing in 2007. In three years, its energy consumption per business unit was reduced by 49% and its ICT services enabled the local population to reduce CO<sub>2</sub> emission by 48.5 million tons, equivalent to 1-year emission from 8.6 million cars (Yang et al. 2009).

Unlike the conventional case study approach that separates data collection and data analysis, we conducted them in tandem to make full use of the flexibility supported by the method (Pan and Tan 2011). The study commenced in early November 2010, and lasted six months. It may be divided into three phases (see Figure 2-2). In Phase 1, archival data was the primary data source. It was collected from both internal sources (e.g. books and press releases) and external sources (e.g. evaluation reports and comments from industry analysts). An advantage of studying an internationally renowned organization like China Mobile is that archival data is abundant. With assistance from our local collaborator, several semi-formal interviews were conducted to confirm the archival data and gain alternative insights. Data

analysis revealed several themes relating to ambidexterity, used to form a theoretical lens (Klein and Myers 1999).

Figure 2-2: Activity Flow of Data Collection and Analysis



Mechanisms to Establish Reliability	Mechanisms to Establish Validity
<ul style="list-style-type: none"> <li>✓ Prepared a case study protocol, documenting a set of procedures as the guideline and a traceable process as the audit trail</li> <li>✓ Prepared an interview protocol and designed interview questions to be open-ended, yet theoretically relevant</li> <li>✓ Collected data from multiple sources, as in the case of what an informant said needed to be supported by either observation or archival data</li> </ul>	<ul style="list-style-type: none"> <li>✓ Set up an interview panel of multiple researchers: one asked questions while the rest took notes and compared interpretations subsequently</li> <li>✓ Presented models to a group of critics formed by academics, practitioners and our case gatekeeper (i.e. a senior director of the Green-IT programme)</li> <li>✓ Ensured emergent models and final findings were supported by literature</li> </ul>

In Phase 2, data was collected through official onsite visits in early January 2011 by means of extensive interviews and observations. Informants included key members of the four stakeholders, and observation covered key operation sites such as a base station and a customer service center (for details, see Appendix 5-3). While interviews were the primary data source, observations provided us with additional understanding, and complemented the interviews. Data analysis in this phase kept us sensitive to new themes. Whenever a new theme emerged from the data, we would quickly redirect questions towards it (Mayasandra et al. 2010). In Phase 3, data was coded, arranged into identified themes and then integrated into an emergent model (Strauss and Corbin 1990). When a new theme emerged during the coding process and insufficient data to support it, we would conduct follow-up interviews via

email or telephone. In all three phases, to ensure reliability and validity, we strictly adhered to guidelines abstracted from the established methodology articles (e.g. Klein and Myers 1999; Pan and Tan 2011) and sample studies that executed them (e.g. Chan et al. 2011; Pan et al. 2012).

## **2.4. Case Description and Analysis**

China Mobile is the largest global telecommunication provider, with wholly-owned subsidiaries in 31 provinces across China. Its main business lies with mobile and wireless services. The company's commitment to sustainable development can be traced back to 2005, when the first Corporate Social Responsibility (CSR) report was published. This initiative soon developed into a company-wide campaign in 2007, when a comprehensive Green Action Plan (GAP) blueprint was released (for detail, see Appendix 5-4) and a commission office (i.e. Division of Energy Conservation and Emission Reduction or more commonly known as GAP Office) was established. As mentioned previously, the results were impressive both internally and externally, and these achievements would have been impossible without the participation of four major stakeholders (see Table 2-3). The description of each stakeholder is followed by the analysis, since juxtaposing the two makes it easier to perceive how analytical models emerged from the data.

### **2.4.1. TMT's Attempts to Devise Harmonious Strategies**

TMT generally includes senior executives and senior managers. In China Mobile, senior executives consist of a board of directors and C-level executives, while senior managers comprise headquarters division heads and subsidiary directors. Attempts at this level are the first of a series, since the team is responsible for strategic thinking that guides other stakeholders. However, creating a balance can be a complex task, due to political issues at TMT. Through the lens of boundary spanning, development at TMT is neatly divided into four phases (see Table 2-4). All strategies formulated by TMT were aligned with the

company's vision. In Phase 1, senior executives revisited the vision in the light of public pressure for sustainability. They recognized that the existing one, overly focused on economic growth, was no longer sufficient, and that the growth in harmony with society should be incorporated into the vision. In Phase 2, new strategies were introduced to realize the new vision. Among them, CSR strategy was the anchor. However, despite being highly decorated, new strategies were mainly sponsored by senior executives, and remained largely disconnected from senior managers who treated CSR for example, as 'good to follow' but not critical for allocating scarce resources.

Because of this separate development, emerging strategies soon took shape, and senior managers also became familiar with them. However, familiarity did not guarantee action. In Phase 3, two stimuli were introduced to induce actions: first, periodic energy assessment was conducted on each department and subsidiary, followed by the broadcasting of results; second, resources such as knowledge and expertise (e.g. best practice for environmental design) were circulated across departments and subsidiaries. The former created enormous peer pressure for actions to be taken, while the latter ensured that actions were supported by peers. In Phase 4, urgent issues became conflicts between the emerging strategy and the old mentality. Two resolutions were adopted: joint activities were promoted in the making of strategic decisions, so that opinions from both the emerging strategy and the old mentality could be collected; meanwhile, a GAP blueprint was designed so that discussions could be carried out on a common framework.



Table 2-3: Summary of Four Stakeholders in the Sustainable Development of China Mobile

	Constituents	Roles	Actions	Challenges	Example of Achievement
<i>TMT</i>	Senior Executives (e.g. board of directors and C-level executives); Senior Managers (e.g. headquarters department heads and subsidiary directors)	Balance harmonious growth and economic growth in formulating strategies that make sense to the entire organization, including suppliers and customers	Devise harmonious strategies through: - reexamining corporate vision in light of public pressure on sustainable development and introduce new strategies aligned with the new vision  - encouraging implementation of the new strategies and reconcile strategic conflicts via joint activities	Mitigate polarized opinions and mobilize scarce resources for ambidextrous strategic pursuits	Devised GAP blueprint that points strategic directions for sustainable development both internally and externally in the next 20 years
<i>Business Units</i>	Operational Managers (i.e. Middle Managers); Field Employees	Balance energy effectiveness and speed in daily operations that carry out actual energy saving, and create demonstrable results for the external to follow	Establish energy-effective operation through: - reexamining operational rules in light of TMT's pressure on sustainable development and introduce new initiatives aligned with the new rules  - compelling business units to adopt new initiatives and reconcile operational conflicts via tight-knit coordination	Break free from operational myopia and transform incumbent paradigm into new complementary assets	Built natural cooling system into 40,000 base stations by 2010 and saved energy consumption from 20 to 80%
<i>Supplier Network</i>	Communication Equipment Suppliers; Auxiliary Equipment Suppliers	Balance ecological and economic positions in collaboration with suppliers so as to integrate sustainability into equipment and solutions  (80% of China Mobile's energy consumption comes from suppliers' ICT equipment)	Form an ecological system through: - reexamining network position in light of supply-chain pressure on sustainable development and introduce new requirements aligned with the new position  - enforcing supplies to meet the new requirements and reconcile collaborative conflicts via establishing Green-IT standards	Mitigate principal-agent issues and routinely fine-tune ambidextrous collaboration	Lowered electricity consumption rate of base station equipment by 54% in 2009 (2007 baseline)
<i>Customer Network</i>	End users; Business users	Balance social and utility needs in narratives that direct the market norms towards energy saving	Build a green society through: - reexamining network responsibilities in light of social pressure on sustainable development and introduce new services aligned with the new responsibilities  - encouraging customers to try out new services and reconcile habitual conflicts via establishing Green-IT norms	Break existing rituals of customers, add real value to them, and create emotional attachment around new narratives	Reduced CO <sub>2</sub> emission of the society by 58.2 million tons in 2010, six times of China Mobile's own emission

Throughout the four phases, TMT acquired a better understanding of harmonious growth, its economic implications, and the social impacts of economic growth. Consequently, when designing new strategies, the team was able to automatically, and often proactively, anticipate both business and environmental concerns. This enhanced understanding also helped TMT to strategize from a higher vantage point. We observed that senior executives would revisit the vision, make further changes and start on another round of four phases. However, changes were only incremental for each round, best elaborated by a Chinese idiom that was constantly repeated during our interviews with TMT members: *“We are crossing the river by feeling the stones”*.

Table 2-4: TMT's Attempts to Devise Harmonious Strategies	
Phase 1 : Reexamining the Vision	
Extending vision to include harmonious growth with the society	<i>“As a leader in the industry, we should grow harmoniously with the environment. We have since 2005 shifted our vision to preserve the environment and social welfare, setting up a good example for others.” – Chairman, Board of Directors</i>
Maintaining economic growth as a priority	<i>“In the context of saving energy, we should not forget growth.... After all, good business has to make money first.” – CEO</i>
Phase 2: Introducing Strategic Changes	
Introducing Corporate Social Responsibility (CSR) strategy	<i>“The CSR strategy was firstly released in 2005, as the company had decided to take a more strategic view on harmonious growth with society. However, at the beginning, CSR was not integrated with the general business operations....It was still being conceptualized.” - Chairman, Board of Directors</i>
Maintaining economic-driven strategy	<i>“For us in strategic planning, our (previous) emphasis was on investments, income, costs and how to do more with less. Energy conservation was a factor but it was a separate concern. In other words, we were more focused on our priorities, but it is ‘nice’ if we can conserve energy on the side” – Director, Beijing Subsidiary</i>
Phase 3: Officially Carrying Out the Emerging Changes	
Promoting performance comparison	<i>“We publish a GAP report every month, ranking each department and subsidiary on energy consumption. We did not say anything. But they know (the message). No one wants to fall behind. That looks bad. So they start to compete with each other, which is what we want to see.” - Senior Director, GAP Headquarters Office</i>
Promoting resource sharing	<i>“Some initiatives require extensive cross-functional collaboration. The GAP office was set up as a crucial link in a ‘tower of strength’. We are the conduit that facilitates knowledge and transfer of assets.” – Senior Director, GAP Headquarters Office</i>
Phase 4: Reconciling Conflicts	
Leveraging joint	<i>“Top management meetings were organized on a regular basis...in the meetings;</i>

activities	<i>they would exchange different views and decide on important GAP strategies (together). Many intensive debates ensued but we were able to make compromises and reach consensus.” – Manager, GAP Headquarters Office</i>
Leveraging the GAP blueprint	<i>“Heated discussion and debates went on very often... The blueprint was negotiated and refined regularly. It functioned as the basis for (TMT) communications. And, later it became a shared message and guided everyone (TMT members) towards the same direction.” - Manager, GAP Headquarters Office</i>

#### **2.4.2. A Strategic Renewal Process for Developing Strategizing Ambidexterity**

Analysis of the above data reveals a strategic renewal process (for a detailed definition, see Appendix 5-1) in which abstract and paradoxical logics are sensed and transformed into workable and congruent new strategies (see Figure 2-3). In Phase 1, the sustainable logic is sensed. It is represented by the harmony vision that aims to divert resources to long-term sustainability, while the profitable logic espoused by the economic vision is also maintained to keep resources at the bottom line (Sekerka and Stimel 2010). In Phase 2, two parallel strategies are designed to realize the logic, which would otherwise remain ambiguous (Tan et al. 2010). This arrangement juxtaposes these strategies, rendering their differences more obvious, and demarcates clear boundaries that protect one from the competing forces of the other (Carlile 2002; Carlile 2004). Since sensing precipitates strategic changes, which happen through parallel designing and eventually create the strategic boundaries, this phase can be seen as the antecedents of boundary creation (e.g. Hedstrom 2005; Metiu 2006) and the latter designing phase can be seen as the enactment of so (e.g. Hinds and Bailey 2003; Mayasandra et al. 2010).

Because of the boundary, emerging strategies evolve smoothly (Bourdieu and Wacquant 1992) and in Phase 3, they are ready for formal implementation. To break the inertia imposed by the incumbent strategy, a co-competition context is developed (Luo 2007): the competition fueled by performance comparison increases peer pressure and propels managers to move out of their comfort zones (Gibson and Birkinshaw 2004), while the collaboration underpinned by resource sharing increases peer support and boosts managers’

confidences to make the move (Rivkin and Siggelkow 2003). During implementation, conflicts naturally surface between the emerging strategies and incumbent strategic thinking. To integrate them and institutionalize a new strategic thinking, conflicts must be dealt with (Montealegre 2002).

Rather than advocating one voice and suppressing the other (Metiu 2006), conflicts are embraced with the help of an effective combination of ‘Integrated Boundary Capability’ and ‘Pragmatic Boundary Object’ (for detailed definitions, see Appendix 5-2). Since joint activities among TMT members move information rapidly across boundaries and create new ideas at the boundary, they fit the definition of integrative boundary capability (Lubatkin et al. 2006). These joint activities are also a proven solution to polarized opinions, which TMT often suffers when overcoming conflicts (Sia et al. 2002), but they can still be derailed by political issues. Consequently, a GAP blueprint is designed. Since its formation engenders significant political effort and is flexible enough to take considerations from multiple sides, the blueprint is aligned with the definition of pragmatic boundary object (Carlile 2002). Given that implementation connects the two strategies and prepares them for integration that happens through institutionalization, this phase can be seen as the antecedents of boundary integration (e.g. Dollinger 1984; Katz and Tushman 1983) and the institutionalization phase can be seen as the enactments of so (e.g. Ancona 1990; Ancona and Caldwell 1992).

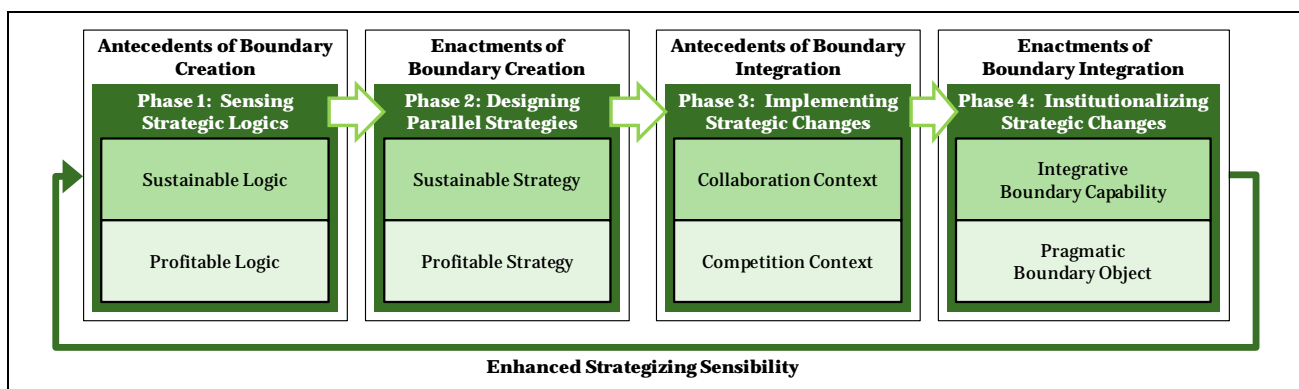


Figure 2-3: Incremental and Iterative Process for Developing Strategizing Ambidexterity

As a result, the organization acquires the ability to strategize ambidextrously, balancing sustainable and profitable logics in formulating strategies that make sense to the entire organization (Jansen et al. 2008), and mobilizing scarce resources to support this ambidextrous strategic pursuit (Cao et al. 2010). This is evident when designing new strategies. TMT can automatically take into account harmonious growth in conjunction with economic growth. We refer to this ability as **strategizing ambidexterity**. It must be noted that this capability development undergoes an incremental and iterative process: after four phases, the capability reaches a higher level, owing to the experience that has been thus accumulated; this enhancement in turn helps TMT to sense more acutely and make further changes to the vision (Pan et al. 2007b). Indeed changes are incremental for each cycle, because if they prove radical, TMT may not have sufficient experience in handling them, and resistance from the incumbents may prove too formidable (Lavie 2006). Because of its leading role and driving force, strategizing ambidexterity can be seen as the *engine* of sustainable development.

#### **2.4.3. Business Units' Attempts to Establish Energy-effective Operation**

Business units are responsible for implementing strategies devised by TMT and delivering demonstrable results to lead external stakeholders. The balancing task is therefore considerable, not to mention the myopia caused by comfortable and sometimes menial daily routines. All operations in the business units are guided by a set of simple rules. Previously, rules were centered on speed aimed at achieving a competitive edge over competitors. In Phase 1, operational managers (i.e. middle managers) added energy effectiveness as a new source for rules (see Table 2-5) after reviewing the GAP blueprint provided by TMT.

In Phase 2, the emerging rules were transformed into new initiatives, most of which centered on technology innovations and their long-term effects. At this point, these initiatives

were mainly maintained by local GAP offices that were set up to guide departments and subsidiaries, and were separated from the inner business units, which still maintained their original way of operating. Due to the separate development, emerging initiatives took shape smoothly. In Phase 3, to encourage middle managers implement these initiatives and think beyond existing routines, GAP office set high-standard measures of energy effectiveness as a KPI and meanwhile, provided rich social and technical aids for innovations. Consequently, conflicts between the new initiatives and existing habits were intensified. Strong coordination and standard correspondences were subsequently introduced in Phase 4 to reconcile these conflicts.

Throughout the four phases, business units acquired a better understanding of the relationship between energy effectiveness and operational speed. Therefore, when designing new operational plans, they could spontaneously take energy effectiveness into account, even without external intervention. Indeed, it is the company's long-term plan to institutionalize GAP into its daily routines and retire the GAP office. As with TMT, development at this point is a continuous cycle, with small changes each time. This gradual evolution was observed by field engineers, one of whom commented, *"We could hardly feel the changes. They just happen, and slowly we are getting better in saving energy."*

Table 2-5: Business Units' Attempts to Establish Energy-effective Operation	
Phase 1: Reexamining Operational Rules	
Introducing new rules on energy effectiveness	<i>"We felt that changes were going to happen, because the top management started to throw more concepts on green and energy saving at us. The GAP blueprint was an important sign. We knew, as the functional units, we ought to introduce some changes... We re-assessed existing operations and found some to be not energy-effective in the long run." - Project Manager, Customer Application Division</i>
Maintaining existing rules on speed	<i>"When implementing GAP, we also face intense competition in the field. Competitors like China Unicom and China Telecom are constantly staring at our market. If we don't act fast, they may take over from us. For example, Unicom's 3G network has taken away some of our customers, because they are the first to launch the iPhone package." - Senior Manager, Telecommunication Division</i>
Phase 2: Introducing Operational Changes	
Introducing energy-effective initiatives	<i>"One of the new initiatives is the installation of natural cooling systems, which are used in our base station ... this intelligent ventilation system acts like a fan ... when the temperature outside falls, it turns off the air-conditioning and turns on the fan</i>

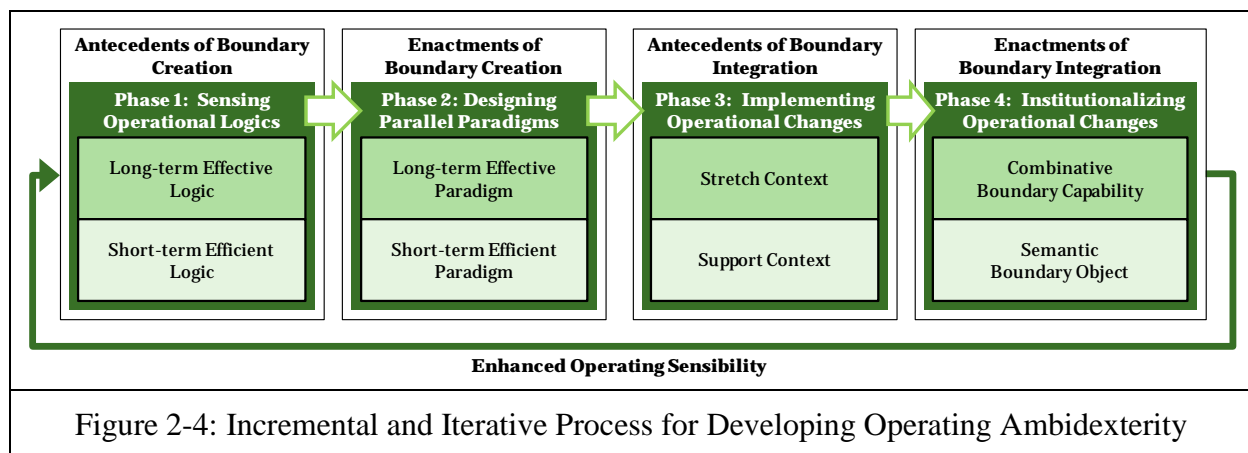
	<i>to bring in the cold air and eject the warm air....it takes more effort and resources to develop (the natural cooling system), but in long run, the return is higher.” – Staff, GAP Headquarters Office</i>
Maintaining existing operation	<i>“In the first year, we did a lot of things, including introducing enhancing network infrastructure and supporting facilities enhancement (e.g. on office buildings). But not many people were excited. They had other more important things to do. After all, people worry about their own business.” – Staff, GAP Beijing Office</i>
<b>Phase 3: Officially Carrying Out the Emerging Changes</b>	
Enforcing high-standard energy effectiveness as a KPI	<i>“It is easy to paper the walls with instructions and tell people what to do; the challenge comes with getting people to act. We created a comprehensive and high-standard set of environmental KPIs based on the GAP blueprint and assigned the relevant KPIs to the appropriate business units.” – Manager, GAP Beijing Office</i>
Providing social and technical aids	<i>“The top management wants business units to take on green challenges and innovate...It is OK to fail. None of us has much experience doing it....we also provide technical expertise to support these endeavors. For example, if they (business units) have an idea, we help them analyze the technical feasibility. ” – Director, GAP Headquarters Office</i>
<b>Phase 4: Reconciling Conflicts</b>	
Leveraging tight-knit coordination	<i>“We have a very strong executing ability, which is attributed to our culture. Whenever top management wants to do something, the subordinates will carry it out fully. Now,(since) they (top management) are leading the programme, the cross functional coordination would have no problem ” – Project Manager, Industry Application Division</i>
Leveraging standard correspondences	<i>“We have some standard forms. One of them is the project initiation form, which is used by business units to initiate green projects. They (business units) can use it to seek feasibility analysis and apply for budgets. We devised it to look like a business proposal, containing standard sections such as opportunity, value proposition and resources required.” – Manager, GAP Beijing Office</i>

#### 2.4.4. An Operational Reconfiguration Process for Developing Operating Ambidexterity

Data analysis reveals an operational reconfiguration process in which unstructured and paradoxical logic is sensed and transformed into concrete and balanced paradigms (see Figure 2-4). In Phase 1, the long-term effective logic is sensed. It is underpinned by the energy-effective rules that fit TMT’s new request for sustainable development, while the short-term efficient logic supported by the incumbent rules is still maintained to guard the efficiency legacy. Parallel paradigms are then designed based on these logics in Phase 2 (Adler et al. 1999). They are juxtaposed to clarify differences and give rise to boundaries (Bourdieu and Wacquant 1992), because of which the emerging paradigm represented by technical innovations takes shape smoothly (Bourdieu and Wacquant 1992).

To break the inertia and myopia caused by the incumbent paradigm, a stretch-and-support context is built in Phase 3: the stretch context supported by the high-standard KPI

compels employees to act beyond the incumbent paradigm, while the support context promoted by the social and technical aids serves to create a conducive environment for employees to take innovative and adventurous moves towards the new paradigm (Gibson and Birkinshaw 2004). Conflicts between the emerging paradigm and the old habits then surface at the boundaries, and are reconciled through ‘Combinative Boundary Capability’ and ‘Semantic Boundary Object’. Since tight coordination combines the organization’s pre-existing capabilities with the emerging ones and fosters complementary interaction, the company possesses what is called a combinative boundary capability (Kogut and Zander 1992; Taylor and Helfat 2009). However, achieving such a combination requires heavy information processing and to increase such capacity, standard correspondences are adopted. These correspondences, coupled with their underlying vocabulary, represent a set of common agreements between operational units and the green office. They are aligned with the definition of semantic boundary objects (Carlile 2004).



Consequently, the organization acquires the ability to operate ambidextrously, balancing long-term effectiveness and short-term efficiency in daily routines (Adler et al. 1999) and connecting new and incumbent paradigms as complementary assets to support this ambidextrous pursuit (Taylor and Helfat 2009). We refer to this ability as **operating ambidexterity**. Its development is also an incremental and iterative process: after each cycle, business units will become a little more capable of sifting through the intricate daily routines



and identifying new areas to improve (Adler et al. 1999; Garud et al. 2006). Given its role of carrying the actual changes and delivering concrete results, operating ambidexterity can be perceived as the *carrier* of sustainable development.

#### **2.4.5. Leading Supplier Network to Form an Ecological System**

The network consists of communication equipment and auxiliary equipment suppliers. Changes by suppliers preceded customers, because customers often regard an organization and its suppliers as a coherent entity, and a consistent image between them needs to be created before customers can be influenced (Sarkis 2006). Balancing at this level is also a heavy task, because of the understanding gaps and the classic principal-agent issue, in which suppliers may behave perfunctorily rather than in the best interests of China Mobile. Any collaboration activity in the network is guided by its position. In Phase 1, the existing position as an economical value chain was recognized as neither sufficient nor responsible, in the light of sustainable development. An extended position as an ecological system was called for, and later realized via a different set of equipment requirements. New requirements, however, only appeared in memoranda at this point, but not in formal contracts, in order to alleviate the potential disruption caused by the volatility of the new requirements (see Table 2-6).

Official implementation was started in Phase 3, with two initiatives that were intended to align new requirements with suppliers' primary interests. The formal sanction scheme required suppliers to try out the new requirements, and public recognition provided incentives for their doing so. Conflicts between the emerging requirements and the old customs were subsequently reconciled in Phase 4 by leveraging the company's strong bargaining power and sophisticated equipment standards. Throughout the four phases, the supplier network acquired a better understanding of the relationship between ecological and economical requirements. Our interviews with suppliers also revealed that in designing new equipment,

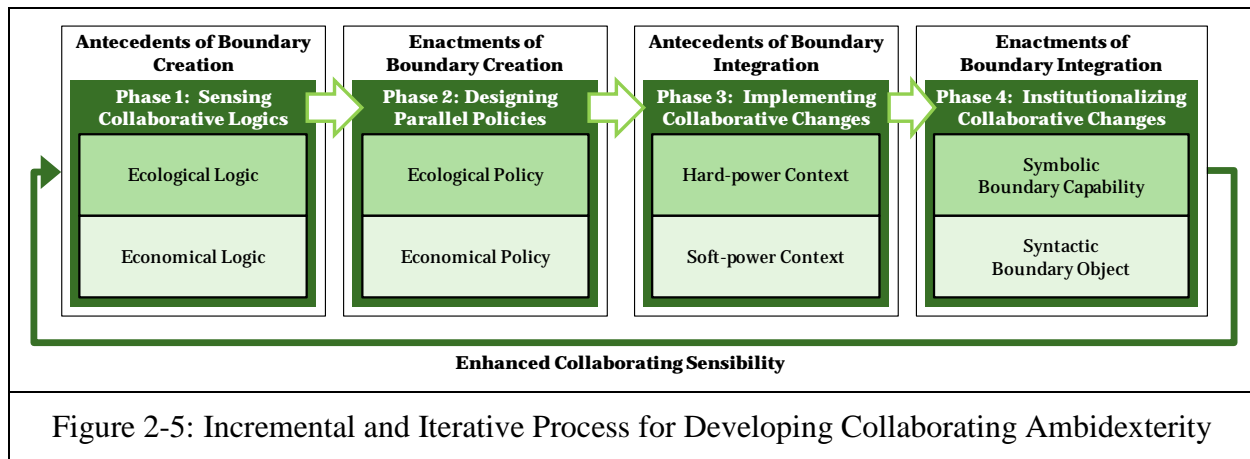
many would consider ecological and economical perspectives simultaneously. HuaWei, for example, a major communication equipment supplier, became so committed after several collaborations that it now often proposes solutions beyond the client's expectations. Changes at this point also evolved gradually, as a GAP manager observed: *"We understand suppliers need time. And also, we don't encourage them to blindly comply with ecological requirements, without proper consideration for costs, quality and safety."*

Table 2-6: Leading Supplier Network to Form an Ecological System	
Phase 1: Reexamining the Network Position	
Extending the network as an ecological system	<i>"China Mobile and our suppliers spare no effort in energy conservation and reduction of GHGs. We should function as an ecological system that is friendly to the environment, rather than exploiting it. Essentially we are part of nature, not above it." – Chairman, Board of Directors</i>
Maintaining the network as a value chain	<i>"Even in the light of green initiatives, the network should still maintain its legacy of a highly competitive value chain. That is essential for survival... To compete in the market, we have to make sure our ecosystem is able to provide better quality and lower cost equipment. – CEO</i>
Phase 2: Introducing Requirement Changes	
Introducing ecological requirements	<i>"In the past, when we looked for suppliers, it was mostly about quality and price. Now, we place an important emphasis on energy conservation...we also involve them (suppliers) on designing new requirements so that they can get prepared." – Senior Director, GAP Headquarters Office</i>
Maintaining economical requirements	<i>"Quality and price are still the dominant factor. The business units care about that a lot. One of our jobs is to ensure basic energy compliance is met first." –Manager, GAP Headquarters Office</i>
Phase 3: Officially Carrying Out the Emerging Changes	
Imposing formal sanction scheme	<i>"Suppliers are assessed and categorized into four levels: A-D. If one was rated as C, we would expect it to become B in 1 year. If the target is not met, we will issue a warning. If they still cannot catch up, you know, we will have to let them go." – Staff, GAP Beijing Office</i>
Providing public recognition	<i>"Our certificate is very popular in the industry. Suppliers often paste copies of it on their products. It is like an approval of quality...Our standard is very high. If suppliers are able to get this certificate from us, people will know that they are truly good." – Senior Director, GAP Headquarters Office</i>
Phase 4: Reconciling Conflicts	
Leveraging high bargaining power	<i>"For most suppliers, we are their largest customer. Our contracts are easily worth up to millions (of RMB). They cannot afford to lose us. So, every time we set a target, they will do the best to meet it. But we don't set undue targets either...." - Manager, GAP Beijing Office</i>
Leveraging sophisticated Green-IT equipment standards	<i>"Based on those standards, a grading assessment on the equipment is carried out biennially. In this way, we can steer the manufacturers to strictly follow environmental standards and enhance comprehensive performance of equipment. For instance, according to the new standard, the power consumption of the base station equipment was 54% lower compared to 2007." – Senior Director, GAP Headquarters Office</i>

#### **2.4.6. An Ecosystem Redefinition Process for Developing Collaborating Ambidexterity**

Data analysis reveals a process of ecosystem redefinition, where an abstract paradox comes to light and is transformed into sophisticated and balanced policies that redefine the ecosystem's collaboration patterns (see Figure 2-5). In Phase 1, the new, ecological logic underpinned by the ecological-system position is perceived in addition to the incumbent, economical logic carried by the economical-chain position (Sekerka and Stimel 2010). In Phase 2, these logics are transformed into parallel policies (Im and Rai 2008) that are juxtaposed and form boundaries (Bourdieu and Wacquant 1992). Because of the boundaries, the new policy takes shape effortlessly (Bourdieu and Wacquant 1992).

In Phase 3, smart power is adopted as the implementation context (e.g. Eisenhardt 1989b; Ravishankar and Pan 2008): hard power is embodied in the form of sanction scheme functions as the 'stick' and soft power represented by the public recognition as the 'carrot' (Andreoni et al. 2003). Since both align sustainability with suppliers' best interests, the principal-agent issue is alleviated (Eisenhardt 1989b). Conflicts between the new policy and old customs are later reconciled in Phase 4 through leveraging 'Symbolic Boundary Capability' and 'Syntactic Boundary Object'. Since bargaining power allows China Mobile to define what is important in the collaboration, the company possesses what is called symbolic boundary capability (Levina and Vaast 2008). Sophisticated standards, on the other hand, disseminate these messages to numerous suppliers with clarity and transparency. Without these standards, the requirements of the collaboration are subject to interpretation of the suppliers and susceptible to misinterpretation. They are thus aligned with the definition of syntactic boundary object (Carlile 2004).



As a result, the organization acquires the ability to collaborate ambidextrously with suppliers, balancing ecological and economical logics in the collaboration (Im and Rai 2008) and routinely sharing knowledge to fine-tune ambidextrous collaboration (Eisenhardt 1989b). We refer to this ability as **collaborating ambidexterity**, the development of which is also incremental and iterative. Because of its impact on ICT equipment, which speeds up the company's operating efficiency and energy effectiveness, collaborating ambidexterity can be seen as the *external accelerator* of sustainable development.

#### 2.4.7. Cultivating Customer Network to Form a Green Society

The network comprises end users and business users. Because of customers' reluctance to change their rituals, balancing at this point remained challenging. All transactions between China Mobile and customers were deemed to fulfill certain responsibilities. In Phase 1, existing responsibilities, which centered on customer needs, were found insufficient in the light of social pressure (see Table 2-7). Hence, the social responsibility of going green was added, and subsequently led to the creation of Green-IT services in Phase 2. However, at this point, these new services were excluded from the mainstream to avoid confusion. In Phase 3, when they matured, new services were officially rolled out. To ensure that customers were receptive to these green options, two types of broadcasts were released: one focused on threats and the other on opportunities. Significantly, the opportunities were so compelling that many customers began to favor services with the

green label, even when they were more expensive. Conflicts between the emerging services and the old rituals were reconciled in Phase 4 by leveraging the large customer base to induce new market norms and public opinions to market green services.

Throughout the four phases, customer network acquired a better understanding of the relationship between social responsibility and customers' utility. Interviews with customers also revealed that when purchasing a new service, many would spontaneously factor in social and utility considerations simultaneously. Again, changes were gradual, as one service manager elaborated: *"You cannot expect customers to change their behavior overnight. No one likes that....You must do it slowly, without making them feel uncomfortable"*.

Table 2-7: Cultivating Customer Network to Form a Green Society	
Phase 1: Reexamining the Network Responsibility	
Extending responsibilities to the social needs	<i>"As the largest telecom service provider in China, China Mobile intends to make full use of mobile informationalization strengths and turn society's attention to energy conservation and emission reduction to build a green-informationalized society."</i> - Chairman, Board of Directors
Maintaining responsibilities on customer needs	<i>"To make profit, our products must be liked by customers. Essentially, we must stick to customer needs first...That is what makes China Mobile what it is today."</i> - CEO
Phase 2: Introducing Service Changes	
Introducing Green-IT services	<i>"We (China Mobile) introduce a wireless electricity meter for the Beijing Grid. The meters, in a broad sense, are effective for both the Beijing Grid and consumers to save energy."</i> – Manager, Customer Service Center
Maintaining utility services	<i>"Customers still weigh their own interests over society, especially where convenience is concerned. New services, like handset recycling and wireless meters, often need extra learning. Therefore, they were not very popular at the beginning."</i> – Manager, GAP Headquarters Office
Phase 3: Officially Carrying Out the Emerging Changes	
Broadcasting threats	<i>"If you want customers to change the ways they are so used to, you need to show them some very good reasons....at customer service centers, we painted the wall and displayed the dire consequences of environment degrading. We expected to create an urgent context."</i> – Manager, GAP Beijing Office
Broadcasting opportunities	<i>"We have to balance the negative side (of the issue). We need to help customers believe that they can make a difference. For example, we put up a sign board showing how much CO<sub>2</sub> emission could be saved if a customer chose not to drive here and benefits of the online alternative. The next thing we know, many have started using the online service. They save on petrol as well."</i> – Manager, Customer Service Center
Phase 4: Reconciling Conflicts	
Leveraging large customer	<i>"At the beginning, there were people who did not want to have it (the wireless meter). They felt it was a nuisance. However, when the service became a default,</i>

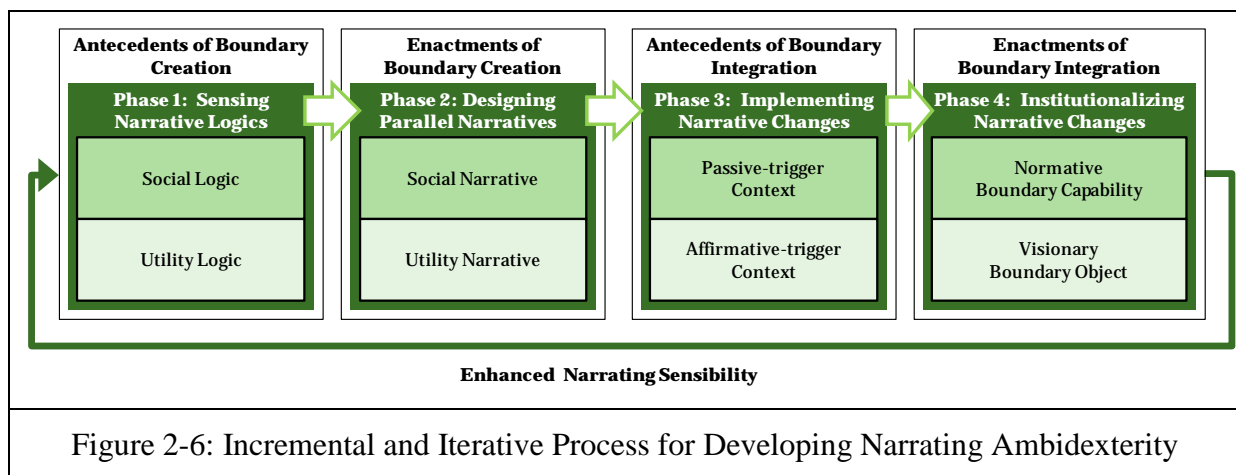
base to create market norms	<i>few people rejected it. Interestingly, those who rejected it (at the beginning) later came back asking for it.” – Manager, GAP Beijing Office</i>
Leveraging public opinions to market Green services	<i>“In China, public opinion is largely directed by the government. If the government wants to promote something, there will be a lot of publications on it. Against the backdrop of sustainability, we are riding on this bandwagon. In this way, we can easily reach our customers’ hearts.” – Senior Director, GAP Headquarters Office</i>

#### **2.4.8. A Market Renormalization Process for Developing Narrating Ambidexterity**

Our data analysis revealed a process of market renormalization, where abstract paradoxes are sensed and transformed into clear, balanced narratives that make a positive difference in people’s lives (see Figure 2-6). As a Green leader, every service provided by China Mobile carries a narrative that fosters meaning and changes customer mentality (Sarkis 1995; Starkey and Crane 2003). In Phase 1, social logic articulated via the social responsibility is added, in conjunction with the incumbent utility logic represented by the responsibility of giving customers what they want (Watson et al. 2010b). These two logics are later transformed into two parallel narratives in Phase 2. The emerging social narrative embodied in energy informatics (e.g. wireless electricity meter) (Watson et al. 2010a) is separated from the incumbent narrative, given that it is designed to create services that are technologically superior and may be confined by customers’ existing utility demands if the two are integrated (Bourdieu and Wacquant 1992; Watson et al. 2010b).

In Phase 3, two triggers are adopted as the implementation context. A passive trigger supported by threats causes customers to respond, while an affirmative trigger underpinned by opportunities encourages them to take initiatives (Benn and Martin 2010; Haugh and Talwar 2010). Conflicts between the emerging narrative and existing rituals are reconciled in Phase 4 by leveraging the ‘Normative Boundary Capability’ and ‘Visionary Boundary Object’. Norms are often more effective than economical forces when it comes to changing customer behavior. The prevalence of SUVs and trucks on U.S. highways is strong evidence that the cost of energy is not as deterministic as the market norm (Watson et al. 2010b). Since China Mobile’s large customer base allows it to create intended market norms, the company

possesses what is called normative boundary capability (DiMaggio 1988). However, for norms to be sustained, emotional attachments must be created (Schepers and Wetzels 2007). To this end, public opinions are constantly directed to help to conceptualize new narratives and evoke emotional responses. They are thus aligned with the definition of visionary boundary object (Haugh and Talwar 2010). Nevertheless, emotional responses are only available when the company itself has demonstrable results as well (Starkey and Crane 2003). If the company failed to set an example, the customers would not commit their time and resources.



As a result, the organization acquires the ability to narrate ambidextrously in the customer network, balancing social and utility logic in market narratives (Im and Rai 2008) and influencing customers in accepting new narratives as market norms (Starkey and Crane 2003). We refer to this ability as **narrating ambidexterity**, the development of which also undergoes an incremental and iterative process. Because of its amplified social impacts and expanded results, narrating ambidexterity can be seen as the *external amplifier* of sustainable development.

## 2.5. Discussion

Two models are synthesized from the above analyses to address the research question on how ambidexterity can be developed. The process model provides a step-by-step guideline (see Figure 2-7). Phase 1 is responsible for sensing paradoxical logics, which form a

cognitive map that guides the development (Rivkin and Siggelkow 2003). However, this map remains vague because the two logics are at the conceptual level and their exact differences are unclear. Phase 2 is responsible for differentiating these paradoxical logics, which are transformed into concrete practices such as strategies and collaboration policies (Smith and Tushman 2005) and juxtaposed so as to demarcate clear boundaries (Bourdieu and Wacquant 1992). These boundaries not only clarify differences between the paradoxical logics, but also protect emerging practice from being crowded out by commitments to the incumbent practice and save the incumbent from being disrupted by the emerging practice (Smith and Tushman 2005).

After the emerging practice has taken root, it is beneficial to integrate it with the incumbent (Smith and Tushman 2005). However, because of strong resistance from existing practice (e.g. Dollinger 1984; Katz and Tushman 1983), motivational contexts need to be built (Gibson and Birkinshaw 2004). These contexts, such as co-competition and smart power, also resemble a ‘yin’ and ‘yang’ paradox (Ghoshal and Bartlett 1997 p.151). When the resistance is alleviated and the two boundaries are connected, conflicts between them become a major hurdle in the final integration (Levina and Vaast 2008). To address these conflicts, collective actions are promoted and these actions later lead to the creation of collective understandings, which signify the integration of boundaries (Levina and Vaast 2005; Metiu 2006). In this course, boundary capability and object play a critical role (Carlile 2002; Carlile 2004).

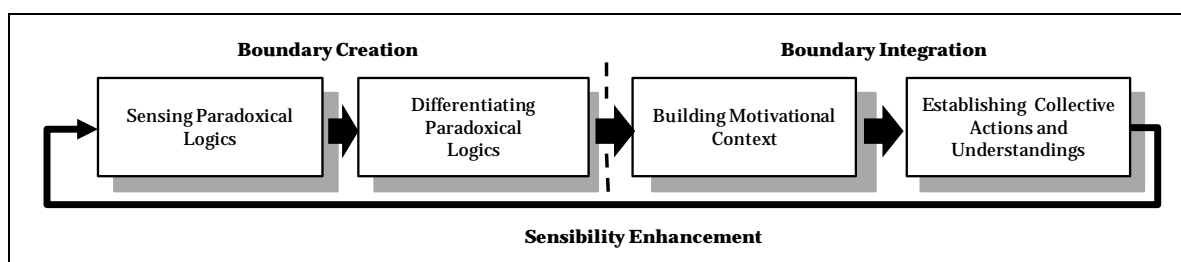




Figure 2-7: Process Model of Ambidexterity Development for Sustainability

Following integration, stakeholders become capable of balancing the two paradoxical logics in practice, and are able to sense from a higher vantage point. This enhanced sensibility brings them back to the logics and enables them to make further changes (Pan et al. 2007b). In summary, instead of a radical development, ambidexterity development in the context of sustainability is an incremental and iterative process, in which sustainability is gradually ingrained into the organization. This process is similar to the concept of Garud et al. on Infosys transformation, who referred to it as “*a revolution that happens in an evolutionary manner*” (Garud et al. 2006). This evolutionary manner fits the sustainability context aptly. Since little knowledge can be tapped into (Watson et al. 2010a; Watson et al. 2010b) and incumbent resistance is significant (Eisenhardt et al. 2010), organizations, especially early movers such as China Mobile, are wise in taking prudent steps and gaining small wins (McCarter et al. 2011).

The integrated model provides an overall guideline for ambidexterity development (see Figure 2-8). First, the four stakeholders’ actions are sequential. Strategy renewal is launched first, to set strategic directions for the rest to follow (Jansen et al. 2008). Then, business units transform these strategies into concrete results, which grant the company credentials to lead external stakeholders (Starkey and Crane 2003). Next, suppliers follow the move, and as a result, a consistent image is established across the supply chain which places China Mobile in an advantageous position to lead customers (Sarkis 2006). This sequence is a key determinant of collaboration effectiveness.

In terms of outcomes, the four types of ambidexterity (i.e. strategizing, operating, collaborating and narrating) constitute the overall ambidextrous option, which is not attainable without anyone, since they are highly interdependent. Their interdependence is represented by four types of cross-fertilization. First, externalization (E arrowhead) looks out

from the inside, transferring sustainable ambitions to external parties and encouraging them to perform congruently (Starkey and Crane 2003). Then, internalization (I arrowhead) looks in from the outside, feeding external development inwards and influencing insiders to adjust ambitions. For example, motivated suppliers may progress beyond China Mobile's expectations and press the company to strategize more boldly. Next, codification (C arrowhead) translates unstructured concepts into concrete artifacts. For example, business units translate TMT's strategic decisions into concrete KPIs, making them operational. Lastly, abstraction (A arrowhead) elevates operational artifacts to concepts, so that they create a wider impact (Pan et al. 2007b). Essentially, codification and abstraction assist the organization in keeping pragmatic instructions, while not missing the big picture (Robinson 1990).

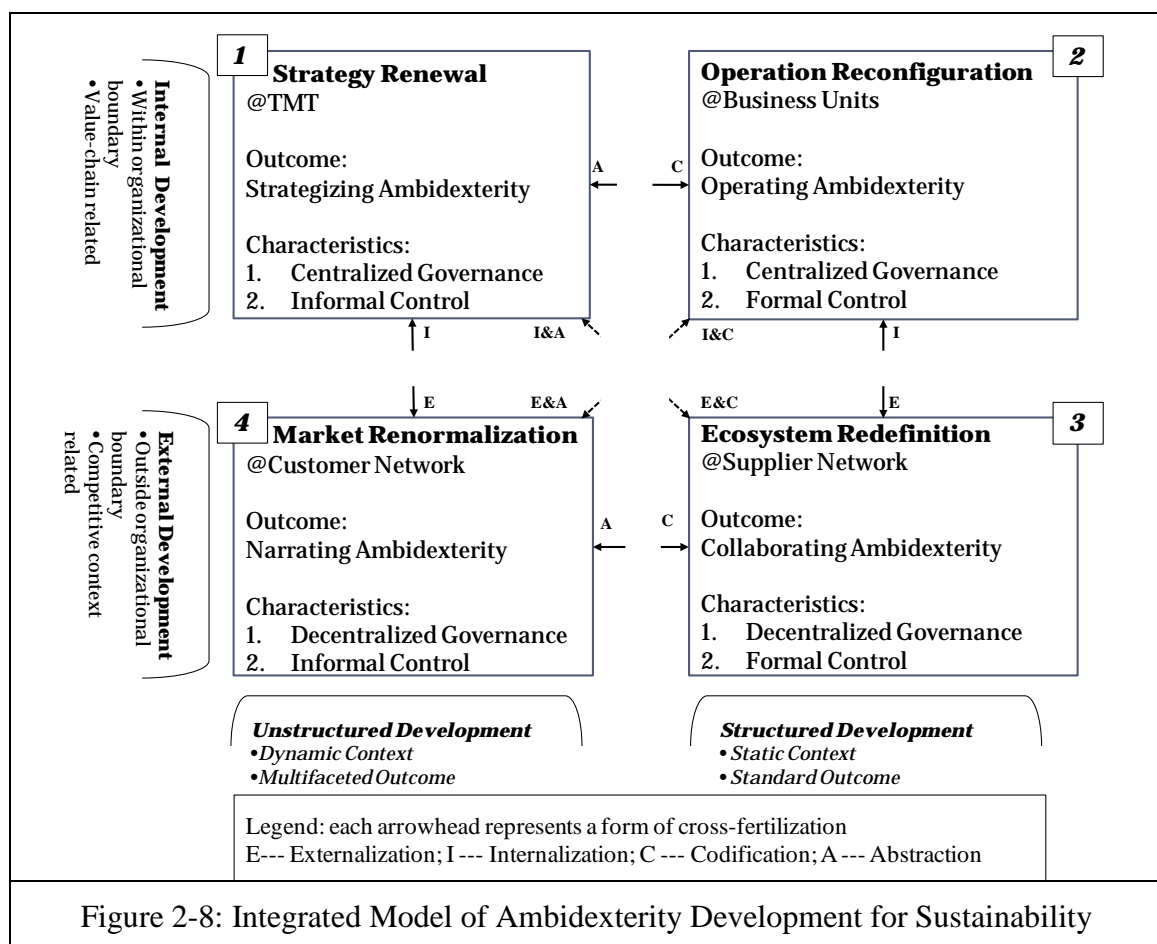


Figure 2-8: Integrated Model of Ambidexterity Development for Sustainability

As informed by the literature, the characteristics of each development can be examined under governance and control. Strategy renewal and operation reconfiguration

adopt centralized governance by assembling resources and decisions together (Xue et al. 2008), by means of joint activities and tight coordination. As internal developments with large scale change, it is reasonable for these stakeholders to act in unison and share fine-grained information (Uzzi 1996). Ecosystem redefinition and market renormalization, on the other hand, adopt decentralized governance by minimizing interference in the stakeholders' domestic operations by means of clearly defined standards and broadcasted messages (Xue et al. 2008). As external developments face major uncertainties, it is wise to give these stakeholders autonomy (Williamson 1981). With regards to control, strategic renewal and market renormalization, in view of their unstructured development, adopt informal control by means of peer pressure and market norms. The dynamic context and multifaceted outcomes of the unstructured development make informal control more suitable (Tiwana 2010). Owing to their structured development, operation reconfiguration and ecosystem redefinition, adopt formal control by means of detailed rules and regulations. The relatively stable environments and standard outcomes render formal control more suitable (Choudhury and Sabherwal 2003).

Although rooted in a technical context, the two models are not irrelevant to other industries. For example, in Wal-Mart's sustainable programme, many concepts from these two models are found to be relevant, for example the introduction of green standards and the initiative of green labeling (Walmart 2010). In fact, these are often recognized as the key success factors when analyzing Wal-Mart's success. (Meeks and Chen 2011). Yet they have not been incorporated into an analytical framework such as ours, which may serve to deepen the understanding level and broaden the implication scope. Nevertheless, despite the explanatory power of the two models, not every concept can be directly applied across industries. For example, a technology innovation that underpins the long-term effective paradigm has a different meaning for Wal-Mart than for China Mobile. For Wal-Mart, managerial innovation enabled by new technologies (e.g. supply-chain management

innovation enabled by Information Systems) is more relevant (e.g. Sarkis 1995; Tan et al. 2010) than direct investment in the technology innovation *per se*.

## **2.6. Contributions and Limitations**

The paper has several important theoretical and practical contributions. First, it fills an important gap in sustainability literature. A key determinant of sustainable development is whether the organization can balance tensions between sustainability and finance imperatives (Starkey and Crane 2003). Unfortunately, studies on this issue have been limited. This study, anchored in a telecommunication company and through the lens of ambidexterity, provides insights into a process as well as an integrated model as to how to achieve such a balance. The process model consists of four phases depicts an incremental and iterative process, yielding a number of theoretical arguments that can be of interest for future empirical studies involving processes. The integrated model depicts the ambidextrous role of key stakeholders and their collective actions. This multilevel overview is especially valuable for a new research field such as sustainability.

The study also fills important gaps in ambidexterity literature. First, the process and integrated models are a timely response to the call for step-by-step and multilevel analyses of ambidexterity development (Gupta et al. 2006; Raisch et al. 2009). In addition, the process model provides an alternative explanation to an enduring debate on the mechanisms of ambidexterity, which struggles with two conflicting schools of thought (Raisch et al. 2009, p.686). One school, represented by the structure mechanism, advocates differentiation and posits that organizations should separate tasks into different organizational units in order to create balance (e.g. Benner and Tushman 2003; O'Reilly and Tushman 2004). The other school represented by the context and coordination mechanisms, promotes integration and posits the fact that organizations should maintain paradoxical tasks in one unit and use organizational contexts to balance them (Birkinshaw and Gibson 2004; Gibson and

Birkinshaw 2004). Our model, through the lens of boundary management, combines differentiation (i.e. boundary creation) and integration (i.e. boundary integration) in one process, and offers an alternative explanation: both mechanisms are needed, but at different stages, aimed at serving complementary purposes. Our study is the first empirical work to support the proposition raised by Raisch (2009): *“Integration and differentiation are complementary, not alternative for ambidexterity”*.

For practitioners, this study also carries significant insights. The two models derived can effectively assist top management and engineering managers to incorporate sustainability into the organization. For example, the Moller-Maersk group, the world-leading shipping company, currently troubled by decreasing financial performance (Olsen 2012) and pressurized by increasing social responsibility (Moller-Maersk 2011), may find the two models particularly helpful, in the following ways: 1) the four-phase process model can help the company to pursue strategic sustainability prudently by introducing strategic renewals that balance profitable and sustainable agendas and gradually unleashing their synergies towards improved financial performance and long-term sustainability; and 2) the four-stakeholder integrated model can assist the company in assigning its 1,357 stakeholders appropriate roles and tasks (Moller-Maersk 2011) (e.g. container suppliers to provide environmental-friendly containers and cargo customers to adopt green packaging) and facilitate their collaboration through appropriate governance and control. In addition to the context of sustainable development, practical implications are also relevant to the context of dynamic capability (Eisenhardt and Martin 2000; Teece et al. 1997). Since ambidexterity assists organizations in adapting to a fast changing market, it is commonly recognized as an indispensable component of dynamic capability (Teece et al. 1997).

However, despite our contributions, the findings must be considered in the light of limitations, which also point to future research directions. First, as aforementioned,

technically nuanced concepts may not be readily applicable to other industries. Therefore, researchers from other areas need to apply the models discriminatively. Moreover, it will be fruitful for future researchers to conduct a comparative analysis across a technical and a conventional industry to tease out the differences. Second, our findings are most relevant to those companies that have been established in the market, and may not be readily applicable to start-ups, for which profitability and survival are still the primary concern. Nevertheless, in the future, it would be insightful to investigate how start-ups leverage the sustainability issue as an opportunity to create competitive advantages over the incumbent.

## **2.7. Conclusion**

The environmental crisis is nearing its tipping point, and many undesirable effects are emerging (Melville 2010). Technology companies are undergoing significant pressure, to green engineering processes and supply chains, and to invent energy-effective products that change people's lives. All these pressures coexist with the conflicting development for profits, and how to balance the two becomes a non-trivial challenge. Our study is, as far as we know, the first attempt to look at this challenge. Drawing on China Mobile's success experience, this study derives a process and an integrated model that answers the question of how to balance sustainability and profitability. Engineering management researchers who have an important responsibility in creating a knowledge repository around sustainability are thus better equipped to research the topic. Meanwhile, managers responsible for sustainable development can also use the two models to plan their endeavors and coordinate key stakeholders.

## **CHAPTER 3. STUDY II: STRUCTURED IMPROVISATION FOR SOFTWARE-BASED NEW PRODUCT DEVELOPMENT: AN AMBIDEXTERITY PERSPECTIVE<sup>4</sup>**

### **3.1. Motivation**

Software has become an integral part of our society, influencing people's work and life in many profound ways. This influence is becoming more profound with the upcoming trend of Social Networks, Location-based Services and Mobile Services, together coined *SoLoMo* (Murphy and Meeker 2011). It is thus not surprising to see many software vendors as being among the fastest growing companies of the new millennium, and the number of new entrants is increasing every day (Meeker 2012). Nonetheless, both incumbents and new entrants grapple with a challenging task of developing competitive products, sustaining their competitiveness in the midst of a highly turbulent environment. Many have failed the task and have ceased to exist. For example, complacent veterans are overthrown by new entrants as they overlook emerging opportunities (Goodridge 2002); entrepreneurs blunder into chaos as they rush into cutting-edge technologies that have no ready ecosystems to support (Adner 2012); and early champions are caught up by competitors who emulate the ideas with better designs (Geromel 2011).

This challenge may be attributed to three distinctive characteristics of software-based new product development (SNPD). First, SNPD is underpinned by a volatile technological environment with relentless breakthroughs (Sanchez 2007). Sometimes software products become obsolete even before they are released. Because this phenomenon is so common, a designated term *Vaporware* has been coined for this type of product (Townsend 2008). This volatility is further exacerbated by the pervasive implications of new software technologies,

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<sup>4</sup> The following manuscript is currently under preparation to be submitted to European Journal of Information Systems (EJIS).

which often disrupt the entire ecosystem over a very short period of time (Adner 2012). Second, SNPD serves erratic customers, whose preferences constantly shift. This is best reflected in the fluctuation of the iTunes-Apps chart where a product's prime period is measured in weeks, if not days; a blockbuster one week may not be heard the next (e.g. Bennett 2012). This erraticism is further exacerbated by the elusive nature of customer preferences. Very often, exquisite and sophisticated software products are deserted by customers, while meaningless and simple add-ons attract great enthusiasm (Birkinshaw et al. 2011). Third, SNPD is renowned for its ultra competitive nature. On one hand, fast followers and imitators launching new products can easily woo customers who feel ambivalent towards existing products (Eisenhardt and Martin 2000; Teece et al. 1997). On the other hand, the competition is escalated by the dissolving boundaries between different software domains. Vendors used to run in separate domains now commonly find themselves clashing with each other, and their closest rivals often arise from foreign domains (e.g. Womack and Douglas Dec 9th, 2010).

However, despite its significance and challenge, SNPD has received little research attention from the IS community, which has overly focused on system deployment/software project management (e.g. Kirsch 2004; Mayasandra et al. 2010). Although both tasks center on software, they are intrinsically different. To name two differences, SNPD is about delivering off-the-shelf product for many customers, while system development is about delivering consulting service for one specific customer; the success of SNPD largely depends on the competitive movement, whereas that of system development has little to do with competitors. NPD community although has generated rich findings, these findings may not apply to the SNPD context. Derived from conventional industries, such as pharmaceuticals (Rothaermel and Deeds 2004), food (Miner et al. 2001) and automobile (Adler et al. 1999), central to these findings is a paradigm of comprehensive planning and premeditated



procedures (Fredrickson 1984; Goll and Rasheed 1998), which is neither effective nor feasible for the software industry, which is highly turbulent and unpredictable.

Therefore, a new management paradigm is needed for SNPD. This paradigm should feature spontaneous actions in order to adapt to the technological volatility, the customer erraticism and the fierce competition. Improvisation, a concept borrowed from the music literature and now widely used in the management literature, is deemed to be an appropriate theoretical lens, since it advocates that actions occurring without prior design can have better outcomes than designed action (Miner et al. 2001; Orlikowski 1996). Guided by the improvisation literature, a case study is conducted on Tencent, the largest Internet Company in China, one that has excelled in the midst of many technological discontinuities, customer preference shifts and competitive attacks. The case unveils a four phase process model of SNPD, featuring a structured improvisation, whereby spontaneous sensing and responding are coordinated by latent and salient structures. Significant theoretical and practical contributions are then drawn from this process model.

The remaining part of the paper is organized as follows. First, we review the NPD literature, through which we understand those insights and gaps that are relevant to SNPD. Next, we review the literature of improvisation to gather theoretical elements that can be used to examine SNPD. Then, we describe our qualitative research methodology, which is tailored towards the research agenda and SNPD context. Third, we describe the case, highlighting the important data pertinent to NPD and improvisation, and then analyze the data with theoretical supports from both literatures. A theoretical model is then derived, and finally, its theoretical and practical implications are discussed.

## **3.2. Literature Review**

### **3.2.1. New Product Development**

NPD is the process of bringing a new product onto the market. It is a complicated business process, including multiple phases (e.g. search, design, and implementation) and

many stakeholders (e.g. R&D scientists, engineers and marketers) (Brown and Eisenhardt 1995). Such a process is critical to modern organizations as it is an important means to interpret and adapt to environments (Clark and Fujimoto 1991), and also a critical channel to build and sustain competitive advantages (Eisenhardt and Martin 2000). The literature on NPD is vast, ranging from explorative case studies to confirmative empirical studies, and cutting across many industries. While findings are insightful, however, they are often contradictory. For example, while some claim that standard and routinized actions are good (Atuahene-Gima 2004; Tatikonda and Montoya-Weiss 2001), others argue the opposite (Pavlou and El Sawy 2010). A key reason for such disputes is that NPD is context dependent, and thus, the findings of one context may not apply to the other (Brown and Eisenhardt 1995).

Thus, we organized prior studies based on the contexts that they draw upon. They were collected from leading management and marketing journals in the past three decades. Through a thorough synthesis, three distinctive contexts were unveiled (see Table 3-1). Although there are overlaps, stable context is often observed in heavy industries such as automobile (Adler et al. 1999), pharmaceuticals (Rothaermel and Deeds 2004) and general chemicals (Dougherty 1992); dynamic context is frequently observed in light industries such as electronic (Rosenkopf and Nerkar 2001), food (Miner et al. 2001) and clothes (Uzzi 1997); and turbulent context is commonly seen in contemporary industries such as software (Tschang 2007) and Internet-related (Iansiti and MacCormack 1997).

NPD in a stable context focuses on process efficiency and product quality, since success in this predictable environment largely depends on low-cost development and superior products (Powell 2006). High predictability also makes it beneficial to standardize NPD tasks and develop routines. Although lacking in explorative spirit, routinized tasks are efficient in terms of execution (Adler et al. 1999) and effective for sustainable quality

(Powell 2006). Explorative tasks, on the other hand, are often designated to R&D divisions that are committed to long-term research (Rothaermel and Deeds 2004). Planning is paramount in this context. Products with predefined markets, concepts and specifications are more likely to succeed (Tatikonda and Montoya-Weiss 2001), while those without them are more susceptible to distraction and substantial backtracking. It is therefore common to find NPD teams investing their best efforts and managerial resources in planning (Atuahene-Gima 2004).

Within a dynamic context, although process efficiency and product superiority are important, they are no longer primary NPD objectives. Successful NPD in this context is often associated with rapid reconfiguration of development processes and quick adjustment of product trajectories (Lavie 2006). Although the former may reduce process efficiency (Adler et al. 1999) and the latter may compromise product quality (Andriopoulos and Lewis 2009), the process flexibility and the product adaptability they represent are most critical to NPD within a dynamic context. To increase flexibility, tasks are often loosely coupled (Sanchez 2007), and to increase adaptability, they are often shortened and overlapped whenever possible, as advocated by the strategy of compressive development (Eisenhardt and Tabrizi 1995; Miner et al. 2001). Despite the dynamic changes, however, planning still plays an important role, and the NPD teams devote adequate time to formal planning (Teece et al. 1997). Yet plans are no longer comprehensive or detailed. Focusing on architectural issues, they leave a range of contingencies for future changes (Kusunoki et al. 1998). Innovation, instead of coming from a designated research lab, often stems from cross-functional (Rosenkopf and Nerkar 2001) or inter-organizational collaborations (Uzzi 1997). Such collaborations enable fast information gathering and collective interpretations, important contributors to innovations in a dynamic context (Eisenhardt and Martin 2000).

While the first two contexts dominate the NPD literature, the turbulent context has received little attention, and few studies have examined it systematically. The findings are thus drawn from those studies that have indirectly discussed the context. First, the primary objective of NPD is to ensure that new development processes can emerge with the turbulent environment (Eisenhardt and Tabrizi 1995) and products are actively responding to the changes (Katila and Chen 2009). These two objectives are often delivered through a series of spontaneous and situated tasks (Orlikowski 1996). Behind these tasks is the central strategy of experiential learning that is reflected through iterative development and extensive testing (Argote 1999), and bricolage that is reflected in making do with what is at hand (Baker and Nelson 2005). Unlike the dynamic context, product developers rely comparatively little on formal planning, as events often happen outside existing formal plans, and the traditional gap between design and execution is reduced dramatically (Barrett 1998). Rather, NPD teams commonly devise plans in real time with execution. Innovation mostly comes from serendipitous discoveries rather than cross-functional collaborations, which are perceived as too time-consuming given the intensive pressure for change. Although somewhat incidental, these discoveries are not entirely based on luck, but on organizational intuition (Miner et al. 2001), real options (Sambamurthy et al. 2003) and knowledge structure (Cohen and Levinthal 1990).

Today, with the proliferation of technological and managerial innovations, many stable and dynamic NPD contexts are shifting towards the turbulent context (Sanchez 2007). This study seeks to extend the NPD literature, hitherto locked into those two contexts, to a turbulent perspective through examining NPD of a software vendor. As may be seen from Table 3-1, prior findings have already provided suggestive evidence that improvisation is an appropriate lens for NPD within a turbulent context. Nonetheless, they had limited empirical examination (Brown and Eisenhardt 1995), with some coming from indirect observations (e.g.

Eisenhardt and Tabrizi 1995). This study has sought to fulfill these gaps by empirically examining improvisation and explicating its functions within NPD. Following this, we review the improvisation literature to prepare for the theoretical foundations for this exploration.

Table 3-1: Comparison of Three NPD Contexts

Concepts	Stable Context	Dynamic Context	Turbulent Context
<i>Desired Outcome</i>	Process efficiency and product superiority	Process flexibility and product adaptability	Process emergence and product responsiveness
<i>Task Nature Strategies</i>	Standard and routinized Comprehensive planning, total quality management	Loosely coupled Capability reconfiguration, compressive development	Spontaneous and situated Experiential learning/iterative development, bricolage,
<i>Attitude towards Planning</i>	Detailed planning that discourages future changes	Systematic and high-level planning that leaves room for contingencies	Real-time planning with execution
<i>Main Sources of Innovation</i>	Long-term, committed R&D	Cross-functional or inter-organizational collaboration	Serendipitous discovery
<i>Sample Industries</i>	Automobile, pharmaceuticals, and general chemicals	Electronic, food, and clothes	Software and Internet-related industries
<i>Sample Studies</i>	(Adler et al. 1999; Atuahene-Gima 2004; Dougherty 1992; Powell 2006; Rothaermel and Deeds 2004; Tatikonda and Montoya-Weiss 2001)	(Eisenhardt and Tabrizi 1995; Kusunoki et al. 1998; Lavie 2006; Miner et al. 2001; Rosenkopf and Nerkar 2001; Sanchez 2007; Uzzi 1997)	(Eisenhardt and Tabrizi 1995; Iansiti and MacCormack 1997; Miner et al. 2001; Pavlou and El Sawy 2010)

### 3.2.2. Organizational Improvisation

Although improvisation is a relatively new theme in the management literature, it has received much attention and been featured in many research streams such as organizational transformation (Orlikowski 1996), organizational learning (Barrett 1998), crisis response (Bigley and Roberts 2001) and new product development (Eisenhardt and Tabrizi 1995; Pavlou and El Sawy 2010). The study in NPD mainly focuses on the effectiveness of improvisation, but not how improvisation is manifested or developed. The concept originated from art literature. It was loosely defined and casually treated within that discipline. The artistic form that organizational scholars visited most was jazz, renowned for its extemporaneous composition and spur of the moment production (Barrett 1998). A migration

to the management discipline, which is more scientifically-based and rigorously-themed, subsequently raised intensive debates which sharpened and extended the concept within its new discipline.

The first debate centers on the issue of definition. Earlier management scholars defined improvisation as a spontaneous act without planning (Orlikowski 1996; Weick 1993). This was soon challenged by successive scholars, who contended, based on empirical observations, that improvisation in fact involved planning, although it was swift and emergent. They further claimed that what characterized improvisation was a timely convergence between design and execution as this convergence substituted the predefined plans (Moorman and Miner 1998). However, this definition was again challenged, since it inevitably subsumed cases of accelerated and compressive development, where design and execution temporarily converged, but were intrinsically separated (e.g. Eisenhardt and Tabrizi 1995). To put it more simply, design in the morning and execution in the afternoon do not constitute improvisation. This dispute was finally resolved by Miner et al. (2001) by introducing the concept of material convergence, whereby design and execution are deeply entangled and inseparable. In this study, we intend to identify improvisation by this material convergence, and further explore how the convergence is achieved.

The second debate concerns the efficacy of improvisation. While some empirical evidence suggests that improvisation can lead to positive outcomes such as financial successes (Eisenhardt and Tabrizi 1995) and creativity (Barrett 1998), some new studies have identified negative outcomes. For example, improvisation may spread scarce resources to urgent but non-strategic issues, produce ingenious yet disparate value, and disrupt regular knowledge accumulation (Miner et al. 2001; Vera and Crossan 2004). Underlying these negative concerns is often a lack of control and coordination mechanisms. Organizational structure, with its capacity to safeguard harmful spontaneous activities, encourages favorable

ones and channel all of them in the same direction, are often observed in successful improvisation (e.g. Kamoche and Cunha 2003; Vera and Crossan 2005). Therefore, we postulate that a successful SNPD will have effective underpinning structures to control and coordinate its improvisation, and we aspire to uncover these in our exploration. This need for structure also resonates in jazz, where musicians need a basic melody and rhythmic structures to guide their improvisation. If these structures are not memorized or constantly repeated, improvisation is merely a series of dissonant voices (Berliner 1994; Weick 1993).

The third debate concerns whether improvisation is an ad-hoc course of action that cannot be reproduced, or a set of routines that can be developed and improved. While conventional wisdom holds the former belief and has raised concerns about infusing routines into improvisation (Weick 1998), more and more evidence suggests that routinized processes for stimulating and enacting improvisation can be developed and instituted (Pavlou and El Sawy 2010; Vera and Crossan 2005). This disagreement may again be rooted in different contexts. Conventional wisdom mainly draws on stable contexts, where improvisation is only invoked by individuals as a means of addressing urgent issues, and is often absent at the organization or project level (Miner et al. 2001, p333). New thoughts, on the other hand, often come from a more turbulent context, where improvisation, rather than an ad-hoc and auxiliary function, is a set of strategic routines that prevail at both organization and project levels (Pavlou and El Sawy 2010; Vera and Crossan 2005). This prevalence then creates a rich empirical ground for processual examination. While prior studies have focused on conceptual and variance models (e.g. Eisenhardt and Tabrizi 1995; Moorman and Miner 1998), they have overlooked the process view of improvisation, but when improvisation becomes part of a strategic routine, a process view on how to develop and manage it also becomes crucial. Our study intends to bridge that gap, and the overall objective of this study becomes a two-way exchange of insights: 1) insights into the IS and NPD literature from the

lens of improvisation; and 2) insights into the improvisation literature from the context of SNPD.

Table 3-2: Three Prominent Debates in Improvisation Literature and Their Implications			
	Definition Debate	Efficacy Debate	Routinization Debate
<i>Conventional Wisdom</i>	Improvisation is a spontaneous act without planning	Improvisation leads to positive outcomes such as financial successes and creativity	Improvisation is an ad-hoc course of actions that are invoked in urgent situations and cannot be reproduced
<i>New Thoughts</i>	Improvisation is a deliberate act with material convergence between design and execution	Improvisation can lead to negative outcomes such as ineffective use of resources, loosely organized outcomes, and disrupted learning	Improvisation can be a set of routines that organizations may develop and improve
<i>Implications for this Study</i>	Improvisation in SNPD is observed when design and execution are materially converged We intend to unveil how the convergence happens	Successful SNPD needs to have effective structures to control and coordinate its improvisational activities We intend to unveil these structures	Improvisation in SNPD is a set of strategic routines that can be observed in the organization and project levels We intend to unveil a process view of these routines

### 3.3. Methodology

Given the research objective of revealing a new NPD paradigm through the lens of improvisation, a case study has been chosen as the research methodology, as it fits in with the explorative nature of this research (Eisenhardt 1989a; Walsham 1995). Tencent has been chosen as the case organization. Founded in 1998, the company began as an Instant Messenger (IM) provider. Its flagship product QQ IM, originally adapted from ICQ, has survived many rounds of technological revolutions, outpaced many formidable global competitors and become the world's largest IM provider, with over 400 million users and 58% below 30. Replicating the IM success in many other products, Tencent has become China's largest, and the world's third largest Internet Company (after Google and Amazon) with a market capitalization of US\$38 billion in 2011. The company is also highly regarded by the industry analysts. Since 2008, it has been featured on two prominent Forbes lists, which rank



the world's most competitive and innovative companies. Therefore, findings from Tencent's NPD are likely to be valuable and insightful for other software vendors.

To leverage the flexibility of the case study and make the exploration more fruitful, data collection and analysis were conducted in tandem (Pan and Tan 2011) and carried out in three phases (see Figure 3-1). Phase 1 began in January 2012, when we obtained access from the gatekeeper, a Human Resource Vice President of Tencent, also a close friend of our local collaborator. Secondary data was the primary source during this phase (Walsham 2006). Tencent has shared with us many internal archives, such as email correspondences, business cases and annual reports. As a high-profile company, the company has also been featured in many external publications, such as news articles, analysis reports, journal articles and popular business books. In total, we collected 122 articles, 24 from internal sources and 98 from external sources (see Appendix 5-5). Two sets of interviews were also conducted during this phase: our local collaborator conducted preliminary interviews with the gatekeeper and his subordinates, and our research team conducted interviews with the customers. Located in a top Asian research university with a large population of Chinese nationals and ethnic Chinese (i.e. both students and faculty members), we experienced little difficulty in finding interview participants. Ten interviews were conducted across undergraduate students, graduates students and junior faculty (see Appendix 5-6).

The analysis of the secondary and interview data provided us with a rich background to China's Internet market, Tencent, and Tencent's NPD. Several critical success factors in terms of why Tencent is able to excel in NPD were distilled. The top three factors are: 1) fast market responsiveness through emulated innovations (featured in 33% of the articles and 57% of the interview accounts); 2) scrupulous attention to user experience (featured in 23% of the articles and 43% of the interview accounts); and 3) acute sense of market opportunities and threats (featured in 20% of the articles and 29% of the interview accounts). On the contrary,

strategic foresight and long range planning were not ranked high, with less than 10% of the articles and interview accounts featuring them. This pattern of emphasizing responsiveness and deemphasizing planning prompted us to adopt improvisation as the guiding theory (Klein and Myers 1999). A review of the improvisation literature further unveiled debates on definition, efficacy and routinization. Together, they constitute the theoretical lens for future data collection.

Phase 2 started in early March 2012 with the commencement of the onsite visit. Pictures and videos were taken at the critical operational sites such as team meetings, corporate presentation and work stations. Field notes were taken during informal chats during breaks and company tours. While observation generated interesting and insightful findings, their primary objective was to complement the interview, which was the main data source. In total, there were 21 unique interview participants. Some participated in multiple sessions, with each session lasting from 45 minutes to 1 hour. Participants were equally distributed across senior managers, middle managers and junior staff. The majority of the participants had been with the company for over five years, and some over a decade (see Appendix 5-6). Participants were key members selected from two core product suites: the Internet Service Suite and the Entertainment Suite. The former is Tencent's oldest product suite, containing its most classic products such as QQ IM and QQ Space. The latter is Tencent's fastest growing product suite, featuring its latest products such as Mini Massively Multiplayer Online (MMO) games and Hardcore MMO games. Observations across these two distinctive suites provide us with a balanced view that excludes elements idiosyncratic to historical backgrounds and highlights concepts that are universally acceptable. The reason that we chose a whole product suite rather than an individual product as the unit of analysis was that in Tencent, one product's development is inextricably intertwined with others. First, one product is often a spin-off from another in the same product suite. Thus, studying it alone may not give a

comprehensive historical account of the product. Second, the development of one product often requires participations from other product teams. This participation is an important contributor of Tencent's success, and studying the development alone may not capture it. Onsite data analysis was conducted in real time with the interview. While one researcher engaged participants and initiated questions, the others interpreted responses, ensured data validity and identified new themes. Whenever a new theme emerged from the data, the interview panel would quickly redirect questions toward it (Pan and Tan 2011). At the end of Phase 2, a model that fused improvisation concepts and NPD emerged.

Phase 3 began in May 2012, when the data was systematically analyzed, coded and arranged into themes according to the emergent model. Here, we used selective coding (Strauss and Corbin 1990). Open coding was also used in this study, but at the earlier two phases for analyzing secondary data and onsite data. The two coding techniques serve different purposes. On one hand, open coding coupled with light literature review is used to explore and surface the theoretical model. On the other hand, selective coding accompanied by heavy literature review is used to augment the surfaced model (Glaser and Strauss 1967). Follow-up interviews were conducted when new themes emerged during the analysis and confirmation of these themes was needed. Email and telephone were common means. If rich contextual data were needed, onsite visits would be conducted by our local collaborator. This iteration between analysis and follow-up interviews took more than three months until the model reached a *theoretical saturation*, when newly collected data started repeating, and failed either to dispute the existing model or reveal new themes (Eisenhardt 1989a).

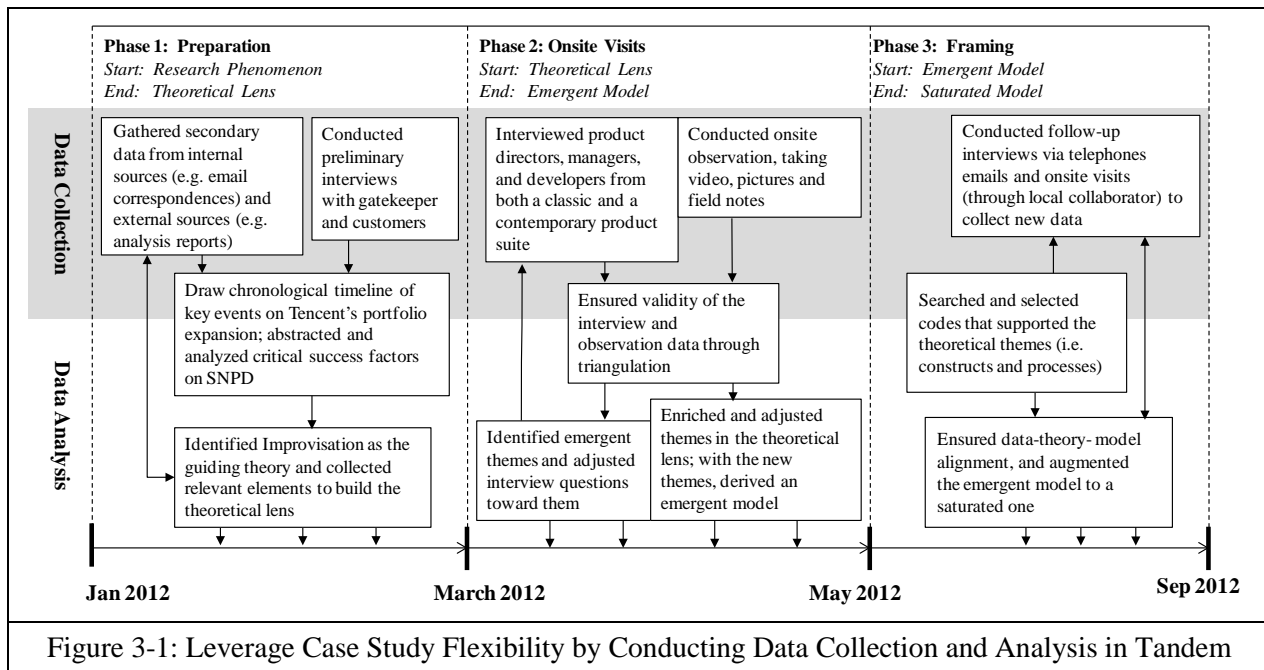


Figure 3-1: Leverage Case Study Flexibility by Conducting Data Collection and Analysis in Tandem

While data collection and analysis in tandem leveraged the flexibility of case study, some rules needed to be put in place to ensure its validity. Indeed, the balance between flexibility and validity is the key to insightful and reliable case findings (Pan and Tan 2011). In our research, we followed the seven principles of Klein and Myer (1999), since they formed a comprehensive and systematic framework to ensure the validity of qualitative research.

Table 3-3: Ensure Case Study Validity by Following Klein and Myer's (1999) Seven Principals

Principle	Implementation	Outcome
<i>Fundamental principle of the hermeneutic circle</i>	Formed in-depth understandings of individual NPD phases by interviewing employees close to it, e.g. product managers for the design and developers for execution; formed comprehensive appreciations of the entire process by interviewing employees overseeing it, e.g. product director for Internet Service Suite and game producer for Entertainment Suite; traveled between these two levels during data collection and analysis	Findings reflected the interdependent insights of the parts and the whole that they formed
<i>Principle of contextualization</i>	Studied Tencent history and China's Internet business dynamics extensively through internal archives (e.g. Special book <i>A decade of Tencent</i> ) and external publications (e.g. Gartner's <i>Hype cycle reports on ICT in China</i> ); interviewed senior employees who have been with the company for nearly a decade	Case description and discussion critically reflected the historical and industrial background of the research setting
<i>Principle of interaction b/w researchers and participants</i>	Conducted interviews in an open-ended fashion, covering product histories, milestones and a typical workday (see Appendix 5-6 for the interview questions), and adjusted questions based on participants' real-time responses and our interpretations on them	Interviews minimized recall of error and reflected the social interaction between researchers and participants
<i>Principle of abstraction and generalization</i>	Collected interview data around a semi-structure, i.e. theoretical lens for the onsite interviews and emergent model for the follow-up interviews. When data and model could not be aligned seamlessly, traveled back and forth between data, model, and literature until the data could be explained by the literature and integrated into the model	Abstraction was corroborated by extant literature and findings were generalized into theoretical constructs of a wider IS research
<i>Principle of dialogic reasoning</i>	Engaged a senior scholar, who can read Chinese, for earlier coding; without prior knowledge of the fieldwork or theoretical lens, he detected some preconceptions; presented the emergent model to a group of critics formed by academics, practitioners and the gatekeeper, who challenged the model's intellectual basis, logic and reflection of the reality	Findings reflected the reality in a unbiased manner and manifested a sound logic
<i>Principle of multiple interpretations</i>	Participants came from different sources, e.g. Tencent employees who offered the internal view and customers who offered the external view; internally, participants also came from different levels, e.g. directors overseeing multiple products and developers responsible for a particular product function; set up an interview panel of four researchers: one asked questions while the rest took notes and compared interpretations afterwards	Findings reflected objective judgment when different versions of the same issue were told and achieved satisfactory overlap of more than 90% among different researchers' interpretations
<i>Principle of suspicion</i>	Conducted close observations onsite, taking photos, videos, and field notes; these materials were used to either strengthen or refute the second and interview data; for any statement to be considered valid, it needs support from two sources out of secondary data, customer interview, company interview and onsite observation	Description and discussion excluded potential biases in individual source

### **3.4. Case Description**

#### **3.4.1. Organization Background**

China now has the world's largest Internet population of 513 million (34% penetration) and an expected annual growth rate of 12% (CINIC 2012). This large population and the high broadband penetration (i.e. 98%) have created a vibrant market that attracts both local and international players. Unlike other regions, China's local players in general outperform the big international names. For example, Baidu now controls 70% of Chinese searches, leaving Google and Bing far behind; TaoBao has taken over EBay as the dominant E-commerce platform forcing the latter to give up its Chinese business. However, local players are frequently criticized for their direct imitations of their American counterparts, and are often portrayed as copycats. Although imitation exists in many successful local companies, it is neither complete nor accurate to attribute their success to imitation. Local players demonstrate many feats beyond the reach of international players, for example the dedication to draw innovative inspirations from the local context and a deep understanding of the Chinese customers. Overemphasizing copycat behavior and overlooking other factors is, in fact, an important reason for deep-pocketed American veterans being defeated by young, poorly funded local players.

Tencent is arguably a leader among local players. The company started from an IM product (i.e. QQ IM) by emulating ICQ. Although there were overlaps between the two, QQ brimmed with unique features rooted in the local context. For example, the virtual outfit aptly fulfills the single child's desire for online identity, and the user-lock clears the concern of users sharing public computers in the Internet cafes. The early success of IM created a large user base, which Tencent leveraged to expand to other products. Today, the company's portfolio covers practically all major Internet domains, and is categorized into four interconnected product suites (see Figure 3-2). The Internet Service Suite consists of IM, Internet value added service and E-commerce. As the first establishment, the suite was once

the largest revenue center, before the Entertainment Suite overtook it. Entertainment is also the fastest growing suite, with a strong focus on games. The popular games are casual, mini MMO and hardcore MMO ones. The Mobile Service Suite, which consists of multimedia message, mobile value added service and M-commerce has received substantial investment recently, given that more customers are starting to use mobile devices to access IM and other Internet services. The Web and Advertising suite, which comprises web portal and search, is the youngest suite, and is comparatively small. While most Internet companies build their revenue through advertising, Tencent's advertisement only contributes 10% of its total revenue and carries significant potentials.

These four product suites, while underpinning the bottom line, cannot be sustained without the support of three strategic divisions. The business policy division, formed by C-level executives, is responsible for the company's strategic directions. As distinct from companies of a similar magnitude, Tencent devotes little effort to long range planning. Learning from their startup experience, the management team posits the fact that long-range plans are as good as irrelevant when the market undergoes turbulent conditions, and that adhering to them may conversely prevent the organization from responding to changes. Therefore, instead of drawing up a specific strategic roadmap, they assign NPD teams the discretion of making strategic decisions, but retain the authority to reject strategies that are not aligned with the company's core values, such as *never put monetization ahead of customer experience*.

Since customer experience is paramount to Tencent, a designated research division has been set up. Both conventional measurements such as focus group experiments, and cutting-edge measurements such as data mining are adopted to unravel customer insights. A further research division is devoted to technology, as technological advancements that are inaccessible to competitors create competitive products and curtail aggressive imitations.

Infrastructure, application and mobiles are the major research foci. Although the research division's main function is to provide technical support for NPD, there are selective products scheduled in this division that aim to generate disruptive innovations. These products follow the conventional development approach of formal design and execution. However, this is not the dominant approach for NPD, and the majority of Tencent products are developed on the basis of spur of the market changes by individual NPD teams.

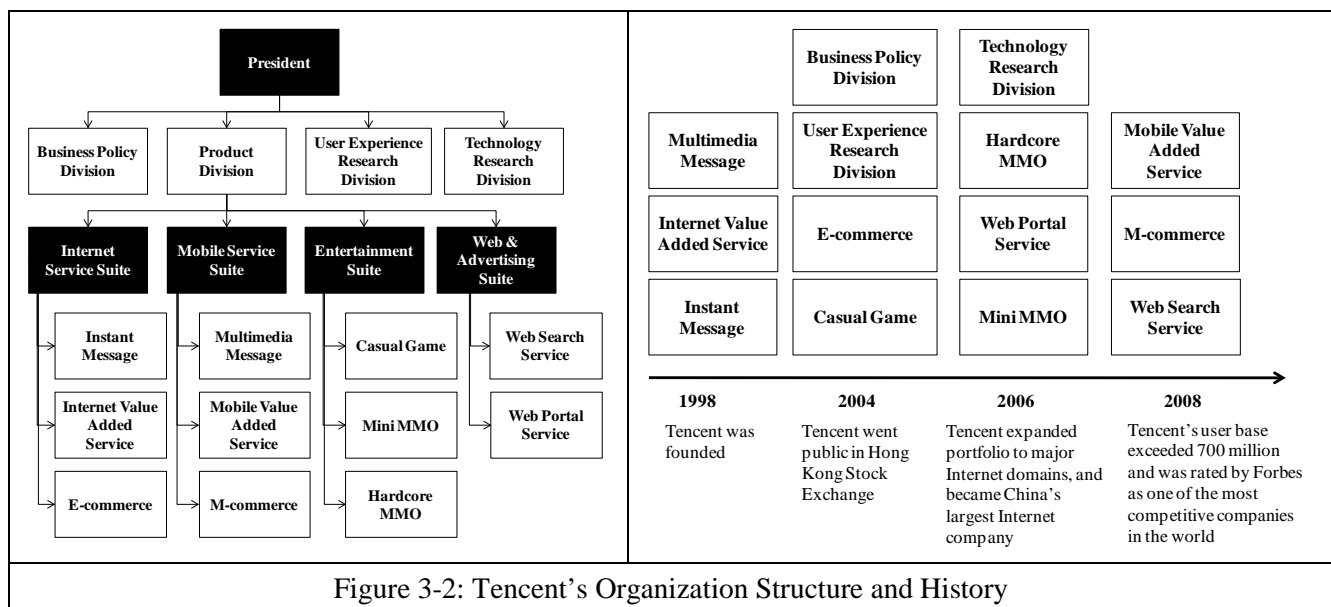


Figure 3-2: Tencent's Organization Structure and History

### 3.4.2. New Product Development

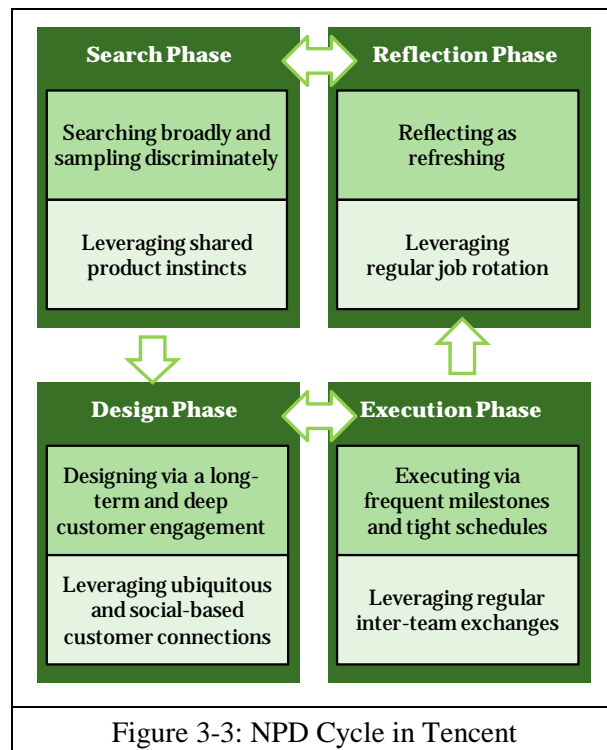
NPD in Tencent is a cyclical process of four phases: search, design, execution and reflection (see Figure 3-3). First, most products start from a broad search for the latest trends in technologies, customers and competitors. Among the three, greatest attention is devoted to competitors, since their me-too products or substitutes not only impose lethal threats, but also serve as the best reference for opportunities. Essentially, threats and opportunities are often two sides of the same coin. This broad search is followed by discriminative sampling, which focuses on selective opportunities and conducts due diligence on them. Central to due diligence is analysis around two key questions, first whether the opportunity is desirable, and second, whether it is feasible. To answer these questions, prior experience is invoked, the reflection on which helps clarify the two questions. This sampling, although sometimes



supported by scientific measurements (e.g. statistical analysis, data warehousing and data mining) is mostly carried out through something less scientific, yet equally effective: *shared product instincts*. First, seasoned product managers, by virtue of broad exposure and habitual reflection, have developed an acute sense of what is likely to work for a product and what is not. This sensing ability is internally coined as a product instinct. Second, by gathering these managers and stimulating debates among them, a pool of shared instincts is created which avoid bias from individuals. Following these shared instincts, quick decisions can be made. In Tencent, being decisive is more important than being comprehensive. Although the latter may result in sounder decisions, it can cost the best time to respond (for sample quotes, see Appendix 5-7).

Design starts when selective opportunities are prioritized for action. The highlight of design is innovation. Tencent views innovation not so much as creating something new, but rather fulfilling customer needs creatively. These needs are often elusive and indiscernible to NPD teams. Although it helps somewhat when NPD members themselves are active users, as they are in many cases, this remains problematic as they can hardly jump out of the engineering mentality. To this end, Tencent engages customers at the very beginning and takes their feedback as the major source of innovation. This engagement, unlike many competitors, does not stop at the prototyping or cosmetic level, but continues until the product acquires and satisfies most of the targeted customers, and captures their deep insights, many of which are psychologically related. While this long-term and deep customer engagement differentiates Tencent products from competitors, it is not easy to implement, as customers need to invest a significant amount of time and many companies do not have such an influence. In this respect, Tencent demonstrates a remarkable feat of not offering any monetary incentive, yet managing to recruit many pioneer users. This feat is attributed to the company's long-term commitment in customer relationships. First, Tencent has built a

ubiquitous connection net with customers by integrating all products into one platform, and has established the brand as an integral part of customers' lives. The company has then transformed these connections from transaction based to social based by paying scrupulous attention to customer needs. As a result of both, customers often feel obliged to help (for sample quotes, see Appendix 5-8).



Execution takes place during the design in order to incorporate real-time customer feedback. It follows frequent milestones and tight schedules so that customers can consistently perceive changes and will continue giving feedback. This, however, raises the requirement for human resources, which often exceeds that of an individual team, especially during the official launch, when the user basis explodes with a sudden influx of feedback. To overcome this

shortage, Tencent promotes regular inter-team exchanges, in which teams working on urgent schedules can borrow people from those working on less urgent schedules. The company knows that for this exchange to succeed, employees from external teams must possess the relevant skills to help, and must be willing to leave the existing task to help. Therefore, the company has been rotating employees on different products whenever possible, so that they have experience of multiple products; meanwhile, the company has also been educating employees to work with a changing mentality from their first day at work; witnessing these frequent inter-team exchanges on a daily basis also helps perpetuate this mentality (for sample quotes, see Appendix 5-8).

The iteration between design and execution continues until the product reaches a tentative stability, when majority of the target customers are acquired and satisfied. Since Tencent takes the development experience, be it successful or unsuccessful, as being as serious as the final product, when a product reaches the tentative stability, reflection becomes the primary task. Some development experience is summarized according to business or technical cases, and is then disseminated through the knowledge management system (KMS). More are shared by individuals at work. This sharing disseminates the experience residing within the minds of individuals, which is more valuable, yet difficult to translate into cases. Because the environment changes every day, the key challenge of reflection is to stay relevant. Hence, experience shared at work is constantly refreshed in relation to the new trends observed in the search. This refreshing process also renders the reflection outcomes readily applicable to practice. Indeed, Tencent does not have time or resources to carry out reflection that has few practical implications. Because this type of reflection is often associated with static teams, whose members share the same past and stuck into the same thinking groove, employees are regularly rotated to create a dynamic team configuration, which helps break away from the old thinking pattern and brings new trends into their reflection.

While trends observed in search inform reflection, insights derived from reflection also inform the search. This is evident in the case of due diligence, where new trends are matched against the prior patterns for clarity. Therefore, search and reflection also form an iterative process of simultaneous actions, like that between design and execution (for sample quotes, see Appendix 5-7). This iteration continues until new and sound product ideas emerge which breaks the tentative stability and lead to a new design and execution iteration. These

two iterations are, indeed, key characteristics of Tencent's NPD and important contributors to its success.

### 3.5. Discussion

To recall the research question, this study aspires to uncover how software vendors conduct SNPD through the lens of improvisation. By progressing between the case and the literature, we inductively derive a four phase process model (see Figure 3-4). Although the model is inductively derived, it is corroborated by the literature of both NPD and improvisation (for definitions of the key concepts, see Appendix 5-9). This section is broken into two parts: first, we explain the four mechanisms that carry out the four phases and their coordinating structures; second, we explain how these four mechanisms enable improvisation and how the coordinating mechanisms routinize it.

Unlike conventional search mechanisms such as probing (Ancona 1990) and scouting (Ancona and Caldwell 1992), which stop at collecting rich external information, Tencent's search mechanism is more rewarding. Through broad exploration and discriminative selection, it first gathers external information from multiple sources, then identifies the important opportunities, and finally frames them based on existing knowledge. We conceive this mechanism *syntopical observation* as a concept adapted from *syntopical reading* coined by Adler and Van Doren (1972), which refers to an advanced, analytical reading that gathers information broadly, filters out the important points and gives meanings to these points, using the readers' own language. For this rewarding mechanism to work, two conditions must be met. First, the organization needs an information filter to select important opportunities. To this end, instincts of seasoned product managers are gathered. Underlying these shared instincts are interactions of mental models and knowledge structures, which form a collective information filter (Prahalad and Bettis 1986). Second, the organization needs real time access

to prior knowledge in order to frame new opportunities. To this end, Tencent conducts search and reflection in tandem.

Design and execution are initiated to respond to the opportunities framed in the search phase. Unlike conventional design mechanisms that rely upon internal capacity (Dougherty 1992) or external consultancy (Rosenkopf and Nerkar 2001), Tencent's design is carried out through long and deep customer engagement, which aims at soliciting innovative concepts. This innovation, capturing customers' latent needs and delivering transformational value, is termed an embedded innovation by Simanis and Hart (2009). However, many organizations fail to benefit from this innovation, as customer investment in doing so is often beyond their influence (Homburg et al. 2000). To this end, Tencent establishes a ubiquitous and social connection with customers, which results in an intimate customer network, built upon social capital, high trust and mutual responsibility (Simanis and Hart 2009). This intimacy creates a social obligation for customers to behave in the interests of Tencent and invest their time (Nambisan 2002).

Design and execution are conducted in tandem in order to gather customer feedback in real time and incorporate the feedback spontaneously. Unlike sequential development mechanisms which feature major milestones and critical transitions (Royce 1970), Tencent's execution is carried out through frequent milestones and tight deadlines. This mechanism upgrading the product in repeated cycles of incremental improvement each time is termed iterative development by Larmen (2004). It has several merits. First, the mechanism retains customer enthusiasm in engaging the embedded innovation (Homburg et al. 2000). Second, it keeps internal morale high, as small wins are frequently observed (McCarter et al. 2011). Finally, it supports Tencent's fast-second strategy of following competitors into a market, but entering with better functionalities and consistent upgrades (Markides and Geroski 2005). However, despite the merits, resource constraints may alter its final outcomes. To this end,

inter-team exchanges are institutionalized. This exchange, while preventing Tencent from coming to a state of isolated operation, where each individual only cares about his job and ignores that of others (Miner 1987), also creates a resilient resource network that mobilizes resources to cope with irregular demands (Reinmoeller and Van Baardwijk 2005). In making do with what is at hand, this resilient network supports bricolage, which is a highly desirable practice in the context of rapid changes (Baker and Nelson 2005).

After the iteration between design and execution, reflection is conducted in order to renew and reuse existing knowledge. Unlike the typical reflection mechanisms such as knowledge creation (Kusunoki et al. 1998) and socialization (Alavi and Leidner 2001), which focus on the past, Tencent's reflection is carried out through a paradoxical practice of reflection as refreshing, which focuses on the future relevance. We conceptualize this pragmatic and forward-looking reflection mechanism as situated introspection. This mechanism is in line with the turbulent context, where the knowledge base alone does not guarantee competitive advantage, but the ability to transform it in relation to new situations does (Carlile 2004). For this mechanism to work, two conditions must be met. First, new trends should be the focus of introspection, which is often overly drawn into historical anecdotes (Lichtenthaler 2009). To this end, Tencent regularly rotates its employees so that the teams are dynamic and diversified. Underlying these teams is a fluid knowledge system that circulates knowledge and updates it around the latest trends (Schreyögg and Sydow 2010). Second, the organization needs a keen observation on the latest trends. This is another reason why Tencent conducts search and reflection in tandem.

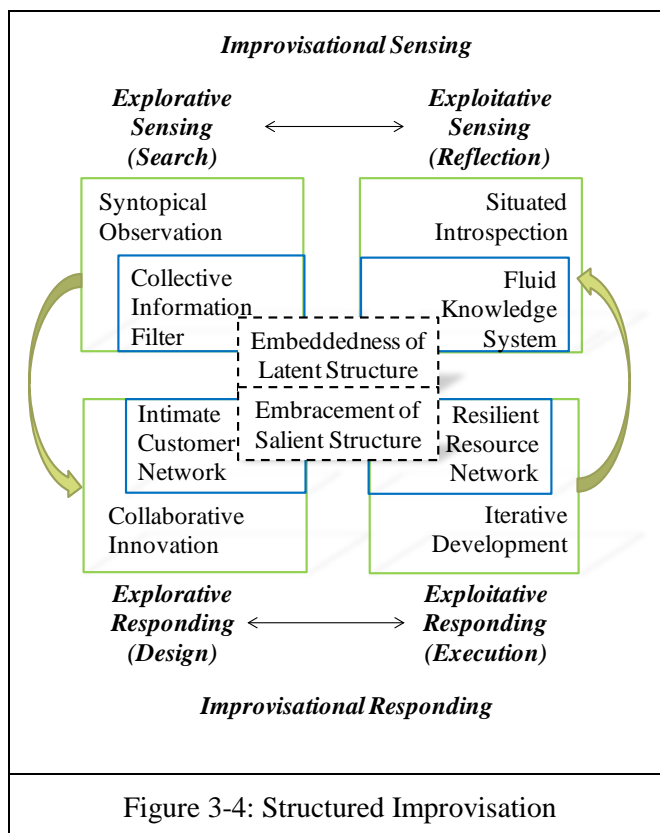
These four mechanisms enable two types of improvisation. First, embedded innovation and iterative development enable design and execution to converge materially. This convergence forms an improvisation that focuses on responding. The concept of improvisational responding is in line with the conventional definition, which concerns only

design and execution, but overlooks its sensing aspects (e.g. Moorman and Miner 1998; Orlikowski 1996). Improvisational sensing is observed in Tencent at the convergence between search and reflection, which is enabled by syntopical observation and situated introspection, because this convergence renders the sensing activities occurring without prior designs. Therefore, improvisation, instead of a singular concept, can be a composite one.

An overarching concept is further derived by referring to their commonality: both improvisational sensing and responding resemble a convergence between exploration and exploitation. As far as sensing is concerned, search is explorative, as it gathers new opportunities from the external sources, whereas reflection is exploitative as it draws on existing, internal experience (March 1991). As far as responding is concerned, design is explorative, as it collects new inspirations from external customers, whereas execution is exploitative, as it appropriates existing, internal resources (Tschang 2007). Hence, improvisation can be defined as the material convergence between exploration and exploitation. This new definition aligns improvisation with the concept of ambidextrous capability, defined as an organization's ability to maintain exploitation and exploration simultaneously (Gibson and Birkinshaw 2004; Raisch et al. 2009) This ambidexterity is, in fact, the underlying reason why an organization is able to act without prior design.

While four mechanisms enable the two types of improvisation, to discipline them in or reduce to routines, coordinating structures are needed. The collective information filter, which controls the syntopical observation as an underlying cognitive model, is a latent structure (Aldrich and Herker 1977), as is the fluid knowledge system, which forms an underlying context for the situated introspection. Prior studies have suggested that intangible structures work better than tangible ones in tasks that have a less defined scope, such as sensing (Kirsch 2004). Embedded within the improvisational sensing, these latent structures are the unique resources that Tencent has accumulated, based on its experience.

The intimate customer network, which controls the embedded innovation through a specific communication channel, is a salient structure (Aldrich and Herker 1977), as is the resilient resource network, which functions as a formal coordinative platform for the iterative development. These salient structures are also consistent with the existing literature, which suggests that tangible structures work better than intangible ones in tasks that have clearly defined scope such as responding (Choudhury and Sabherwal 2003). These salient structures are embraced rather than embedded within the improvisation. Otherwise, the structures might be transformed into an underlying context and lose their clarity (Leidner and Kayworth 2006). Although only embraced rather than embedded, these structures are resources that Tencent have consistently deposited and accumulated. They are very rare in the market.



In summary, these latent and salient structures are important resources that support improvisational routines, and their development constantly improves the routines. Because of their uniqueness and rareness, these improvisational routines are difficult to replicate and the foundation of Tencent's competitive advantage (Barney 1991).

### 3.6. Contributions and Limitations

Our main contribution lies in conducting an exploratory study of Software-based NPD (SNPD), a critical challenge of software vendors, which has yet been well researched in



the IS literature. Through the theoretical lens of improvisation and the case study on Tencent, we derive a process model of structured improvisation that consists of two types of improvisation and two types of coordinating structures. Future IS researchers may use this model as an explorative framework to further our understandings on SNPD. This study also complements the NPD literature by offering an improvised paradigm, which is freshening as compared to the conventional planning-based paradigm, and also answers the call for more NPD studies towards the turbulent context (Brown and Eisenhardt 1995).

SNPD also provides a fruitful research context for improvisation. Improvisation in prior research contexts is often observed as ad-hoc individual activities (e.g. Bigley and Roberts 2001; Miner et al. 2001), but improvisation in SNPD is a regular and prominent behavior at both the group and organization level, thanks to its high turbulent context. This context offers a rich empirical ground to dissect improvisation. First, four mechanisms and the way in which they interact are uncovered, which answers the call for what improvisation contains and how it is developed (Miner et al. 2001).

Second, two coordinative structures are unveiled which answer the call for what resources are needed for improvisation (Moorman and Miner 1998) and how to improve improvisation (Miner et al. 2001). All answers are synthesized into a process model, which further complements the existing conceptual (Barrett 1998) and variance views on improvisation (Eisenhardt and Tabrizi 1995). Moreover, by breaking improvisation into sensing and responding, the study extends the concept from the polarized focus on responding to a more balanced view. The overarching definition that merges the two further abstracts the concept from an ambidextrous perspective, which is an important contributor to this spontaneous behavior.

For practitioners, the study also provides significant insights. First, it provides a comprehensive and empirically supported framework to guide improvised SNPD. Since the

framework includes critical mechanisms, structures and clear causal relationships, it provides specific and actionable prescriptions for software product managers. The study also possesses practical implications beyond SNPD. For example, managers who strive to use improvisation as an effective means of coping with turbulent conditions in organizational transformation (Orlikowski 1996) and crisis response (Mendonca et al. 2001) can also gain practical insights from our model.

Despite contributions, the findings must be considered in light of their limitations, which also point to important future research directions. First, while thorough analyses have been conducted across major phases of SNPD, attention has mainly been placed upon internal developers. External developers, such as 3<sup>rd</sup> party service providers and open source communities, have not been studied herein. These stakeholders in fact play important roles in SNPD, and studies integrating both internal and external developers will be a fruitful future research arena. Second, Tencent as an Internet company is an extreme case in terms of environmental turbulence. Although this makes the theoretical outputs more salient (Eisenhardt 1989a), it overlooks cases of moderate turbulence such as the enterprise software vendors, the practice of which may follow a moderate improvisation. Future studies may explore this area and conduct comparative analyses between a highly turbulent SNPD context and a moderate one. In this way, we can form a more complete picture of SNPD. While both biases may be shortcomings in this paper, it must be noted that our findings are supported by the existing literature on NPD and improvisation. This suggests the analytical generalizability of our findings, and their usefulness for theory buildings (Lee and Baskerville 2003).

## **CHAPTER 4. STUDY III: BOUNDARY-SPANNING BY DESIGN: TOWARDS ALIGNING BOUNDARY-SPANNING CAPACITY AND STRATEGY IN IT OUTSOURCING<sup>5</sup>**

### **4.1. Motivation**

In today's IT-enabled environment, it has become a competitive necessity for organizations to outsource IT projects to external vendors. These projects not only include support but also core functions (e.g. Lee et al. 2004; Walden 2005). Successful IT Outsourcing (ITO) projects assist organizations in decreasing transaction/production costs (Ang and Straub 1998), accessing advanced technologies (Loh and Venkatraman 1992) and focusing on their strategic competence (Lee et al. 2004). However, in the actual implementation, ITO has also posed a new set of challenges, which are attributed to the fact that ITO projects are complex by nature, and entangled with various problems, such as opportunistic behavior (Argyres et al. 2007), technical volatility (Willcocks et al. 1995), stakeholder conflicts (Gopal and Gosain 2009) and boundaries (Levina and Vaast 2008). These issues are so acute that they have often been found to be responsible for the failure of many ITO projects. According to a survey conducted by Deloitte, 70% of ITO clients perceived their projects as unsatisfactory (Dongo 2008). Consistently, vendors were not happy either. A recent study revealed that one third of ITO vendors expressed intentions to terminate their contracts prematurely (Heng et al. 2009).

By virtue of its strategic significance and implementation challenges, ITO project management has attracted considerable attention from researchers. This research stream has provided invaluable insights, especially on how to limit opportunistic behavior (e.g. Argyres

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<sup>5</sup> The following manuscript has been accepted as forthcoming in IEEE Transactions on Engineering Management. The manuscript was submitted on 31<sup>st</sup> October 2010 and with the author for 18 months and 3 revisions. An earlier version of this manuscript was presented at the International Conference on Information Systems (ICIS) 2010 and won the 1<sup>st</sup> runner-up best paper award.

et al. 2007; Gopal et al. 2003), constrain technical volatility (e.g. Goo et al. 2009; Lee and Kim 1999), and reconcile stakeholder conflicts (e.g. Carson 2007; Miranda and Kavan 2005). However, it is enigmatic that projects with refrained opportunistic behavior, stabilized technical environments, and aligned stakeholder interests can still fail dramatically. A common characteristic often shared by these projects is that clients and vendors fail to understand each other properly or collaborate effectively (e.g. Couto et al. 2006; Cowley 2004). The popular phrases, one from clients: *"They simply don't understand our business"*(Cowley 2004) and another from vendors: *"They just don't appreciate our methodology"*(Levina and Vaast 2005), best express this characteristic.

This collaborative concern is mainly caused by the existence of numerous boundaries between clients and vendors, such as knowledge (Levina and Vaast 2008) and identity boundaries (Cramton 2001), which prevent the creation of effective communication and mutual understanding (Pan et al. 2007a). In addition, the boundary issue has been exacerbated since the emergence of offshore sourcing, where ITO tasks are contracted to low-cost nations, such as India, China, and Russia (Couto et al. 2006). In this new arrangement, because vendors and clients are located in different countries or even different continents, national boundaries, such as language and culture, are additionally factored in (Levina and Vaast 2008; Rai et al. 2009).

Given the widely recognized boundary concerns in ITO projects, boundary spanning has become an effective mechanism that is often adopted by both clients and vendors (e.g. Levina and Kane 2009; Levina and Vaast 2005). However, the mastery of this mechanism is challenging, since it is entangled with both contractual and relational expectations. First, effective boundary spanning is often expected by both vendors and clients as an important contractual obligation (Koh et al. 2004). For instance, dedicated and qualified staff must be assigned to transfer knowledge and monitor the development process between the two parties

(Gopal and Gosain 2009; Mayasandra et al. 2010). Second, effective boundary spanning also needs to bear the responsibility of facilitating social bonding and building trust (Lee and Kim 1999). For example, project managers representing clients and vendors are expected to visit each other often and learn to adapt to each other's cultures (Mayasandra et al. 2010; Rai et al. 2009).

In spite of the attendant significance and challenges, research on boundary spanning has been limited in the ITO context. Within the limited research that has taken place, scholars have focused mainly on the client perspective, seeking to understand how clients span boundaries with vendors (e.g. Levina and Kane 2009; Levina and Vaast 2008), whereas how vendors span boundaries with clients has only been briefly covered (Levina and Vaast 2008, p.323) but not systemically analyzed. In fact, vendor perspective is as critical as that of the client, if not more so. First, vendors are often responsible for initiating boundary spanning (Whitten and Leidner 2006) and second, the final effectiveness of boundary spanning often hinges on the vendor rather than the client (Levina and Kane 2009). In summary, without a clear understanding of how vendors span boundaries, the collaboration issue can hardly be alleviated. Our research aims to bridge this gap. We take the case study methodology and compare boundary spanning across two ITO vendors, which are chosen based on their merits in boundary spanning.

The main part of this paper is organized as follows. First, we review the literature on IT outsourcing and boundary spanning: the former review assists us in understanding the value of boundary spanning in the ITO context, and the latter assists us in forming a theoretical lens, which guides the subsequent data collection and analysis. It should be noted that although boundary spanning is insufficiently studied in the ITO research domain, it has attracted much attention and generated rich findings in the domain of general management. These findings, though not specifically targeted at ITO projects, are sufficiently relevant to

constitute a sound theoretical lens. After the literature review, we present our approach to data collection and analysis. This is followed by a discussion, which uncovers two models on how vendors span boundaries. Finally, we conclude the study by drawing theoretical and practical implications.

## **4.2. Literature Review**

### **4.2.1. Boundary Spanning in IT Outsourcing**

The fundamental reason for the emergence of boundaries, as suggested by the ‘theory of practice’, is the existence and entrenchment of different practices (Bourdieu and Wacquant 1992). In ITO projects, since clients and vendors come from different industry backgrounds and possess distinctive practices, boundaries are prevalent (Mayasandra et al. 2010). For example, in the second case of Levina and Vaast (2005), the client is a highly recognized publisher, and the vendor is a startup web-design house. A deep knowledge boundary subsequently emerges because the publishing and web-designing practices have accumulated their own expertise, which is codified based on assumptions that only insiders take for granted, and is articulated in a language that only insiders understand (Carlile 2004; Pan et al. 2007a).

In addition to the knowledge boundary, which is cognitively driven, clients and vendors may also face affectively driven boundaries (Hinds and Mortensen 2005). For example, in the same case, the client perceives itself as a hierarchically structured and disciplinarily oriented organization, whereas the vendor views itself as an organically structured and creatively oriented organization. This subsequently leads to the emergence of identity boundaries. Both knowledge and identity boundaries can be categorized as organizational boundaries, since they are rooted in different organizational contexts in which clients and vendors operate (Bechky 2003). The other category in the ITO context is the national boundaries, which are attributed to the different national contexts that clients and vendors operate in. This being the case, language and cultural differences create boundaries

that often require an even longer period to bridge as compared to organizational boundaries (Levina and Vaast 2008; Rai et al. 2009).

However, despite their negative implications for collaboration, boundaries are also a necessary element for maintaining collaboration, since they prevent clients and vendors from being affected by the other and maintain operational efficiency inside the boundaries (Carlile 2002). For instance, referring again to the same case from Levina and Vaast (2005), should no boundaries exist between the client and the vendor, the former's publishing practice and the latter's web-designing practice may be intertwined and negatively affected by the other. Therefore, boundary dissolution, the highly decorated mechanism in the 'boundaryless organization' discourse (Ashkenas et al. 1995), is not applicable to the ITO relationship.

Boundary spanning, on the other hand, by preserving existing boundaries while creating a joint field, is a sounder and more relevant approach (Carlile 2002; Carlile 2004). For example, clients find it effective to designate middle managers to represent them and work with offshore counterparts. In this way, the core operations of the clients remain unaffected within their own boundaries. These middle managers are sometimes immigrants from popular offshore countries such as India, China and Russia, who hold current positions in the US, Japan or Western Europe. They have no problem in speaking the local language and understanding the local culture (Levina and Kane 2009). However, the findings in this context are mainly derived from the client perspective, while vendors' practice in boundary spanning has only been briefly covered, but not systematically studied. Next, we review the boundary-spanning literature to develop a theoretical lens that can help bridge the gap.

#### **4.2.2. Boundary Spanner and Boundary Spanning Strategy**

Boundary spanning, by definition, is a collection of externally oriented activities embracing important external stakeholders. These activities include managing requirement changes, negotiating project scopes and acquiring key resources (Ancona 1990) (see

Appendix 5-10 for a summary of the key concepts). Although boundary spanning has not attracted much attention in the ITO literature, it has been well researched in the management literature for over 40 years (e.g. Allen and Cohen 1969; Rosenkopf and Nerkar 2001). We collected in total 33 articles from the leading management journals, using keywords such as “*boundary spanning*”, “*boundary*”, “*boundary management*” and “*boundary integration*”. Based on our in-depth analysis, prior studies may largely be categorized into two streams: individual boundary spanners and organizational boundary-spanning strategies. Both streams are highly relevant to vendors’ effectiveness in spanning boundaries with clients. For example, to span boundaries successfully, vendors ought to possess capable individuals to take on the boundary-spanner role and devise effective strategies that assign the right individual to the right position (Ancona and Caldwell 1992).

The research on individual boundary spanners, mainly constituted by earlier studies, investigates who are the individuals that carry out the boundary-spanner role and examines what skills they possess (e.g. Tushman and Scanlan 1981a; Tushman and Scanlan 1981b) A **boundary spanner**, according to Tushman and Scanlan (1981a), refers to an individual who gathers information externally and disseminates it internally. This individual may either be designated or emerge from practice. However, designated individuals are not always effective because they sometimes fail to span boundaries in practice (Levina and Vaast 2005). Indeed, the boundary-spanner role requires certain skills that not everyone possesses. Individuals with these skills but who are not designated can still emerge as boundary spanners. Accordingly, what are the skills required for an individual to span boundaries? Learning from Tushman and Scanlan (1981b), such an individual must be both an internal and external communication star. To become an internal star, the individual needs to obtain strong technical skills, so that he will be frequently consulted by internal members as to work related matters (Allen and Cohen 1969). To become an external star, the individual needs to



possess strong communication skills, so that he can acquire external requests and respond to them skillfully (Tushman and Scanlan 1981a).

Employees with both technical and communication skills are highly relevant to the concept of **ambidextrous employees**, originating from ambidexterity research. The word ambidexterity is derived from its original reference as the ability of humans to use both hands equally. As a metaphor in the organizational context, the concept refers to organizations' ability to balance strategic exploration and exploitation simultaneously (e.g. Cao et al. 2009; O'Reilly and Tushman 2004). However, this concept, which has gained significant momentum recently, is not only limited to the organizational level, but also extended to team and individual levels (Lavie et al. 2010). Research at the team level is interested in project management that balances operational efficiency and flexibility (e.g. Adler et al. 1999; Bigley and Roberts 2001). Research at the individual level, meanwhile, is interested in employees, who possess both domain expertise and connection with the environment (e.g. Birkinshaw and Gibson 2004; Markides 2007).

These employees are then referred to as ambidextrous employees, and are likened to individuals with both technical and communication skills: a) domain expertise is similar to technical skills, since the two concepts can be and are often used interchangeably (e.g. Tushman and Scanlan 1981a; Tushman and Scanlan 1981b); b) environmental connection is also similar to communication skills, since the former is often recognized as a natural manifestation of the latter (Tushman and Scanlan 1981a). On the other hand, individuals who polarize towards either technical or communication skills are often referred to as **polarized employees** (Cao et al. 2010). Polarization does not imply being inferior. In fact, polarized workforce has its own advantages. For example, since the practices for developing one skill set are often homogeneous, focusing on one will extensively increase the

efficiency in knowledge development, and prevent knowledge accumulation from being disrupted by other forms of practice (Carlile 2002).

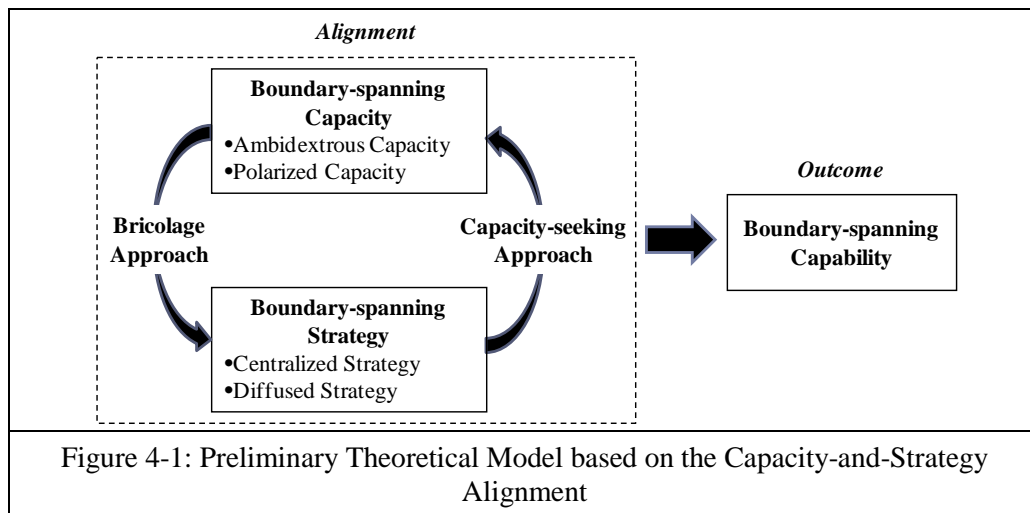
While earlier research on boundary spanning mainly centers on individuals, recent research starts to focus on organizations, and aspires to investigate strategies that organizations adopt to manage their external environment and to examine the effectiveness of these strategies (e.g. Ancona 1990; Ancona and Caldwell 1992). **Boundary-spanning strategy**, according to Ancona and Caldwell (Ancona and Caldwell 1992), refers to the patterns of externally oriented activities that an organization demonstrates over a period of time. Prior studies have examined the strategy from three different perspectives: orientation (e.g. Ancona 1990; Ancona and Caldwell 1992), content (e.g. Levina and Vaast 2006; Schultze and Orlikowski 2004) and structure (e.g. Marrone et al. 2007; Tushman 1977). Among these, the structure perspective is most critical, since boundary-spanning activities are by nature implemented through organizational structures (Leifer and Delbecq 1978; Leifer and Huber 1977) and structures have to be laid out first before the orientation and content can be built upon.

From the structure perspective, strategies can be identified as either centralized or diffused. In the **centralized strategy**, only selected individuals are responsible for external communication, and all the communication activities are centrally controlled by these individuals. This arrangement increases communication accuracy, and reduces communication errors (Allen et al. 1979; Tushman 1977). On the contrary, in the **diffused strategy**, a large proportion of team members, sometimes even the entire team, is involved in external communication. This arrangement unloads the heavy pressure on individual spanners, and creates more channels for absorbing valuable information from the external environment (Friedman and Podolny 1992; Marrone et al. 2007).

Despite the significance of findings from both streams of literature, researchers have limited discussion on their interactions. In fact, these two elements are so closely related that one cannot take effect without the support of the other. For example, individuals who are capable of spanning the boundary may not work effectively if they are not guided by a suitable strategy, and boundary-spanning strategies may not take effect properly if the implementation is not supported by a group of qualified individuals. Hence, instead of maintaining that individual boundary spanners and organizations' boundary-spanning strategies are important determinants of successful boundary spanning, it is more accurate to state that the alignment of the two is the very determinant. As a result, we adopt this alignment as our theoretical lens. To bridge the level difference between the individual spanners and the organizational strategies, we introduce a new concept of **boundary-spanning capacity**, which is defined as the sum of every individual's technical and communication skills. This capacity reflects an organization's potential in boundary spanning. The theoretical lens is then developed into an alignment between the capacity and the strategy. From there, we derive our research question: *how do ITO vendors align boundary-spanning capacity and boundary-spanning strategy?*

As suggested by the Resource-based View (RBV), the alignment of capacity and strategy can bring forth a set of business processes that form a particular organizational capability (Barney 1991; Montealegre 2002) and if the alignment is constantly evolving, the capability can be seen as a dynamic one (Eisenhardt and Martin 2000; Teece et al. 1997). In the boundary-spanning context, the alignment of boundary-spanning capacity and strategy, as we postulate, may result in business processes that bridge the internal and external boundaries. These processes then form a boundary-spanning capability (see Figure 4-1). Study on this capability has been limited, although the concept has been implied in several contexts, such

as the discussion on information-processing capability (Dollinger 1984) and interest alignment capability (Gottschalg and Zollo 2007).



Another important discovery of the RBV is that there are two approaches to achieve alignment: some organizations choose to align the strategy towards the existing capacity, so that the new strategy can deploy the existing capacity and enable it to reach its full potential (e.g. Pan et al. 2007b; Pan et al. 2006), while others choose to align the capacity towards the strategy so that the new capacity can best support the existing strategic direction and realize the strategy to its full extent (e.g. Montealegre 2002; Teece et al. 1997). Since the first approach keeps the existing capacity intact and makes the best of what is at hand, it is in line with the concept of **bricolage**, which is defined as deploying moderate resources at hand to overcome constraints (Baker and Nelson 2005; Levi-Strauss 1966). Since the second approach seeks new capacity to fulfill the strategic aspiration, it is in line with the concept of **capacity-seeking**, which is defined as acquiring advanced resources to overcome constraints (Montealegre 2002; Teece et al. 1997). The bricolage approach is often seen in organizations that have limited resources for developing advanced capacities (e.g. Baker and Nelson 2005) or organizations whose existing capacities are so heavily embedded that changes to them are difficult (e.g. Pan et al. 2007a; Pan et al. 2006). The capacity-seeking approach, on the other

hand, is often seen in organizations that have rich resources and at the same time, possess the opportunity to develop a capacity from a clean slate (e.g. Montealegre 2002).

#### **4.3. Methodology**

We chose the case study as our research methodology for two reasons. First, the research question is based on ‘how’, and is thus better answered through inductive methods (Walsham 1995). Second, since the study aims to break new theoretical ground (e.g. boundary spanning from the ITO vendor perspective), a case study is more effective, because of its strength in exploring new conceptual arguments (Siggelkow 2007). For the purpose of case selection, three criteria were identified: a) the ITO vendors should engage in intensive boundary-spanning activities so that the theoretical phenomenon is significant; b) the ITO vendors should have received positive feedback from clients about their inter-organizational collaboration so that vendors’ boundary spanning is likely to be effective; c) top management should be willing to support a detailed case study so that rich and embedded insights can be gained. Four ITO vendors were shortlisted on the basis of the first two criteria, but in the process of access negotiation, two of these were eliminated because their top management failed to grant us sufficient access. Based on prior experience, when top management support is in question, data quality can be severely compromised.

The remaining two vendors are: a) Neusoft, one of the largest domestic IT service providers in China; b) SAP China, a local subsidiary of SAP, one of the largest international IT service providers. Both are renowned organizations in the industry and together, they make comparative analyses possible (e.g. Pan et al. 2012). Both organizations have a large ITO center in the Chinese city of Dalian to handle their ITO projects from Japan, which is the second largest ITO market in the world after the US (Oshri et al. 2008). Dalian is often known as the ‘Bangalore of China’, given the fact that while western companies have

typically chosen Bangalore, Japanese companies have turned to Dalian on account of the geographical closeness and its large Japanese-speaking population (Oshri et al. 2008).

A case study generally comprises two major tasks: data collection and data analysis. Unlike the conventional approach, which separates the two tasks, we conducted them in tandem to leverage the flexibility of the case study (Pan and Tan 2011). The study was started in early August 2009 when we obtained access from our gatekeeper, a senior director of SAP China, who is also an alumnus of our school. The senior director, who is well connected in Dalian, then assisted us in sourcing other vendors. Later, a Senior Vice President of Neusoft came on board with great interest, and promised unlimited access to his organization. Two other vendors also indicated some interest, but as mentioned previously, because of the limited access, we chose to exclude them. The entire process of data collection and analysis took six months and could be divided into three main phases (see Table 4-1). Each phase targeted different data sources, which included: a) semi-structured interviews; b) archival data; and c) observation. Multiple data sources increased the validity of the study (Klein and Myers 1999) and to enhance reliability, we prepared a case study protocol, which documents a set of detailed procedures as guidelines and a traceable process as the audit trail (Walsham 1995) (see Appendix 5-11 for an abstract of the protocol).

In Phase 1, archival data was the main data source. This included annual reports, press releases, assorted media articles and anecdotal comments from industry analysts (Staudenmayer et al. 2005). An advantage of studying renowned organizations, like Neusoft and SAP, is that there is an abundance of archival data. The collection was summarized to an equivalent document of approximately 150 pages. It took two months to finish and two research assistants were hired to help with it. Several semi-formal interviews, with the assistance of our local collaborator, were also conducted. The purpose of these interviews was to confirm the archival data and to gather a good overview of the boundary spanning.

Data analysis on the archival and preliminary interview data revealed several themes on boundary spanning, which in combination with relevant literature formed the theoretical lens. The lens was further developed into a preliminary theoretical model (Figure 4-1), used to guide future data collection. The model was not fixed but flexible to incorporate emerging themes from the new case data, the purpose of which is to first verify the preliminary model and refute the irrelevant elements, and then to extend it into a full-fledged one.

In Phase 2, data was collected through an official onsite visit. An interview protocol, part of the case study protocol, was developed to guide this crucial process. It included an introduction of the research goals, resources needed, and a set of interview questions (Staudenmayer et al. 2005). The onsite visit was initiated in early October 2009 and lasted one week. During that period, we were granted full access to the two case organizations. Extensive interviews and observations were conducted to make good use of the full access. In total, 25 unique informants participated in the interview (i.e. 11 from Neusoft and 14 from SAP China). Informants included Top Managers, Middle Managers and Junior Staff (see Appendix 5-12 for the list of interviewees). Each interview lasted from 90 minutes to 2 hours. All interviews were digitally recorded and subsequently transcribed into a 140-page (font size 10pt and single line spacing) document and 30 pages of field notes. Meanwhile, close observations were carried at selected sites, which included development/support stations and training centers. The observations provided us with a live picture and a better understanding of the boundary-spanning practices. Ten videos (with total playtime of approximately 60 minutes) and more than 40 photos were collected during the observations. They were later used to complement the interview data in the analysis.

To minimize the errors of recalling past events, which may give rise to validity and reliability issues, interview questions were designed to be open-ended, covering history, events and a typical workday. The preliminary model played an important role at this stage to

ensure that questions, although open-ended, continued to follow a general direction and a clear structure. Informants were also encouraged to illustrate general observations with specific comments and examples (Staudenmayer et al. 2005). During the interview, five researchers were present: one asked questions while the other four listened, made notes, and asked for clarification if required. This set-up made possible the discussion of each interview in detail, and the comparison of interpretations of different researchers (Holmstrom Olsson 2008). The analysis, which was conducted in parallel with data collection, kept us sensitive to new themes outside the preliminary model. Whenever a new theme emerged from the data, we could quickly redirect questions towards it (Mayasandra et al. 2010). A key feature of the inductive approach, like the case study, is that concepts can emerge from the data, rather than being restricted by *a priori* hypotheses (Strauss and Corbin 1990). However, while the parallel process allowed us to exploit the flexibility of the method, it significantly increased our workload (Pan and Tan 2011). Intensive interviews and observations were conducted daily from 9am to 5pm and analyses, conducted after dinner, lasted until midnight. We did our best to gather as much information as possible in the first visit. Prior experience has informed us that the first visit is always received with the best access.

In Phase 3, data was coded, arranged into identified themes and then integrated into an emergent model, which used the preliminary model as the scaffold and was the early version of the full-fledged model. We followed the selective coding technique (Strauss and Corbin 1990) (see Appendix 5-13 for a sample). However, the data and model may not consistently be merged and when that happened, we went through an iterative process of moving back and forth between data, model and relevant literature, until data could be explained by literature and successfully merged into the emergent model (Walsham 2006). When a new theme emerged, but there was insufficient data to support it, we would conduct follow-up interviews.



To increase the validity and reliability of the findings, the emergent model was presented to a panel of academics and practitioners, whose responsibility was to challenge the underlying logic and data accuracy. The presentation was conducted in four rounds until the panel deemed the model logically sound and was an accurate representation of the reality (Klein and Myers 1999). A summary presentation was also provided to our gatekeepers at both Neusoft and SAP China, who consented to the model and offered their views for minor adjustment. This iteration process of data analysis and data collection took more than four months until the model reached **theoretical saturation**, meaning newly collected data began to be repeated and failed either to dispute the model or to reveal new themes (Eisenhardt 1989a).

Table 4-1: Summary of the Three Phases in Data Collection and Analysis			
Phase	Duration	Tasks	How to Increase Reliability and Validity
1	Two Months	<ul style="list-style-type: none"> <li>✓ Collected archival data and conducted preliminary interviews</li> <li>✓ Analyzed archival/preliminary interview data to construct a theoretical lens and a preliminary theoretical model</li> </ul>	<ul style="list-style-type: none"> <li>✓ Prepared a case study protocol that documents a set of procedures as the guidelines and a traceable process as the audit trail</li> <li>✓ Collected data from multiple sources, e.g. what an informant said needed to be supported by either observations or archival data</li> </ul>
2	One Week	<ul style="list-style-type: none"> <li>✓ Collected data through onsite semi-structured interviews and direct observations</li> <li>✓ Analyzed interviews and observation data on the spot, sensed emergent theoretical themes, and responded by adjusting interview questions</li> </ul>	<ul style="list-style-type: none"> <li>✓ Prepared an interview protocol (i.e. part of the case study protocol) and designed interview questions to be open-ended yet theoretically relevant</li> <li>✓ Set up an interview panel of multiple researchers: one asked questions while the rest took notes and compared interpretations afterwards</li> </ul>
3	Four Months	<ul style="list-style-type: none"> <li>✓ Analyzed all the data and framed it into an emergent model</li> <li>✓ Collected additional data to support emergent themes</li> </ul>	<ul style="list-style-type: none"> <li>✓ Presented the emergent model to academics, practitioners and the gatekeeper</li> <li>✓ Ensured emergent models and final findings were supported by literature</li> </ul>

#### 4.4. Case Description

##### 4.4.1. Neusoft

The company is a leading IT service provider in China, with a staff of 15,000 and 9,000 clients. Less than two decades ago, the company was merely a startup incubated at

Northeast University with fewer than 10 individuals – two university professors and their graduate students. Informed by our literature review on boundary spanning, we focused on two pertinent elements of the case organization: a) the boundary-spanning capacity, which is manifested in the technical and communication skills of Neusoft's workforce; b) the boundary-spanning strategy, which is manifested in Neusoft's communication structure with clients. Two themes then emerged from the data: one concerned the relationship between the two elements, and the other the coevolution between them.

In terms of the relationship, the company has a technical-extreme workforce and a window-communication structure (see Table 4-2). The workforce is the product of its technically focused recruitment and training; hiring of new members is based largely on technical merit and technical training is far richer than the communication training. Moreover, Neusoft also has its own IT Institute, the curriculum of which is purely focused on coding. This technical focus can be seen as a legacy of its earlier establishment as a research laboratory. In fact, the research-lab culture is still deeply cherished by the top managers, many of whom were professors. For example, when designing its new headquarters in 2000, the company chose the campus-style, low-rise buildings in a suburb instead of the high-profile office towers in downtown, which many Chinese ITO vendors were doing as a means of boosting their corporate images. When we first arrived at the site, we indeed mistook the office buildings for a university campus.

The window-communication structure is named after a key role, the Window Project Manager (PM), whose primary task is to collect and disseminate information between clients and Neusoft. In most cases, Window PMs are located at the clients' premises so that they can better understand the clients' needs. As frontline staff members, Window PMs must be equipped with good communication skills. Our direct interviews also confirmed this. From an interesting recorded scene, we noted that whenever a Window PM was present at the

interview, the engineers tended to speak less and thus the Window PM dominated the conversation. Good technical know-how, on the other hand, is also required of these PMs, because they are expected to understand the technical requirements of the clients and communicate these requirements to internal engineers effectively. To this end, Window PMs are in general groomed from the ranks of technical leaders. A further important feature of the window structure is that all communication must and can only go through the Window PM. Engineers are not allowed to communicate with clients directly and clients, on the other hand, have very limited knowledge about the internal engineering team, since the only person they deal with is the Window PM.

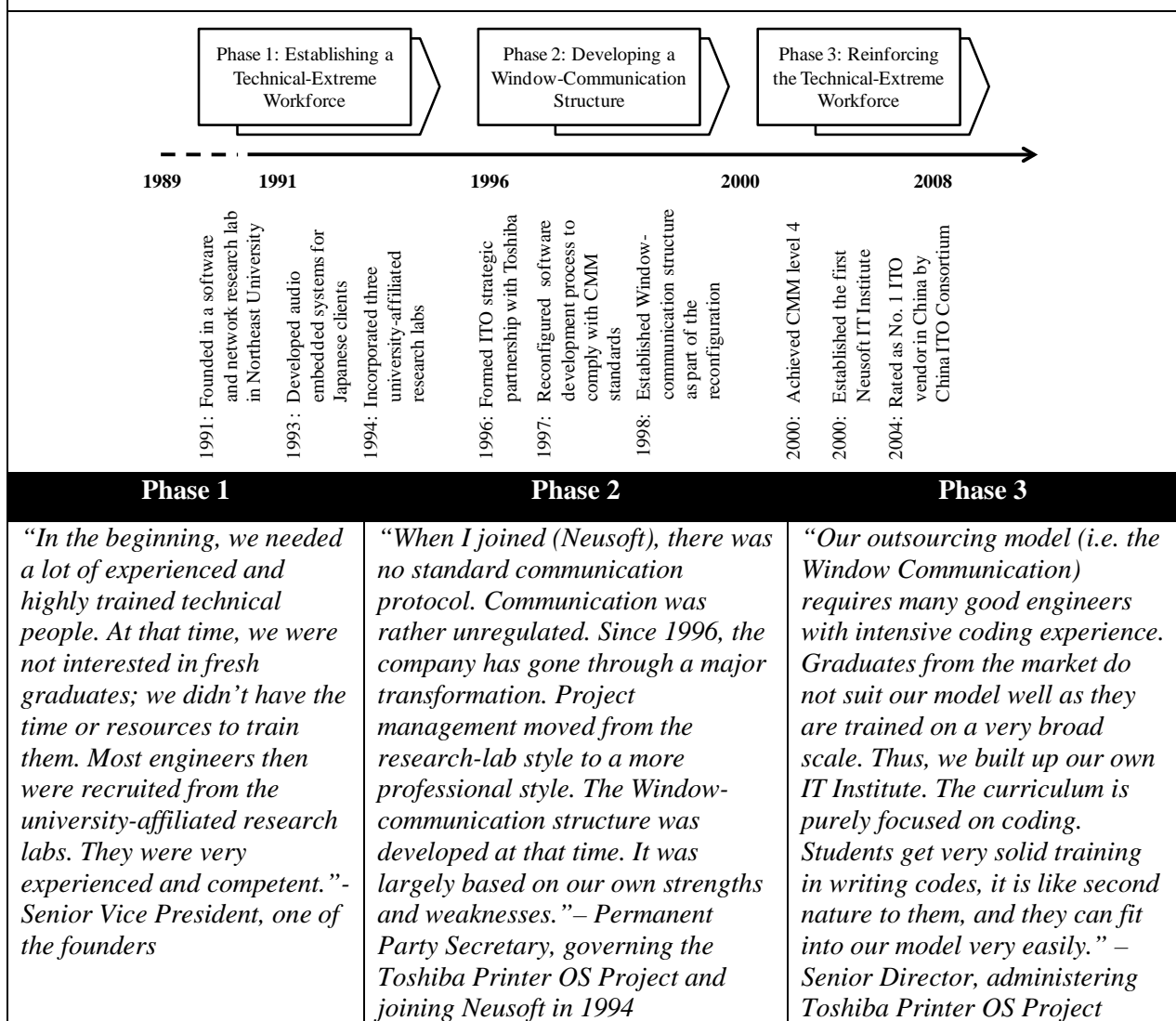
Table 4-2: Relationship between Workforce and Communication Structure at Neusoft	
Technical-Extreme Workforce	
Recruitment emphasizes technical skills but not communication skills	<i>“When we recruit, we don’t expect everyone can speak Japanese. For Neusoft, our primary focus is on technology. We need to make sure the people we hire can program well. Intensive coding experience is highly appreciated.” – Senior Vice President, overseeing the entire Dalian operation</i>
Training emphasizes technical upgrade but not communication upgrade	<i>“We have training courses all year long for our staff to upgrade their skills. They can learn from the very basic programming, such as C, C++, and Java, to those at the more advanced levels, such as enterprise architecture. We also have some communication training, but it is meant for managers who need to meet clients regularly. For the rest, that is not important.” – Senior Director, administering Toshiba printer OS development project</i>
Window-Communication Structure	
Communication is handled by Window PMs only	<i>“Window PMs are the superstars of the team. They have rich experience in technology and are also familiar with the Japanese culture. They have no problem with communication. Sometimes, we hire local Japanese nationals as Window PMs. But those people must also have a rich technical background (as well). To assume this role, the individual must be good at both technology and communication.”– Assistant Director, assisting the senior director to implement strategic decisions</i>
Communication is centrally controlled by Window PMs	<i>“Not everyone in the team is allowed to communicate with the client. Only Window PM can do so. Information circulation, either outbound or inbound, must go through the Window, who will vet the content and make sure it is professional and the presentation is up to Japanese standards. On the other hand, we don’t want clients to see much of the inside. Their contact point should be limited at the Window PM.”-Permanent Party Secretary, governing the Toshiba Printer OS Project</i>

In terms of coevolution, Neusoft’s workforce and communication structure were aligned through three phases (see Table 4-3). In Phase 1, the company’s main concern was to

ramp up its technical capacity. In 1991, most ITO projects were about system development, which was naturally coding intensive. Existing engineers were often unable to cope with the heavy workload and the supply of experienced software engineers was also limited in the market at that time (Deng 2008, p.20). A major breakthrough that resolved this capacity shortfall transpired when three university-affiliated research laboratories were lobbied into joining the company. Powered by experienced researchers from these laboratories, Neusoft soon established an outstanding engineering team, which was deemed the best in the Northeast region. However, in terms of communication, there was no clear structure at that time and communication happens through multiple channels, e.g. translators, project managers or engineers on their own.

In Phase 2, a clear communication structure was established. In 1996, Neusoft started to upgrade its business from providing predominately technology solutions to include end-to-end business solutions. The ITO partnership with Toshiba was an endeavor in this direction. Requested by Toshiba, Neusoft started to reconfigure its development process, which, at that time, largely followed a loose research-lab style and was deemed unfit for developing business solutions. A more standard and professional development style was needed. That was when Neusoft started to pick up the CMM (i.e. Capability Maturity Model). As part of the reconfiguration, the window-communication structure was decided by the management team, after serious consideration of the strengths and weaknesses of the existing workforce. The new structure was warmly welcomed not only by Toshiba but also other clients, who acknowledged the enhanced communication quality delivered through Window PMs.

Table 4-3: Timeline and Events in the Coevolution at Neusoft



In Phase 3, the window-communication structure in turn reinforced the technical focus of the workforce. In 2000, Neusoft achieved CMM Level 4 and as part of the endeavor, the new window-communication structure was institutionalized across all project teams (Deng 2008, p.107). Since the structure made communication irrelevant to most engineers, communication expectations on engineers were further reduced and technical expectations were further raised. This change, coupled with rapid expansion, demanded an army of technically excellent engineers. Although engineering graduates from public schools were in great supply at this phase, they often proved disappointing to Neusoft due to their lack of technical focus and aspirations. To fill this gap, the company established its own IT Institute in 2000, the curriculum of which was focused on coding and not much else. The graduates

from the Institute, as a top manager commented, are ‘tailor-made’ to support the window communication.

#### **4.4.2. SAP China**

SAP is an internationally renowned IT service provider, with 47,000 employees and clients in more than 120 countries. The company has multiple subsidiaries worldwide, each with their own dynamics. This study focuses on the China subsidiary, which was set up in 1997 to support clients in the Asia Pacific and Japan, with the primary focus on Japan. As with the Neusoft case, two themes also emerge from the data. In terms of the relationship between the workforce and communication structure, SAP reflects a very different pattern to that of Neusoft (see Table 4-4). First, its recruitment accords equal emphasis to both technical and communication skills. Therefore, candidates who are technically strong but communicatively challenged will not be considered. Second, its training programs also accord a balanced weight on both technology and communication. As a result, the workforce is strong in both technical know-how and communication. Our direct observation, made through the interviews, also confirmed that, nearly every consultant had a strong technical background (e.g. an engineering related degree), and everyone was able to articulate clearly.

Concerning structure, the company adopts a very open approach. Every individual consultant can communicate with clients directly. In fact, senior consultants are also expected to actively approach clients, even before the client requests. Clients, on the other hand, can communicate with different consultants based on the nature of their issues. For example, a client with a database issue is likely to be attended by a database specialist. Another quality of this open structure is that communication channels are flexible. For example, an issue can be routed to different individuals if collaboration is needed. A client may thus receive an early response from one consultant and a subsequent response from another. However, since everyone is proficient at communication, this arrangement operates smoothly.

Table 4-4: Relationship between Workforce and Communication Structure at SAP China	
Technical-Communication Balanced Workforce	
Recruitment emphasizes both technical and communication skills	<i>“Most of the people we hire tend to, let’s say, have double degrees, one in a technical area and one in Japanese, or they would have worked in Japan for 2, 3 years with a technical degree. The weakest technical hire I would take would be someone who has only majored in Japanese but has maybe worked for 3 years in Japan in a technical role. That is probably the weakest candidate I would consider. Anything else doesn’t work.” – Senior Director, administrating Global Support China Center</i>
Training emphasizes both technical and communication upgrades	<p><i>“We focus on and devote considerable resources to technical training. We occasionally fly over the overseas experts to deliver technical training. We also send consultants overseas to receive (technical) training. Locally, we assign newcomers to a senior consultant as his mentor to constantly groom him/her on the technical aspects” – Support Manager A, administering message services related to CRM</i></p> <p><i>“The company also provides plenty of training on customer interactions. For example, we have a full-time in-house Japanese teacher to deliver language training. She is very familiar with the context we are in, because she used to work for SAP Japan. This relevance is crucial...the company often invites customer interaction experts from Japan to deliver training and everyone also gets opportunities to rotate to the Tokyo office for a while to be immersed into the local culture.” – Support Manager B, administering message services related to Logistic</i></p>
Open-Communication Structure	
Communication is handled by every consultant in the team	<i>“We expect everyone to work closely with our clients and encourage them to jump out of the (internal) boundary and approach clients proactively. ...essentially, clients are not served by the same consultant but by multiple consultants... We trust our employees and in general, after 3-6 months of training, they are presented to the client. But of course, they start with the basic issues.” – Senior Director, administrating Global Support China Center</i>
Communication is circulated among individual consultants	<i>“The company promotes flexible and collaborative team work. For example, if I feel the issue is better explained through face-to-face interaction, I will route the message to the onsite division. If the onsite consultants need advisory support, they can route the message to the advisory division (to ask for help). Essentially, all inputs from different divisions are consolidated in the message so that everyone is on the same page. Eventually, clients may receive a response from any of us, depending on who has the most relevant expertise.” – Consultant A, handling CRM related messages</i>

In terms of coevolution between the workforce and the communication structure, SAP also reflects a very different path from that of Neusoft (see Table 4-5). In Phase 1, the company’s main task was to establish an efficient communication structure. When the China center was first established in 1997, the management team’s major concern was whether this new offshore subsidiary was capable of handling the heavy workload generated by SAP’s complicated product line, ranging from Enterprise Resource Planning Systems (ERPs) used by Fortune 500 to Customer Relationship Management Systems (CRMs) used by Small and

Medium Businesses (SMBs). A message-solving mechanism was then designed to facilitate the communication: each time a user needs support, he is instructed to submit a message, logging the technical components, priorities and symptoms of the issue; the message is then assigned to a consultant with the relevant technical expertise. This mechanism is expected to expedite the communication process by focusing consultants within a set of technical areas and eliminating middlemen.

However, despite good intentions, the mechanism failed to deliver expected outcomes. At the end of Phase 1, only simple issues from SMBs could be handled by the China center, and those from large clients continued to remain in Japan. The reason behind this disappointing result was that the new center lacked sufficiently qualified consultants to operate the mechanism, which demanded a strong technical background and superior communication skills on every consultant. This requirement was further raised by scrupulous Japanese clients with an eye for detail. For example, small bugs are often treated as huge embarrassments and correspondences with grammatical errors are simply ignored. One of the founders summarized these challenges succinctly: *“We are taking the hardest job in IT”*.

In Phase 2, the situation was improved. In 2004, a new senior director was appointed as the head of the China center to speed up this offshore migration. The very first task on his list was to recruit consultants with both technical and communication skills so that the existing message-solving mechanism could take effect. However, the recruitment proved very challenging, because in the job market, individuals with both skill sets were in limited supply, although individuals with one skill set were many. Three strategies were then adopted. First, the company set up its office in two strategic locations (i.e. Dalian and Shanghai) so that it could access talents in both cities and their regional areas. Second, the company sponsored a double-degree program (i.e. one degree in engineering and the other in Japanese) in the Dalian University of Technology, the best university in Dalian. The sponsorship allowed SAP

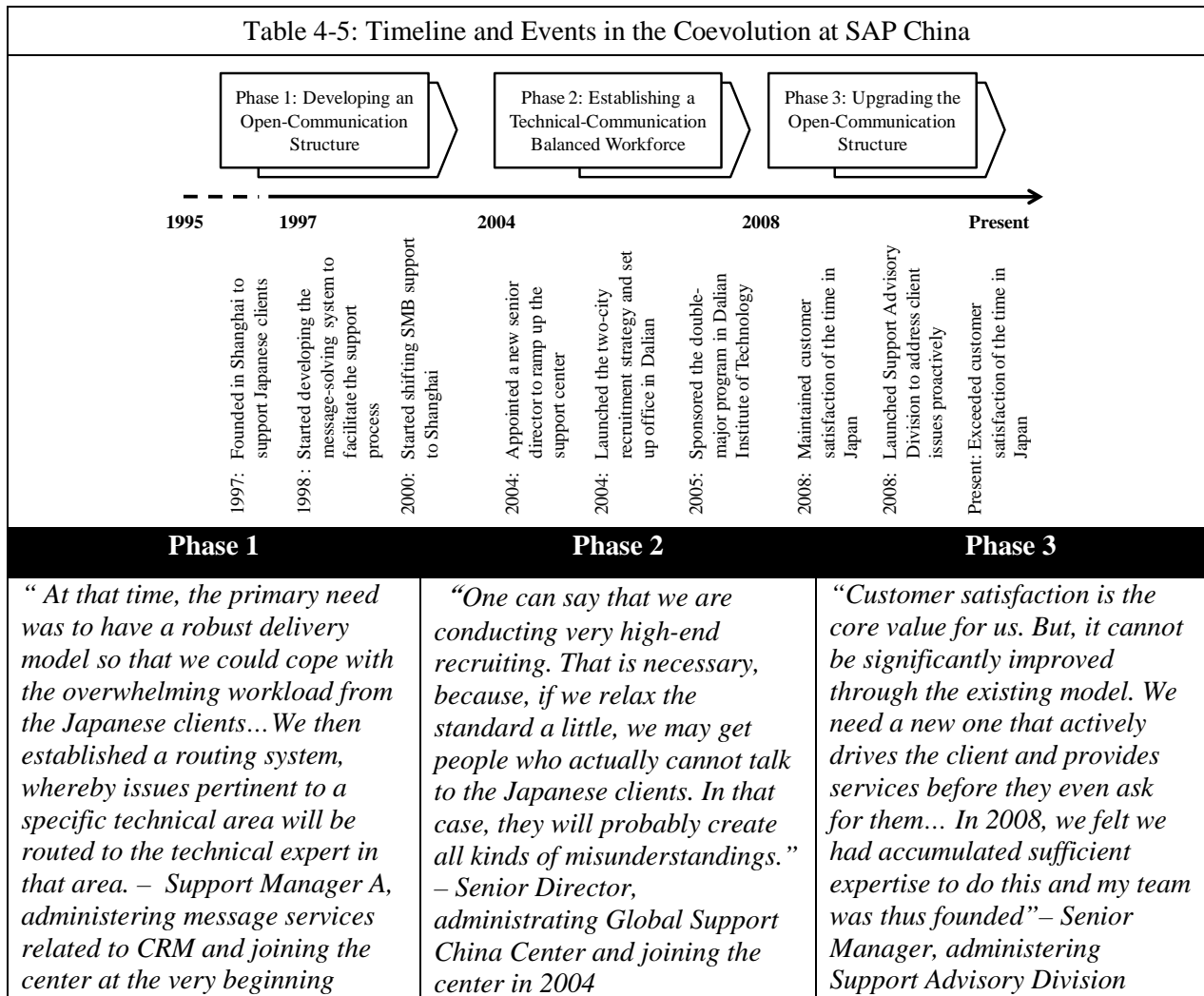


to recruit those students for internship. Under normal circumstances, many interns would stay after their stints. Indeed, SAP seldom had problems in wooing the best graduates in China, due to its prestigious brand and outstanding training programs. Third, a recruitment campaign was launched in Japan, with the objective of recruiting both Japanese-born engineers, who were looking for exciting opportunities in China, and Chinese immigrants who had worked in Japan for years and intended to return to China.

However, even though the new recruits were of a ‘topnotch’ caliber, they could not become fully productive until going through an intensive training cycle of 20 months to 3 years. At the end of 2008, the China Center had developed a strong workforce. Some consultants were even globally recognized as Subject Matter Experts in their expertise. The potential of the message-solving mechanism was thus fully unleashed: over 800,000 issues were solved in that year and client satisfaction was maintained at the same level as when support was delivered by the local Japanese support team.

In Phase 3, SAP China was ready for more ambitious undertakings. With the outstanding consultants accumulated in the past years, the management team aspired to enhance client satisfaction to a higher level by upgrading the support model. Under the previous model, services were responsive, since they were not rendered until clients logged a message. Under this new model, services could be delivered before clients even requested them. This proactive model was carried out by the establishment of a new division in 2008, called the Support Advisory Division (SAD), which proactively assessed client systems and pre-empted issues. Since the assessment was often carried out via conference calls, during which clients were invited to share concerns about their systems, consultants were required to possess excellent communication skills. Rich technical knowledge was also expected so that consultants could quickly identify the issue, and offer prompt responses. In general, clients would expect some form of useful feedback right after investing their time in sharing. To this

end, SAD consultants were mostly Subject Matter Experts, elite of the center. This new initiative was received by many positive responses from clients. A follow-up feedback survey showed that client satisfaction had reached a new level, exceeding that of the time when support was provided by the local Japanese. This was a remarkable achievement that few ITO vendors could equal.



#### 4.5. Discussion

To recall the research question, this study aspires to uncover how vendors align boundary-spanning capacity and strategy. By progressing back and forth between data and literature, we inductively derive two models that answer this question: the first model concerns the alignment forms and the second concerns the alignment paths. Given that the

two models are inductively derived from empirical data, we next provide an explanation of how they are corroborated by the existing literature.

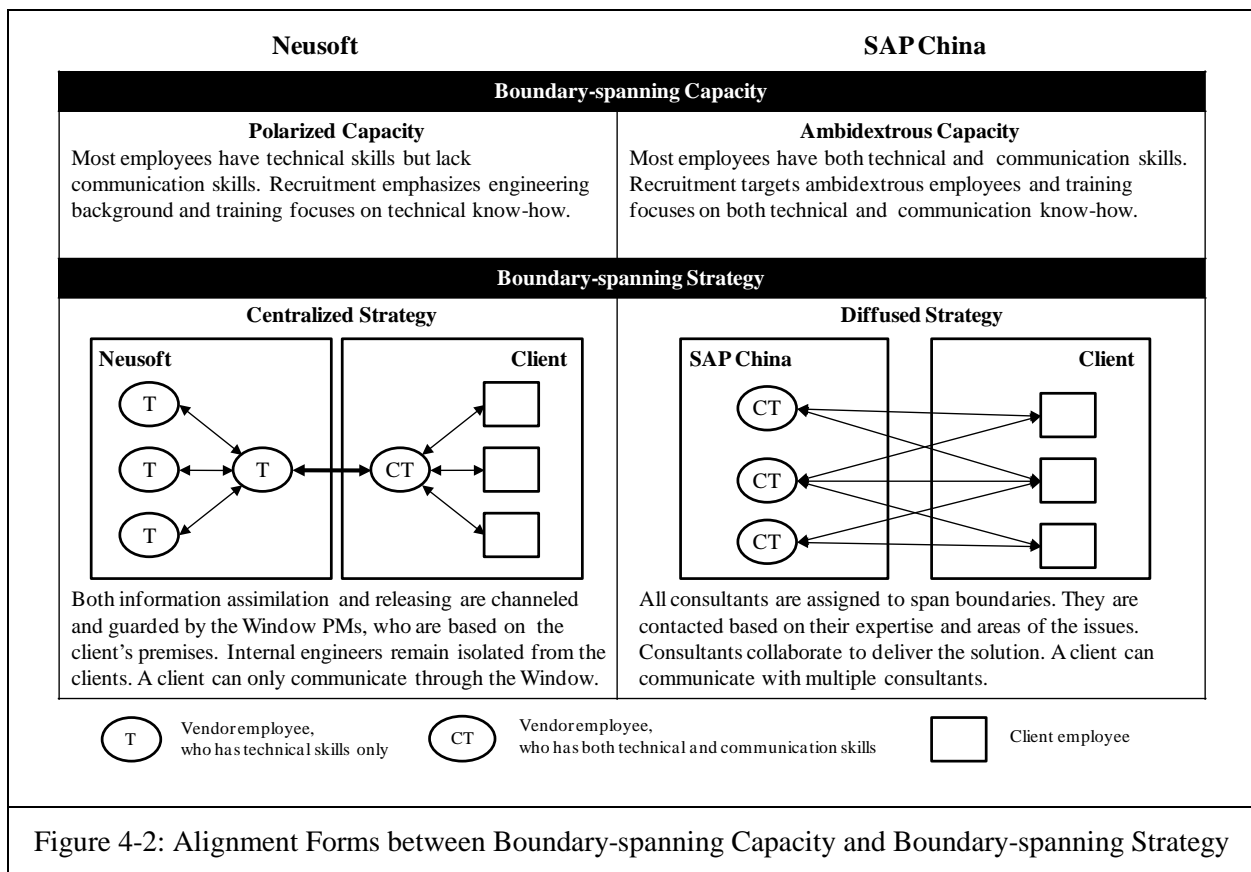
#### 4.5.1. Alignment Forms

The two organizations adopt two distinct alignment forms (see Figure 4-2). In Neusoft, the boundary-spanning capacity features an extreme tendency towards technology, as most employees possess strong technical skills, but their communication skills are limited. Drawing on the concept of polarization (Cao et al. 2010; Jansen et al. 2009), we conceptualize this capacity as a **polarized boundary-spanning capacity**. This capacity is not uncommon among technology oriented ITO vendors, which rely heavily on technical excellence (e.g. Gopal and Gosain 2009; Rosenkopf and Nerkar 2001). In SAP China, the capacity, on the other hand, features a balanced combination, since every employee has both commendable technical and communication skills. Drawing on the concept of ambidexterity (Birkinshaw and Gibson 2004; Markides 2007), we conceptualize this capacity as an **ambidextrous boundary-spanning capacity**. This capacity is popular among business oriented ITO vendors, which rely heavily on consulting excellence (e.g. Allen et al. 1979; Mani et al. 2010). With regard to strategy, Neusoft's strategy is embodied in the window-communication structure. Since external activities are centrally controlled by the Window PMs and are isolated from the internal engineers, the structure can be seen as a **centralized strategy** (Tushman 1977). SAP's strategy, on the other hand, is enacted through the open-communication structure. Since external communication is distributed across all consultants, who collaborate and deliver solutions collectively, the structure can be seen as a **diffused strategy** (Marrone et al. 2007).

Our empirical data reveals that the two capacities and the two strategies are aligned neatly. At one end, Neusoft's centralized strategy successfully hides the weaknesses of its polarized capacity and simultaneously, surfaces its technical strengths. The polarized capacity,

if coordinated by a less centralized strategy, for example the diffused strategy, will not function well, because less competent communicators will be posted directly to the client, causing potential misunderstandings (Levina and Vaast 2005) and portraying a less professional image (Ancona and Caldwell 1992). At the other end, SAP's diffused strategy makes effective use of its ambidextrous capacity and simultaneously, exhibits its full strength. The ambidextrous capacity, if coordinated by a less diffused strategy, for example the centralized strategy, will not function well either, because talented individuals will be deprived of external activities, thus wasting the resources invested in recruiting and training them. Moreover, ambidextrous employees, who are isolated from communication and focused on technology only, may risk losing their ambidextrous status and are thus more likely to leave (Katz and Tushman 1983). As a result of the alignment, both organizations have successfully developed their own **boundary-spanning capabilities**, which are represented by the effective business processes that ease the organizational boundaries (e.g. knowledge and identity boundaries) and national boundaries (e.g. language and cultural boundaries) with their clients.

Although these alignment forms look simple and intuitive, many managers fail to comply with them. For example, in Levina and Vaast's study (2005), the organization in the second case adopted the diffused strategy, when it in fact did not possess enough qualified individuals to do so. Moreover, in Katz and Tushman's work (1983), some organizations stuck with the centralized strategy even when they had many qualified boundary spanners who were kept idle. The results also confirmed that few of those organizations were successful in their boundary spanning. An important reason why managers failed to follow the alignment is that the forms, although intuitive, are often complicated by inextricable boundary-spanning contexts, such as social embeddedness, political dependence and technical volatility (Ancona 1990; Tushman and Scanlan 1981b).



#### 4.5.2. Alignment Paths

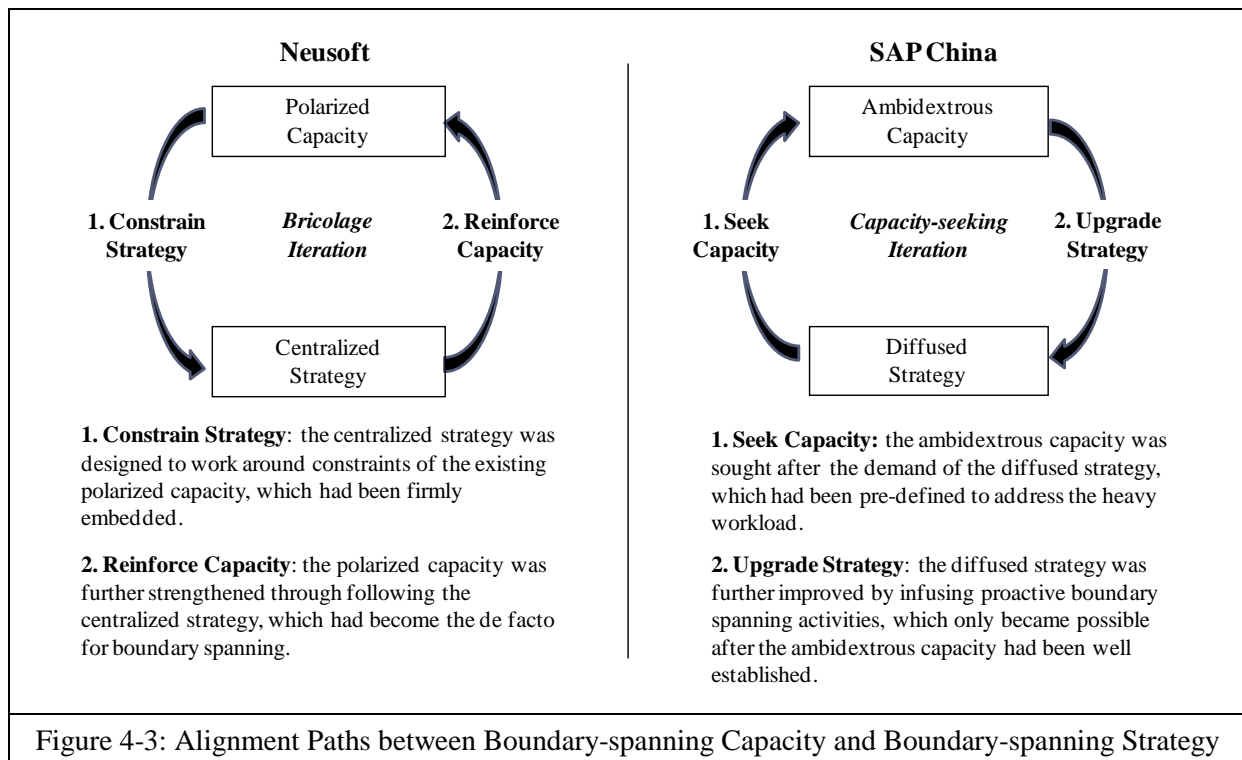
The two organizations also adopted two distinct paths to align their boundary-spanning capacity and strategy (see Figure 4-3). Neusoft built the capacity first and then designed the strategy to work around the capacity. In Phase 1, the company's first priority was to develop the polarized and technically-excellent capacity, which was later embedded into the organization through the strategic acquisitions and the preservation of the research-lab culture. In Phase 2, the company designed the centralized strategy, in order to work around limitations of the polarized capacity. In this strategy design, the polarized capacity is seen as a constraint, because of its limitation in terms of individuals' communication skills (Barney 1991). This constraining effect is in line with the path-dependence discourse, which demands strategy design to respect and make use of the prior capacity or resources (Pan et al. 2006; Pan et al. 2007c). Given that the prior boundary-spanning capacity remained intact in this alignment and alignment was achieved by leveraging the existing capacity at hand, the

underlying logic is in line with the **bricolage** approach (Baker and Nelson 2005; Levi-Strauss 1966).

SAP China, on the other hand, designed the strategy first and built the capacity in accordance to the strategy's requirements. In Phase 1, the company designed the diffused strategy. This process had little consideration for capacity constraints, because a) as a new establishment, the company had limited historical luggage to bear; and b) the management team was confident of acquiring any type of boundary-spanning capacity that was required, through leveraging its brand equity and rich resources (Montealegre 2002). In Phase 2, the company successfully developed its ambidextrous capacity, which was targeted to fulfill the high-standard requirements of the diffused strategy (Montealegre 2002; Teece et al. 1997). Since alignment was achieved by acquiring new capacities, the underlying logic is in line with the **capacity-seeking** approach (Teece et al. 1997).

Capacity seeking and bricolage are often seen as contrasting approaches (Baker and Nelson 2005; Levi-Strauss 1966). Comparatively, capacity seeking is more intuitive and more commonly seen. Many researchers have advocated the need to use a predefined strategy to guide capacity development so that the capacity follows and fulfills the strategic aspirations (e.g. Porter 1991; Tan et al. 2010). Although bricolage covers less extensive scope, it is in fact closer to reality, since few organizations have the opportunity to start a new strategy from a clean slate (e.g. Pan et al. 2006; Pan et al. 2007c) and even fewer have the ability to build the capacity that they desire. For example, a startup like Neusoft in its earlier days is unlikely to obtain ambidextrous capacity, because the company does not possess the reputation or financial resources to attract 'topnotch' talents and then provide them with comprehensive trainings. This is especially evident in the ITO context, where ambidextrous employees are in scarce supply, and this scarcity is further exacerbated by the rising trend of offshore sourcing that demands boundary spanners to communicate in a foreign language

(Hinds and Bailey 2003). When an ITO vendor fails to get what it expects, it needs to settle for whatever is at hand, and adjust its strategy accordingly (Baker and Nelson 2005).



In addition, neither bricolage nor capacity seeking is an unidirectional process (e.g. Baker and Nelson 2005; Montealegre 2002). Both involve a feedback session. In Neusoft, after the company has established the centralized strategy to work around its polarized capacity, the strategy was subsequently used to inform future capacity development, which further reinforced the polarization. This reinforcement is best elaborated through the establishment of Neusoft's own IT Institute, the objective of which is to produce an army of technically-excellent talents. In SAP, after the company had established the ambidextrous capacity to support its diffused strategy, the capacity was subsequently used to improve future boundary-spanning activities, which further upgraded the diffusion. This upgrade is best elaborated in the establishment of the Support Advisory Division (SAD), which advocates proactive engagement. An important issue of the diffused strategy is that although all employees are assigned to engage with clients, no one owns the channel and therefore few act proactively (Marrone et al. 2007). The feedback, together with the earlier session, forms

an iteration, which indicates that boundary spanning is not a static practice but can be a dynamic one (Allen and Cohen 1969; Allen et al. 1979). In this dynamic practice, the boundary-spanning capacity and strategy are not constant, but continuously coevolving. Therefore, boundary-spanning capability as the outcome of this co-evolution can be seen as a **dynamic capability** (Teece et al. 1997).

#### **4.5.3. Boundary-spanning by Design**

Based on the alignment forms and the alignment paths discussed above, we further derive a concept of boundary-spanning **by design**, which is essentially the overarching logic behind the two vendors' boundary-spanning practices. As far as capacities and strategies are concerned, boundary spanning by the two ITO vendors does not happen spontaneously or randomly, but occurs as a result of deliberation and planning (Garud et al. 2006; Mintzberg 1978). In Neusoft, the 'designer' (i.e. the top management) designs and then implements the centralized strategy to work around its polarized capacity. It is a strategy design that follows the bricolage approach (Baker and Nelson 2005; Levi-Strauss 1966). In SAP China, the design is the other way round: the top management designs and then develops the ambidextrous capacity to support its diffused strategy. It is therefore a capacity design that follows the capacity-seeking approach (Tan et al. 2010; Teece et al. 1997).

The by-design concept is also applicable to other ITO vendors. First, it is necessary for vendors to do so. In ITO projects, vendors often suffer from low bargaining power (Levina and Kane 2009) and limited resources (Levina and Vaast 2008). To increase the bargaining power and secure more resources from clients, they need to plan ahead by either implementing enabling strategies that can present the best part of their existing capacities or acquiring sufficient capacities that can support their predefined strategies. If there was no proper design or boundary spanning was left to emerge from the practice, misalignment may transpire easily (e.g. Katz and Tushman 1983; Levina and Vaast 2005) and clients may in



turn perceive vendors as incompetent partners. In addition to the necessity for designing boundary spanning, ITO vendors also have the flexibility to do so. This can be attributed to vendors' flexibility in arranging complementary assets around ITO projects, an ability often absent in clients, given that their assets cannot be easily mobilized around IT projects (Levina and Ross 2003). On a broader scale, this incompetence in designing boundary spanning can be an important reason for clients to outsource IT projects to vendors.

However, this by-design concept is infrequently seen in non-ITO contexts such as partnership alliances (Levina and Vaast 2005) or headquarter-subsidary relationships (Ancona 1990), in which stakeholders in general prefer the strategy or capacity to emerge from real practice (e.g. Ancona 1990; Levina and Vaast 2005). This may be attributed to the fact that boundaries involved in these contexts are more volatile and uncertain as compared to boundaries in the ITO context, which are fundamentally contractually based (Williamson 1981) and clearly scoped (Koh et al. 2004). Given the volatility and uncertainty, it is detrimental to design a strategy or a capacity ahead and then adhere to the design. Rather, it is more beneficial to experiment and let the strategy or capacity emerge from practice (Galbraith and Kazanjian 1988). In summary, vendor boundary spanning in ITO is like dates, where first impressions matter, and they are thus encouraged to develop a proper design to create the best impressions. Boundary spanning in the partnership alliances or headquarter-subsidary, on the other hand, is like a marriage, where mutual experiences matter and stakeholders are advised to accumulate best practice along the way.

## **4.6. Conclusion**

### **4.6.1. Theoretical and Practical Contributions**

By addressing the research question posed at the beginning of the paper, this study makes several significant theoretical contributions. First, it fills an important gap in the ITO literature, which calls for more effective boundary spanning (Couto et al. 2006; Cowley 2004). Previously, research on boundary spanning in ITO has been scarce and has mainly

adopted the client perspective (e.g. Levina and Kane 2009; Levina and Vaast 2008). This study sheds light on the vendor perspective. Through the novel theoretical lens of capacity-strategy alignment, two models are derived, delineating how vendors span boundaries. The first model theorizes two alignment forms, which, if not understood, may cause vendors to be unaware of whether their arrangement is aligned, and in which direction they should be heading. The second model theorizes two alignment paths, which if not understood, may result in vendors lingering on the way to alignment but not being able to reach alignment. From these two models, we further postulate that vendors' boundary spanning occurs by design rather than by emergence (e.g. Ancona 1990; Levina and Vaast 2005). Moreover, this study also supplements research on why organizations outsource IT projects to vendors (e.g. Ang and Straub 1998; Lee et al. 2004) by adding a new factor; in addition to cost efficiency (Ang and Straub 1998) and access to advanced technology (Lee et al. 2004), vendors' flexibility towards designing boundary spanning is also important.

On the other hand, this study also makes significant contributions to boundary spanning literature. First, it integrates the two key boundary-spanning elements (i.e. boundary spanners and boundary-spanning strategies), which although closely related have largely been treated separately in past research. The alignment forms also reconcile two contradictory schools of thought on boundary-spanning strategy: conventional wisdom suggests that the centralized strategy is more effective, because a limited number of boundary spanners can increase communication efficiency and reduce the incidence of errors (e.g. Allen et al. 1979; Tushman 1977), while contemporary wisdom advocates diffused strategy, since a large number of boundary spanners can unload the heavy tension on individuals and create more channels for absorbing valuable information (e.g. Friedman and Podolny 1992; Marrone et al. 2007). Both schools of thought have garnered rich analytical and empirical support, but neither has considered the characteristics of internal capacity. Our findings reveal that there is

no ‘best’ strategy but only a ‘suitable’ strategy. The best strategy for one organization may not apply to another, because their internal boundary-spanning capacities can be different. In addition, the by-design concept further provides a rational perspective to the boundary-spanning research, which has mainly been dominated by the open-system and natural perspectives (Scott 1998). These two perspectives have perceived boundary spanning as either externally shaped activities (e.g. Dollinger 1984; Fennell and Alexander 1987) or socially guided interactions (e.g. Levina and Vaast 2006; Schultze and Orlikowski 2004), but overlooked the perspective that it can be a rational design. Third, the study also theorizes a new concept of boundary-spanning capability as the outcome of capacity-strategy alignment, and further conceptualizes it as a dynamic capability. This capability, although implied in prior studies (e.g. Dollinger 1984; Friedman and Podolny 1992), has yet to be formally conceived or studied.

In terms of practical contributions, this study sheds important light on ITO project management, especially for vendors. One enduring and ever more urgent challenge faced by ITO vendors today is to develop the ability to span boundaries with clients that operate in a different industry, and very often a different country (Whitten and Leidner 2006). Our two by-design models offer a set of practical instructions on how to align boundary-spanning capacities and strategies so as to acquire this capability. In particular, vendors may use alignment forms to assess whether their boundary-spanning capacity and strategy are aligned; if the assessment reveals a misalignment, they can then turn to the alignment paths and choose one as the guideline to work towards alignment. The findings are also insightful for clients. By uncovering the vendor perspective, clients can have a better understanding of how vendors span boundaries with them, and thus collaborate more effectively. For instance, knowing that a vendor uses the centralized strategy, it is not wise for the client to bypass the

broker (e.g. Window PM) to communicate with the internal team directly, because the internal team is not designed for client communication.

#### **4.6.2. Limitations and Future Research**

Despite the theoretical and practical contributions, the current findings must be considered in the light of their limitations, which also point to important directions for future research. First, a common criticism of the case study methodology is the problem of generalizability or external validity (Walsham 2006). It must be acknowledged that statistical generalization is impossible with only two case studies, and the aim of this study is not to establish the validity or statistically test the generalizability of a particular finding (Staudenmayer et al. 2005). However, we assert that our findings are valid, and can be generalized beyond the two organizational contexts, because they are not only grounded in the observed reality of real organizations but are also corroborated by some of the most established work in ITO management and general management literature.

Second, we focused mainly on vendors in this study, and did not seek clients' opinions extensively (with the exception of clients' quotes provided by vendors). Although this study is about the vendor perspective regarding boundary spanning, it would still be helpful to understand how clients perceive vendors' practices. At present, boundary-spanning research that incorporates both client and vendor perspectives is rare. Future research should explore this untapped area. Third, the two cases are two extreme examples in terms of alignment. They are positioned at the two ends of the capacity and strategy continuums. Although this renders the theoretical contrast more significant (Eisenhardt 1989a; Pan et al. 2012), it overlooks situations in the middle of the continuums. Despite that alignment at the two ends makes it a reasonable postulation that the two continuums are also aligned midway, empirical data is still necessary to verify it. Through verifying it, future research can generate a more complete picture of the alignment in boundary spanning.

## **CHAPTER 5. CONCLUSION**

### **5.1. A Typology of Ambidexterity**

To summarize the three studies above, we propose a typology based on synthesized analyses of the four case organizations. The typology is constructed around two dimensions: paradox volatility and variety. Aligning these two dimensions, two processes and mechanisms are adopted. Their combination yields four types of ambidexterity (see Figure 5-1).

#### **5.1.1. China Mobile: Fusional Ambidexterity**

There are two patterns in strategic development like the transformation into ambidexterity: deliberate and emergent (Garud et al. 2006; Mintzberg and Waters 1985). The former follows premeditated steps, whereas the latter allows activities to emerge (for a comparison of deliberate and emergent processes, refer to Table 5-1). Ambidexterity development in China Mobile follows an emergent process: the iterative development cycle characterizes learning what works by testing the water and taking one action at a time in search of viable solutions for the next. This emergent process is suitable and effective in the context of China Mobile's sustainable transformation, which features volatile paradox as few managers have experience in and fewer can predict what is likely to happen (e.g. how customers will respond to differences between Green and incumbent services). There are two reasons behind this efficacy. First, the emergent process affords the organization real options in managing paradoxes and developing ambidexterity (McCarter et al. 2011). It has been empirically testified that organizations committing resources step by step maintain a richer pool of slack resources that can be readily deployed to handle potential upheavals (Voss et al. 2008). Second, emergent processes can also reduce resistances by breaking the transformation into pieces and producing small wins that boost stakeholders' confidence in taking up more advanced changes (McCarter et al. 2011). Otherwise, resistances will be too

formidable to cope with, since dramatic changes are needed in paradox management and ambidexterity development (Garud et al. 2006).

However, the emergent process does not imply that there is no deliberation or plan in the actions. Indeed, few organizations do this in practice, and those who do find it a recipe for chaos (Mintzberg and Waters 1985). To this end, China Mobile designed a GAP blueprint to guide and coordinate the transformation. However, the blueprint is loosely defined with an open target and flexible path, because if deliberated with a specific target and designated path, the blueprint would bring about some forms of rigidity that are counterproductive to handling volatile paradoxes (March 1991). Emergence and deliberation are not mutually exclusive. A company can adopt both and reap the synergies between them. However, they are not equally important: for example, in China Mobile the emergence dominates the process, while the deliberation supports it.

As reviewed in the first study, there are two mechanisms in ambidexterity development: structure (e.g. He and Wong 2004; O'Reilly and Tushman 2004) and culture (e.g. Gibson and Birkinshaw 2004; Jansen et al. 2008). The former stresses specific rules and regulations, whereas the latter focuses on intangible values and norms (for a comparison of culture and structure mechanisms, refer to Table 5-2). In China Mobile's sustainability transformation, the company inculcates a balancing culture as the means of developing ambidexterity. This mechanism fits the high paradox variety of China Mobile, which cuts across and is embedded in multiple stakeholders (e.g. TMT, business units, and partners) and business processes (e.g. strategic decision, operation, and collaboration). There are two reasons for adopting culture as a balancing mechanism. First, organizational culture has a broad influence, spanning across every corner of the business (Detert et al. 2000), which makes it an effective tool for managing paradoxes with a broad coverage. Meanwhile, it has an in-depth influence that can reach the underlying business assumptions and address context

specific paradoxes (Hatch 1993). Moreover, culture can function as a psychological contract for stakeholders to adhere to, especially when they face scenarios that have not been specified (Koh et al. 2004; Mayasandra et al. 2010). This paradox variety has made it impossible for China Mobile to delineate a comprehensive list of rules for every scenario. In this case, a balancing culture can act as an invisible pressure that ensures that all stakeholders comply despite whether the scenarios are dictated. Culture and structure mechanisms are not mutually exclusive either. In China Mobile, structure mechanisms such as the specific business policies are also adopted. However, they are not the dominant, but an enabling factor for ambidextrous culture. From the discussion on the development process and mechanism used by China Mobile, we derive our first proposition:

***Proposition 1:*** *organizations following emergent process and using culture as the balancing mechanism are more likely to achieve ambidexterity in the face of high paradox volatility and variety*

The emergent process and culture mechanism lead to the creation of a *Fusional Ambidexterity*, whereby sustainable and profitable agendas are integrated. Through this integration, if a decision is to be made or an action to be taken, the two agendas will be considered simultaneously. Although this single case is unable to empirically testify that organizations adopting the emergent process and culture mechanism will gain fusional ambidexterity, it is sufficient to inductively derive that the fusional nature is attributed to both emergent process and culture mechanism. The emergent process allows the two paradoxical tasks to gain in-depth understanding toward each other, being it about conflicts or synergies. Following this, the culture mechanism transforms the mutual understandings into daily routines, which in the long run becomes part of the organization's value system (Hatch 1993). As a result of this in-depth mutual understanding and the precipitation of the understanding, the two paradoxical agendas are effectively fused.

Table 5-1: Major Differences between Emergent and Deliberate Processes		
	Emergent Process	Deliberate Process
Dealing with the Paradoxes	Unanticipated contradiction and surprising complementation	Predicted contradiction and expected complementation
Nature of Planning	Devise on the go Trial and Error	Premeditated Limited adaptive learning
Nature of Activities	Flexible to adjust and open for changes	Determination to stick to the plan
Logic of Execution	Evolutionary updates	Revolutionary transformation
Major Vulnerability	Difficulty to entrench incremental success	Deviation from the planned route Settle with the second best
Common Misconception	There are no rules to follow in the execution	A premeditated plan should not be updated or evolved
Analogy	Jazz	Symphony

Table 5-2: Major Differences between Culture and Structure Mechanisms		
	Culture Mechanism	Structure Mechanism
Dealing with the Paradoxes	Embedded into the context Each instance has unique characteristics	Standard format, context independent Each instance is a mere replication of the other, with little difference
Major Medium	Norms and beliefs	Rules and regulations
Range of Effects	Every dimension	Selective dimensions
Logic of Execution	Effectiveness driven	Efficiency driven
Major Vulnerability	Take a long time to form	Lack of flexibility

### 5.1.2. Tencent: Seasonable Ambidexterity

Ambidexterity development in Tencent also follows an emergent process, since the SNPD also characterizes searching on the go and one iteration at a time (Mintzberg and Waters 1985). An emergent approach is adopted because the pertaining paradox is filled with many uncertainties. For example, technical and commercial discontinuities from an innovation are often poorly understood in advance (Lyytinen and Rose 2003). Questions like what technical changes will consumers want in the new product and what new implications it would bring are unknown beforehand (Orlikowski 1996). Therefore, as with China Mobile, Tencent also finds the emergent process more appropriate. In addition, an emergent process also enables the organization to act before everything is fully understood and to respond to an



evolving reality, rather than having to focus on a stable fantasy (Mintzberg and Waters 1985). Indeed, most successful software products were founded with incomplete information, and arrived at designs that were very different from the original intention (Timmons and Spinelli 1999).

Despite the similarity in the process, Tencent demonstrates a very different pattern when coming to the mechanism. Instead of leveraging culture, Tencent develops ambidexterity through the formation of a structure, and more specifically, structured improvisation. This mechanism fits the moderate paradox variety of SNPD. Although facing many uncertainties, Tencent's SNPD follows similar patterns, involving the practice of balance exploitation and exploration. Organizational structure manifested through rules and regulations can then increase the operation efficiency of this standard development (Dalton et al. 1980). On the other hand, the culture mechanism reflected through soft norms and abstract ideologies will leave too much room for interpretation, and results in inefficiency and misunderstandings (Aldrich and Herker 1977; Mayasandra et al. 2010). Similarly, the structure mechanism will lose its merits in a high-variety context such as China Mobile's sustainability transformation as well, because paradoxical activities will then be enforced by the same set of rules, despite various idiosyncrasies. From the analysis of the development process and mechanism used by Tencent, we derive our second proposition:

***Proposition 2:*** *organizations following emergent process and using structure as the balancing mechanism are more likely to achieve ambidexterity in the face of high paradox volatility and moderate paradox variety*

The emergent process and the structure mechanism give rise to a *Spontaneous Ambidexterity*, whereby the balance of exploitation and exploration is achieved via impromptus responses to the turbulent environment. This balance is not achieved at any specific point of time or as an outcome of any serial of actions, but at the midst of continuous

iterations between exploitation and exploration. It is, in poetic language, a balance at the edge of chaos. The emergent process helps Tencent gradually gain and refine best practices, while the structure mechanism institutionalizes these best practices. As a result, the two paradoxical agendas are seamlessly converged and spontaneously balanced.

### **5.1.3. Neusoft: Compartmental Ambidexterity**

Ambidexterity development in Neusoft follows a deliberate process as compared to the emergent process used by China Mobile and Tencent. This process is reflected through a premeditated destination (see the alignment-form model) and a controlled path (see the alignment-path model). It characterizes a determination to get things done as planned, and leaves little room for trial and error (Mintzberg and Waters 1985). This deliberation fits the ITO context. First, client-vendor relationship in ITO is fundamentally contractually based (Williamson 1981) and clearly scoped (Aldrich and Herker 1977). Second, ITO practice has received much attention ever since 1990s from both the industry (e.g. Dongo 2008; Oshri et al. 2008) and the academia (e.g. Loh and Venkatraman 1992; Mani et al. 2010). In face of the moderate volatility, a deliberate roadmap can help organizations acquire resources that fit the exact needs and avoid excessive or insufficient resources at the best (Mani et al. 2010). Further, a deliberate design can guide resource allocation in a consistent manner that brings out their strengths and coordinates activities toward a common goal that minimizes conflicts and maximizes yields (Montealegre 2002).

In terms of mechanism, Neusoft uses structure as a means of developing ambidexterity, as with the case of Tencent. Herein, the structure is reflected through the organizational policy that designates boundary-spanning activities to two organizational compartments, where communication is handled by a small group of ambidextrous employees (i.e. window project managers) and technical delivery is handled by a larger group of polarized employees (i.e. engineers). As a system development vendor, Neusoft's technical

and communication service deliveries are guarded by CMM5 and are standardized with little variation (Choudhury and Sabherwal 2003). The paradoxical relationship between them is also standard. Adhering to the same arguments in Tencent, when the paradox variety is moderate, organizational structure will work better than culture as the ambidexterity development mechanism (Aldrich and Herker 1977; Mayasandra et al. 2010). From the discussion on the development process and mechanism used by Neusoft, we derive our third proposition:

***Proposition 3: organizations following deliberate process and using structure as the balancing mechanism are more likely to achieve ambidexterity in the face of moderate paradox volatility and variety***

The deliberate process and structure mechanism lead to the creation of a *Compartmental Ambidexterity*, whereby the two service tasks are separated into their own compartments and delivered by designated groups of employees. The compartmental nature of this ambidexterity is associated with its development process and mechanism. Through the deliberate process, the organization strives to reconfigure its resources in the best possible shape for managing the paradox. The structure mechanism then implements and institutionalizes this configuration. As a result, the paradoxical agendas are compartmentally separated but overall balanced.

#### **5.1.4. SAP China: Generative Ambidexterity**

Ambidexterity development in SAP China also follows a deliberate process, although SAP designs its capacity to align the strategy, while Neusoft does the opposite. Through a premeditated plan, SAP's recruitment and training follow a clear roadmap and ensure the realization of an ambitious strategy in an accurate and efficient manner (Montealegre 2002). If the design were not decided upfront and strictly enforced, the ambidextrous capacity might not be attainable, since ambidextrous employees are limited in the market, and managers may

end up relaxing the standards and settling with the second best. This deliberation is also attributed to the moderate paradox volatility in the ITO context, which makes it appropriate to set a specific objective and limit learning for a while in order to pursue the objective with determination (Mintzberg and Waters 1984).

In terms of mechanism, SAP China cultivates an ambidextrous culture as a means of managing the paradox. This is reflected in the fact that boundary-spanning practice is guided by values and norms, rather than specific rules. For example, services in SAP China can be delivered by an ad-hoc group of consultants who congregate without specific rules but work as an efficient community under some basic principles (Pan and Leidner 2003). However, this community-like service provision is only effective when supported by a capable workforce (Levina and Vaast 2006), in this case an ambidextrous one. Similar to China Mobile, this culture mechanism fits the company's high paradox variety. As an IT system support vendor, technical and communication excellence are complicated by multiple channels such as hotline support, onsite visits and remote advisory support, and varying degrees of service levels such as technical, development and consulting service. This complexity, which made the seasoned IT director believe the tasks performed by SAP GSC China are the hardest in the industry, creates many variances in the paradoxical relationship. From the analysis on the development process and mechanism used in SAP China, we derive our fourth proposition:

***Proposition 4:*** *organizations following deliberate process and using culture as the balancing mechanism are more likely to achieve ambidexterity in the face of moderate paradox volatility and high paradox variety*

The deliberate process and structure mechanism give rise to a *Generative Ambidexterity*, whereby the evolution between the boundary-spanning capacity and strategy yields new balancing possibilities. First, both boundary-spanning capacity and strategy are

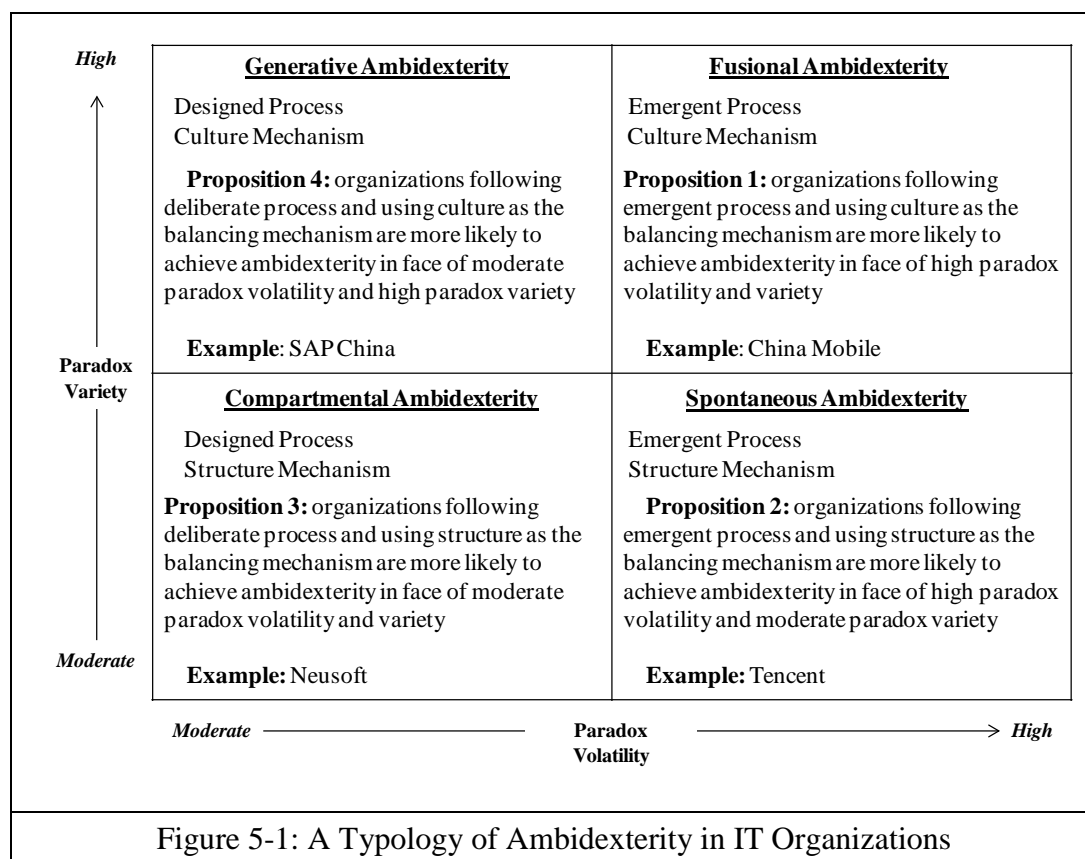
seeded with a generative property (Pavlou and El Sawy 2010). As far as the capacity is concerned, this property is reflected through the workforce's learnability, the ability to take up new skills (Garud et al. 2006). For example, if technical skills are not on a par with communication, the workforce can regain balance through more technical trainings. Given that every employee has the background and prior knowledge to learn both skill sets, this training takes effect easily. However, if one skill set is missing like that in the polarized capacity, the ability to learn will be severely compromised (Cohen and Levinthal 1990; Van den Bosch et al. 1999), as would be the balance. As far as strategy is concerned, this generative property is manifested in the flexibility of boundary-spanning processes, whereby new processes can be created and added for a new balance. The introduction of proactive support functions is an elaborate example for this generative property. This flexibility is also attributed to the fact that boundary-spanning processes in SAP are loosely coupled around value and beliefs, rather than confined by structural rules (Orton and Weick 1990).

Furthermore, the learnability of the workforce and the flexibility of the organizational processes are not independent but correlated. For example, when the workforce is upgraded, new processes may be created, because the uplifted workforce makes them possible (Montealegre 2002). This generative nature of ambidexterity is also the result of the deliberate process and culture mechanism. On the one hand, the deliberation systematically implants learnability into the boundary-spanning workforce. On the other hand, the culture mechanism instills flexibility into the boundary-spanning processes. As a result, balance is updated and sustained through this continuous generation of new skills and processes.

Although the four IT organizations possess four distinctive forms of ambidexterity, this does not imply that each company can only be tagged with one type of ambidexterity. For example, if Neusoft moves up the service value chain and becomes a more consulting oriented organization, it may migrate from the compartmental ambidexterity into the

generative ambidexterity, since the paradox is highly varying in the context of IT consulting. Fundamentally, the central theme of our theoretical model is that an organization's position in terms of ambidexterity is determined by the paradox variety and volatility that it faces; it is thus possible to witness an organization toggling between different types of ambidexterity as it evolves across different paradox variety and volatility.

Overall, this typology is still at its inception. Although the existing framework manages to provide preliminary answers to some of the critical questions on ambidexterity development (e.g. the relationship between paradox variety and development mechanism), the existing theoretical arguments have not been tested and new arguments need to be developed around the causal relationships between those three sets of variables (i.e. paradox variety and volatility, ambidexterity development process and mechanism, and four types of ambidexterity). In the future, more data pertaining to the typology needs to be collected so that existing theoretical arguments can be empirically verified and new arguments can suffice.



## **5.2. Contributions**

The paper has several important theoretical and practical contributions (for a summary, see Table 5-3). The contributions are twofold. First, the incorporation of ambidexterity into three important IS research domains offers a novel perspective to examine management issues faced by IT organizations. Findings from this perspective help IS scholars to better understand how ambidexterity is developed in IT organizations and guide them in the future exploration through this novel lens. Second, the IT context also offers fresh insights into the ambidexterity literature, thanks to the turbulent nature of this context. The following is organized based on these two streams of contributions. Contribution to IS literature can be further divided into the three IS domains, namely IT-enabled Sustainability, Software-based New Product Development and IT Outsourcing.

### **5.2.1. Contributions to IS Literature**

Modern IT organizations face an increasing number of paradoxes because of their escalating scale and the increasingly dynamic market conditions. Our thesis makes a solid theoretical contribution to the IS field by offering a new theoretical lens of ambidexterity to examine these paradoxes. Through this lens, we identify three paradoxes in three IS research domains, propose pertinent management solutions and synthesize all the findings into a typology model.

Future IS researchers will have a better understanding of this paradox issue and the ambidexterity perspective. This new perspective is not only effective in addressing contemporary IT management issues, but is also helpful in addressing conventional IS management issues such as ineffective collaboration in ITO (e.g. Levina 2005; Levina and Vaast 2006) and complex IS development (e.g. Gopal and Gosain 2009; Zmud 1980). New insights may also be added from this new perspective.

Equipped with our theoretical models, IT managers may thus have a deeper understanding of the paradoxes in IT management issues and an insightful tool kit for

developing ambidexterity in order to manage the paradoxes. Given the increasing imperative of paradoxical challenges, managers who can think paradoxically and develop ambidexterity systematically are more desirable for modern IT organizations. Theoretical and practical implications can also be drawn from the three focal IS research domains, namely IT-enabled Sustainability, Software-based New Product Development (SNPD), and IT Outsourcing (ITO).

First, the sustainable transformation in China Mobile sheds lights on how to balance profitability and sustainability, an issue that has not been covered before, but lies at the very heart of IT-enabled sustainability (Starkey and Crane 2003). The process and integrated models have brought significant theoretical value to this research domain. The former depicts an incremental and iterative process, yielding a number of theoretical arguments that can be of interest for future IT-enabled sustainability studies that include processes. The later model depicts the ambidextrous role of four key stakeholders and their collective actions, which encapsulate multilevel analyses that are very valuable for a new research field like IT-enabled sustainability (Melville 2010; Watson et al. 2010a). The two models can assist senior or engineer managers in incorporating sustainability into the IT organizations. The process model offers them step-by-step guidelines to handle this dramatic change, while the integrated model offers them an overall guideline to marshal different stakeholders collectively (Chan et al. 2011). Since sustainable development is expected to be a compelling obligation for future IT organizations, our study will carry more practical value.

Second, the study at Tencent offers new insights into the Software-based New Product Development (SNPD), which has been overlooked by IS and NPD communities alike. The study highlights the unique characteristic of SNPD, which is the simultaneous iteration between exploitation and exploration. The process model featuring structured improvisation further provides solutions to manage this iteration: first, the sensing and responding



mechanisms iterate the two activities; second, the latent and salient structures coordinate and routinize the iteration. For practitioners, this model provides some actionable guidelines for software product managers to simultaneously iterate between exploitation and exploration and to coordinate tasks and resources by following specific rules in each phase.

Third, the case study of Neusoft and SAP China sheds lights on ITO vendors' balance between technical and communication excellence through boundary spanning. This boundary anchor point has yet been researched, but important for ITO, which calls for more effective boundary spanning (Couto et al. 2006; Cowley 2004). The two alignment models depict vendors' boundary spanning as a by-design practice, through which technical and communication excellence are balanced. The first model theorizes two alignment forms, which if not understood may cause vendors to be unaware of whether a balance is in place and in which direction they should be heading. The second model theorizes two alignment paths, which, if not understood, may result in vendors lingering on the way to balance, but not being able to reach it. Hence, ITO vendors may use the two alignment forms to design their boundary spanning and develop the ambidexterity toward technical and communication excellence. Clients may use the forms to better understand their vendors and avoid upsetting vendors' design.

### **5.2.2. Contributions to Ambidexterity Literature**

When we borrow concepts from the existing literature, we also need to return fresh insights to the source (Suddaby et al. 2011). In this thesis, the literature on ambidexterity also benefits from the context of IT organizations. This is a contribution that reflects a two-way exchange of new insights. As a new concept in the management discipline, managers today still lack clear guideline as to how to develop ambidexterity, especially on a step-by-step basis. Our study is a timely response to this. Through the dynamic context of the IT industry, we uncover a variety of insights on ambidexterity development. For example, the integrated

model of China Mobile, which covers multiple stakeholders and their collaboration, offers multilevel analyses on development (Gupta et al. 2006; Raisch et al. 2009); its process model, which comprises differentiation and integration mechanisms, provides an alternative explanation to an enduring debate on which development mechanism is more effective. The practical implications are also evident. Managers instructed to develop ambidexterity in organizations may first use the typology to examine their paradoxes, identify the suitable ambidexterity, and then apply the pertinent development processes (i.e. deliberate or emergent) and mechanisms (i.e. structure or culture) involved.

Table 5-3: Summary of Theoretical and Practical Contributions

Theoretical Contributions		Practical Contributions
Overall IS Literature	<p>The thesis makes solid theoretical contributions to the IS field by offering a new paradoxical thinking in addressing IT management issues.</p> <p>The thesis further contributes three prevalent sets of paradoxes, three process models on how to balance them, and a typology of four types of ambidexterity.</p>	<p>IT managers would have a deeper understanding of paradoxes in IT management.</p> <p>IT managers would have an insightful tool kit for developing ambidexterity in order to address the paradoxes.</p>
IT-enabled Sustainability	<p>The study of China Mobile sheds light on the importance of the balance between profitability and sustainability in the IT-enabled sustainability.</p> <p>The process model depicts an incremental and iterative process, yielding a number of theoretical arguments that can be of interest for future empirical studies in sustainability that involve processes.</p> <p>The integrated model depicts the ambidextrous role of key stakeholders and their collective actions. This multilevel overview is especially valuable for a new research field like sustainability.</p>	<p>The process model offers top managers or engineering managers a step-by-step guideline to handle dramatic changes involved in the sustainable transformation.</p> <p>The integrated model offers these managers an overall guideline to coordinate different stakeholders collectively.</p>
Software-based New Product Development (SNPD)	<p>The study of Tencent highlights the unique characteristic of SNPD, which is the simultaneous iteration between exploitation and exploration; SNPD has been overlooked in both the IS and the NPD communities.</p> <p>The structured improvisation of Tencent, by uncovering four different mechanisms and structures, offers a spontaneous solution to</p>	<p>The structured improvisation model provides some actionable guidelines on how to iterate between exploitation and exploration.</p> <p>The model also provides some guidelines on how to coordinate SNPD development tasks and</p>

	develop ambidexterity around the iteration.	resources by following specific rules in each phase.
IT Outsourcing (ITO)	<p>The study of Neusoft and SAP China sheds light on ITO vendors' balance between technical and communication excellence in spanning boundary with clients, an understudied yet important area in ITO literature.</p> <p>The alignment models supplement prior studies on why organizations outsource IT projects to vendors by adding a new factor of vendors' flexibility toward aligning boundary-spanning capacity and strategy.</p>	<p>For ITO vendors, the findings offer them a set of practical instructions on how to align boundary-spanning capacities and strategies so as to achieve the balance between technical and communication excellence.</p> <p>For ITO clients, the findings help them have a better understanding of how vendors span boundaries with them and thus collaborate more effectively.</p>
Ambidexterity	<p>The three process models complement the existing ambidexterity development literature that focuses on variance models.</p> <p>The typology model extends the existing conceptualization of ambidexterity: first it introduces two new types of ambidexterity (i.e. generative and spontaneous ambidexterity), and then, it organizes different forms of ambidexterity by associating them with the two critical dimensions of paradox variety and volatility.</p>	<p>Managers tasked to develop ambidexterity can follow the three process model to guide their development.</p> <p>The typology model can function as a selection mechanism for managers to choose the suitable development process and mechanism.</p>

### 5.3. Final Remarks

Ambidextrous organizations are the upcoming trend, and in the future, being ambidextrous is no longer optional for many IT organizations. However, how IT organizations can develop this capability remains challenging, especially given their complexity and the dynamic nature of the IT industry. This thesis is, so far as we know, the first attempt to look at this challenge. Drawing on three case studies conducted in leading IT organizations, rich theoretical findings have been uncovered. IS researchers, who bear an important responsibility to create a knowledge repository around paradoxes and ambidexterity in the IS domain, are thus better equipped to research on the topic. Meanwhile, managers of IT organizations, by tapping into this thesis, may have a better understanding of the paradoxical challenges that they face, and use models to guide their ambidexterity development.

## 5.4. Appendices

### Appendix 5-1: Definitions of Key Constructs on Ambidexterity

	Processes	Definition	Outcomes	Definition
<i>TMT</i>	Strategic Renewal	Renewing of incumbent strategies by sensing paradoxical strategic logics, transforming them into workable and congruent strategies, while curbing polarized opinions of TMT	Strategizing Ambidexterity	<i>Engine</i> of sustainable development: the ability to balance sustainability and profitability in formulating strategies and to mobilize scarce organizational resources for ambidextrous pursuits
<i>Business Units</i>	Operational Reconfiguration	Reconfiguring of incumbent operations by sensing paradoxical operational logics, transforming them into clear and congruent paradigms, while breaking operational myopia	Operating Ambidexterity	<i>Carrier</i> of sustainable development: the ability to balance long-term effectiveness and short-term efficiency in daily routines and link incumbent and new paradigms as complementary assets
<i>Supplier Network</i>	Ecosystem Redefinition	Redefining of incumbent collaboration in the supplier network by sensing paradoxical collaborative logics, transforming them into sophisticated and balanced policies, while mitigating principal-agent issues	Collaborating Ambidexterity	<i>External Accelerator</i> of sustainable development: the ability to balance ecological and economical concerns in the network collaboration and routinely fine-tune the ambidextrous collaboration
<i>Customer Network</i>	Market Renormalization	Recreating of incumbent market norms of the customer network by sensing paradoxical narrative logics, transforming them into clear and balanced narratives, while breaking customers' existing rituals	Narrating Ambidexterity	<i>External Amplifier</i> of sustainable development: the ability to create balanced narratives in the market that customers are willing to accept as norms

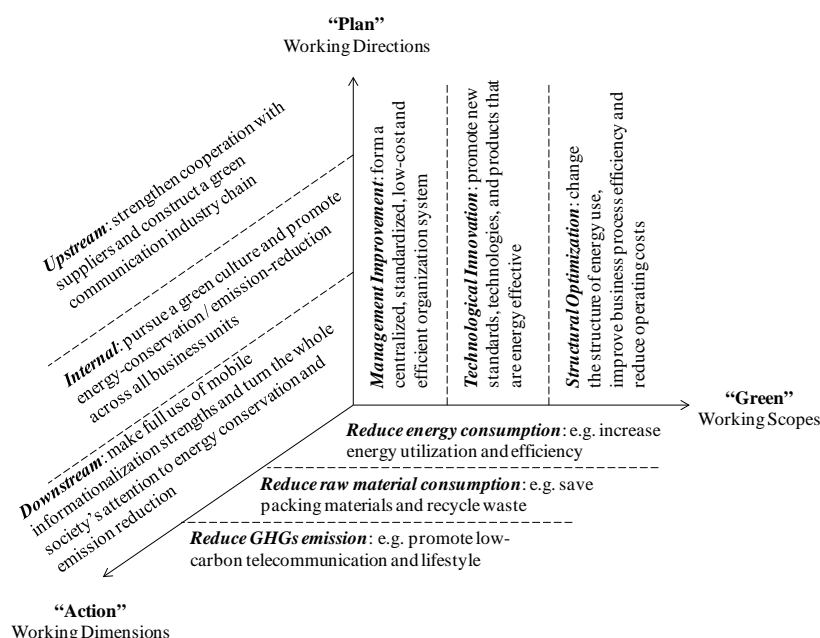
## Appendix 5-2: Definitions of Key Constructs on Boundary Spanning

Concepts	Definition	Sources
<i>Boundary Management</i>	Boundary management is a collection of both internally and externally oriented activities that create and integrate boundaries so as to protect the internal efficiency and seek external resources.	Synthesized from (Ancona 1990), (Ancona and Caldwell 1992) and (Bourdieu and Wacquant 1992)
<i>Boundary Creation</i>	Boundary creation is a collection of internally oriented activities that cultivate local practices that differentiate it from external stakeholders. These activities include cultivating subcultures, establishing local identities and accumulating indigenous knowledge and so on.	(Mayasandra et al. 2010), (Hinds and Bailey 2003)
<i>Boundary Integration</i>	Boundary integration is a collection of externally oriented activities embracing important external stakeholders. These activities include creating boundary object, implementing boundary strategy and so on.	(Ancona 1990), (Ancona and Caldwell 1992)
<i>Boundary Capability</i>	The capability refers to an organization or a team's outward business processes that help bridge its external boundaries, such as information gather, requirement dissemination, and joint activities with external parties.	(Du and Pan 2010), (Ancona and Caldwell 1992)
<i>Boundary Object</i>	The object refers to a broad range of artifacts that are plastic enough to adapt to local needs and constraints of the parties that employing them, yet robust enough to maintain a common identity across sites so that different parties can communicate effectively via this common identity.	(Carlile 2002), (Levina and Vaast 2005)
<i>Integrative Boundary Capability</i>	The capability refers to intensive cross-functional engagement that moves information across boundaries and facilitates the formulation of new ideas at the boundaries.	Adapted from (Lubatkin et al. 2006)
<i>Pragmatic Boundary Object</i>	The object often refers to common interests that are developed to take considerations from multiple parties and to provide adequate means of information sharing and knowledge assessment at the boundaries.	(Carlile 2002), (Carlile 2004)
<i>Combinative Boundary Capability</i>	The capability refers to coordinated actions that combine capabilities and resources of different parties and facilitate complementary interactions.	Adapted from (Kogut and Zander 1992), (Taylor and Helfat 2009)
<i>Semantic Boundary Object</i>	The object often refers to common meanings that are developed to create shared agreements and to provide an efficient means of information processing at the boundaries.	(Carlile 2004)
<i>Symbolic Boundary Capability</i>	The capability refers to an organization or team's authority or credential to name what is important in the boundary engagement and convince the other party to follow.	Adapted from (Bourdieu and Wacquant 1992), (Levina and Vaast 2008)
<i>Syntactic Boundary Object</i>	The object often refers to a common lexicon that is developed to share information and assess knowledge clearly and accurately at the boundaries.	(Carlile 2004)
<i>Normative Boundary Capability</i>	The capability refers to an organization or team's power or leveraging abilities to influence or create norms at the boundaries.	Adapted from (DiMaggio 1988)
<i>Visionary Boundary Object</i>	The object refers to common conceptual ideas that can evoke emotional responses of all parties at the boundaries.	Adapted from (Haugh and Talwar 2010)

### Appendix 5-3: Design of the Case Study

Design Level	Detailed Description
<b>Research Question</b>	How do technology organizations develop ambidexterity in the context of sustainable development?
<b>Strategy</b>	Inductive method, case study
<b>Main Data Source</b>	Semi-structured interview: each lasted from 90 minutes to 2 hours, transcribed to a 120-page (font size 10pt and single line spacing) document and generating 30 pages of field notes
<b>Other Data Sources</b>	Archival data: summarized to a document equivalent to 305 pages Direct observation: 80 photos and 16 videos (total play time 65 minutes)
<b>Informants</b>	TMT (Senior Executives: 2; Senior Managers: 2; GAP Headquarters Office: 2) Business Unit (Middle Managers: 3; Field Employees: 2; GAP Local Office: 3) Supplier Network (Suppliers: 2; GAP Headquarters Suppliers Relationship: 3) Customer Network (Customer: 3; GAP Headquarters Customer Relationship: 3)
<b>Theoretical Bases</b>	Ambidexterity, Boundary Management, Governance, and Control
<b>Sample Interview Questions</b>	<ul style="list-style-type: none"> <li>• How did you (top managers) balance profit and long-term growth? <ul style="list-style-type: none"> <li>○ What were the conflicts involved?</li> <li>○ How did you address these conflicts?</li> <li>○ Were there any effective tools that helped you address these conflicts?</li> </ul> </li> <li>• How did your team (managers of business units) balance normal work routines and the new changes brought in by the top management? <ul style="list-style-type: none"> <li>○ How did your team and the Green office cope with conflicts?</li> <li>○ How did you (members of the Green Office) motivate the business units to take on the Green-IT initiatives?</li> <li>○ How did you make sure business units will maintain the Green-IT initiatives even without your intervention?</li> </ul> </li> <li>• How did you (members of the Green Office, partner liaison division) ensure the business partners work towards the same new direction of proving Green-IT equipment? <ul style="list-style-type: none"> <li>○ What policies did you enact in the collaboration with suppliers, towards the Green-IT initiatives?</li> <li>○ What were the effective tools that you used to coordinate this huge number of partners?</li> <li>○ How did you ensure that the new Green-IT standards became embedded in the partners' development routines?</li> </ul> </li> <li>• How did you (members of the Green Office, customer liaison division) influence customers to change behavior from using the conventional services to adopt new Green-IT services? <ul style="list-style-type: none"> <li>○ How did you design the new services to make them environmentally-friendly while appealing to customer needs?</li> <li>○ What incentives did you give to customers for them to change their existing behavior?</li> <li>○ How was the market norm of using Green-IT services developed?</li> </ul> </li> </ul>

## Appendix 5-4: Summary of GAP Blueprint and Achievements on Energy Footprint



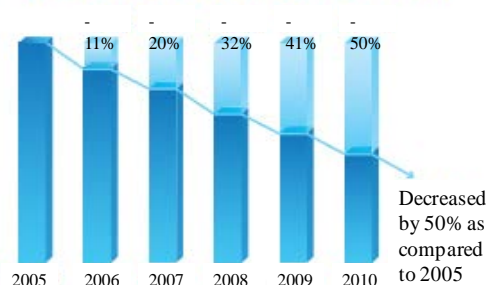
The Green Action Plan (GAP) programme encapsulates three components:

- 1) *Green* concerns the working scope of the programme and is the response to industrial and social expectations
- 2) *Action* concerns the working dimensions of the programme and is targeted at the company's value-chain restructuring
- 3) *Plan* concerns the working directions of the programme and is targeted at the company's capability upgrading.

The three elements are not isolated but closely related to each other, e.g. to reduce energy consumption, changes to equipment (suppliers), business processes (internal), and services (customers) are all needed.

Energy Portfolio	2008	2009	2010
Electricity (in million kilowatts)	9,920	11,140	12,440
Natural Gas (in million cubic meters)	6.6	8.8	6.0
Liquefied petroleum gas (in hundred tons)	3.9	10.5	7.5
Gas (in million cubic meters)	-	0.8	1.0
Coal (in ten thousand tons)	8.3	5.3	5.3
Gasoline (in million liters)	143.8	155.6	149.1
Diesel (in million liters)	32.9	23.5	26.1
Total CO <sub>2</sub> Emission [1] (in million tons)	8.45	9.46	11.12
[1] These calculations are based on “Energy to CO <sub>2</sub> Conversion Scheme” published by China Government. The scheme works as the follow: 1 KW electricity = 0.84KG CO <sub>2</sub> , 1 Liter gasoline = 2.3 KG CO <sub>2</sub> , 1 Liter diesel = 2.63 KG CO <sub>2</sub> , 1 CM natural gas = 0.56KG CO <sub>2</sub> , 1 CM liquefied petroleum gas = 1.46KG CO <sub>2</sub> , 1 KG coal = 2.66KG CO <sub>2</sub> , 1 CM gas = 9.5KG CO <sub>2</sub> .			

Evolution of China Mobile's Electricity Consumption Per Business Unit (2005 – 2010)



Clean Energy Adoption	2008	2009	2010
Total number of clean-energy supported base stations	2,135	6,372	7,795
Sunlight	1,615	5,581	6,279
Wind	-	72	308
Mix of Sunlight and Wind	515	689	1069
Others (e.g. Hydropower, geothermal heat)	5	30	139

**Key Points:** although the overall consumption of electricity rises (see Table at the left), the unit consumption decreases dramatically over the past three years, in the light of the rapid expansion of the business (see Figure at the top right). The same can be said of the CO<sub>2</sub> emission while the total consumption of heavy emitting energies, such as coal, gasoline and diesel has decreased (see Table at the left). This is evidence of China Mobile's commitment to transforming its energy portfolio to a more environmentally friendly configuration. Part of the achievement is attributed to the adoption of clean energies. For example, more and more base stations have started to use clean energies to power their equipments and operations (see Table at the bottom right).

## Appendix 5-5: Sources and Samples of Secondary Data

Sources (Code)	Number of Articles	Sample Articles
Corporate Website (SCW)	9	<ul style="list-style-type: none"> <li>▪ "2011 Annual Report," in: <u>Tencent Financial Reports</u>, January 1<sup>st</sup> 2012.</li> <li>▪ "Corporate Governance," in: <u>Tencent Investor Relations</u>, 2012.</li> <li>▪ "Tencent's History and Milestones (in Chinese)" in: <u>Homepage About Us</u>. Retrieved from: <a href="http://www.tencent.com/zh-cn/at/rm/index.shtml">http://www.tencent.com/zh-cn/at/rm/index.shtml</a>, Jan 1<sup>st</sup> 2011</li> </ul>
Internal Publication (SIP)	15	<ul style="list-style-type: none"> <li>▪ Special Book "A decade of Tencent (in Chinese)," in: <u>Tencent's External Circular</u>, November 1<sup>st</sup> 2011.</li> <li>▪ Ma, H. "A Letter from Tencent President to All Employees: Strategic Renewal and Structural Reformation (in Chinese)," in: <u>Tencent's Internal Circular</u>, January 1<sup>st</sup> 2006.</li> <li>▪ Ma, H. "A Letter from Tencent President to All Employees: Open the Window of Unknown (in Chinese)," in: <u>Tencent's Internal Circular</u>, November 12<sup>th</sup> 2010.</li> <li>▪ Ming, W. "New Interpretations of Tencent's Agile Development (in Chinese)," in: <u>Tencent's Internal Circular</u>, January 1<sup>st</sup> 2012.</li> </ul>
News Articles (SNP)	18	<ul style="list-style-type: none"> <li>▪ Century, A. "Chinese Messaging App Gains Ground Elsewhere," in: <u>New York Times</u>, November 4<sup>th</sup> 2012.</li> <li>▪ Einhorn, B. "Tencent: March of the Penguins," in: <u>Business Week</u>, August 4<sup>th</sup> 2011.</li> <li>▪ Hille, K. "Tencent under Fire in Clash with Qihoo," in: <u>Financial Times</u>, November 8<sup>th</sup> 2010.</li> <li>▪ Mozur, P. "Internet Breadth Helps Buoy Tencent," in: <u>The Wall Street Journal</u>, August 14<sup>th</sup> 2012.</li> <li>▪ Shen, J. "Tencent to Open Platform," in: <u>China Daily</u>, November 25<sup>th</sup> 2010.</li> </ul>
Technology Forums (STF)	16	<ul style="list-style-type: none"> <li>▪ Chiang, B. "Tencent to Work Around eCommerce, with Express Delivery Service," in: <u>Technode</u>, March 21<sup>st</sup> 2012.</li> <li>▪ Lacy, S. "How Did I Get More Bullish on Chinese Innovation than Kai-fu Lee?" in: <u>Techcrunch</u>, September 15<sup>th</sup> 2010.</li> <li>▪ Ye, S. "While Sina Frets Monetization, Tencent Weibo Keeps Focus on the User," in: <u>TechRice</u>, February 26<sup>th</sup> 2012.</li> <li>▪ Yongfeng, X. "Success of Tencent Game: Agile Development and Situated Responsiveness (in Chinese)," in: <u>Sohu IT Forum</u> October 18<sup>th</sup> 2012.</li> </ul>
Analysis Reports (SAR)	14	<ul style="list-style-type: none"> <li>▪ Chiu, C. C., Ip, C., and Silverman, A. "Understanding Social Media in China," in: <u>McKinsey Quarterly</u>, April 2012.</li> <li>▪ Longwood, J. Ganly, D. and Cheung, M. "Hype Cycle for ICT in China," in: <u>Gartner</u>, July 30<sup>th</sup> 2012</li> <li>▪ Gregersen, H. and Dyer, J. "The World's Most Innovative Companies," in <u>Forbes</u>, September 2012. Retrieved from: <a href="http://www.forbes.com/innovative-companies">http://www.forbes.com/innovative-companies</a></li> <li>▪ Zia, D. W. "Trends in China's eCommerce Market," in: <u>Forrester</u>, January 11<sup>th</sup> 2011.</li> </ul>
Journal Articles (SJA)	12	<ul style="list-style-type: none"> <li>▪ Bhattacharya, A. K., and Michael, D. C. "How Local Companies Keep Multinationals at Bay," <u>Harvard Business Review</u> (86:3) 2008.</li> <li>▪ Jiang, W., and Zheng, W. "Dynamics of Internet Ecosystems: A Case Study of Tencent," <u>IEEE International Conference on E-Product E-Service and E-Entertainment</u>, 2010, pp. 1-4.</li> <li>▪ Xie, G., Ni, J., and Ren, L. "Imitation Innovation in China: A Case Study of the Software Industry," <u>Journal of Technology Management for the Global Future</u>, 2006, pp. 988-991.</li> </ul>
Popular Books (SPB)	38	<ul style="list-style-type: none"> <li>▪ Lan, S. "Tencent Under X-ray (in Chinese)," published by <u>China Citic Press</u>, July 2011. ISBN: 9787-508-62861-5</li> <li>▪ Lin, J., and Zhang, Y. "Pony Ma's Tencent Empire (in Chinese)," published by <u>China Citic Press</u>, August 2009. ISBN: 9787-508-61614-8</li> <li>▪ Zheng, X. "Tencent's Management Journal (in Chinese)," published by <u>Wuhan University Press</u>, November 2009. ISBN: 9787-307-07308-1</li> <li>▪ Zhou, Y. "Business Insider of Tencent (in Chinese)," published by <u>Zhejiang People's Publishing House</u>, June 2012. ISBN: 9787-213-04897-5</li> </ul>



## Appendix 5-6: Sources and Details of Primary Data

Company Interview			
Sources (Code)	Total Participants	Details	Sample Interview Questions
<b>Overall interview breakdown by phases</b>			
Preliminary Interview (PTP)	4	<ul style="list-style-type: none"> <li>▪ The gatekeeper, VP of Human Resource</li> <li>▪ 3 of his direct subordinates</li> </ul>	<ul style="list-style-type: none"> <li>▪ Could you give a historical overview of Tencent?</li> <li>▪ What do you think are the key factors behind Tencent's success?</li> </ul>
Onsite Interview (PTO)	18	<ul style="list-style-type: none"> <li>▪ 10 from Internet Service Suite</li> <li>▪ 8 from Entertainment Suite</li> </ul>	<ul style="list-style-type: none"> <li>▪ Could you elaborate the process of a new product development from its inception to its final delivery?</li> <li>▪ How do you manage to rapidly respond to emerging opportunities and outperform competitors?</li> </ul>
Follow-up Interview (PTF)	15 Sessions	<ul style="list-style-type: none"> <li>▪ 10 through emails</li> <li>▪ 3 through telephones</li> <li>▪ 2 through onsite visits</li> </ul>	<ul style="list-style-type: none"> <li>▪ How do you manage to make quick yet careful decisions on the change of product directions? (To confirm the theme of Collective Information Filter)</li> <li>▪ How do you get the most of your knowledge sharing in a short period of time? (To confirm the theme of Fluid Knowledge System)</li> </ul>
<b>Interview at Internet Service Suite breakdown by ranks</b>			
Director (PTiD)	2	<ul style="list-style-type: none"> <li>▪ 1 in charge of regular products</li> <li>▪ 1 in charge of urgent products</li> <li>▪ Average tenure: 7 years</li> </ul>	<ul style="list-style-type: none"> <li>▪ Could you give a historical overview of QQ IM?</li> <li>▪ How does your team transform this product from something obscure to such as a sensational success?</li> </ul>
Product Manager (PTiM)	4	<ul style="list-style-type: none"> <li>▪ 2 working on QQ IM</li> <li>▪ 1 working on QQ Space</li> <li>▪ 1 working on Video</li> <li>▪ Average tenure: 5 years</li> </ul>	<ul style="list-style-type: none"> <li>▪ How do you manage to quickly respond to new opportunities and fully exploit them?</li> <li>▪ How do you manage to consistently innovate in an already matured product like QQ IM?</li> </ul>
Engineer (PTiE)	4	<ul style="list-style-type: none"> <li>▪ 2 working on QQ IM</li> <li>▪ 1 working on QQ Space</li> <li>▪ 1 working on Video</li> <li>▪ Average tenure: 4 years</li> </ul>	<ul style="list-style-type: none"> <li>▪ Could you describe a typical day/week of work and that during peak times?</li> <li>▪ How do you like the regular job rotations?</li> </ul>
<b>Interview at Entertainment Suite breakdown by ranks</b>			
Producer (PTeD)	1	<ul style="list-style-type: none"> <li>▪ In charge of Hardcore MMO and Mini MMO games</li> <li>▪ Tenure: 5 years</li> </ul>	<ul style="list-style-type: none"> <li>▪ Could you give a historical overview of QQ Game?</li> <li>▪ As a newcomer, how does Tencent game catch up with the veteran game producers?</li> </ul>
Line Manager (PTeM)	3	<ul style="list-style-type: none"> <li>▪ 1 working on Hardcore MMO</li> <li>▪ 2 working on Mini MMO</li> <li>▪ Average tenure: 4 years</li> </ul>	<ul style="list-style-type: none"> <li>▪ How do you avoid threats from competitors and exploit opportunities they create?</li> <li>▪ How do you differentiate QQ games with the competitors?</li> </ul>
Engineer (PTeE)	3	<ul style="list-style-type: none"> <li>▪ 2 working on Hardcore MMO</li> <li>▪ 1 working on Mini MMO</li> <li>▪ Average tenure: 3 years</li> </ul>	<ul style="list-style-type: none"> <li>▪ How do you reuse your existing technological and market knowledge?</li> <li>▪ What is a typical career path as a game developer?</li> </ul>

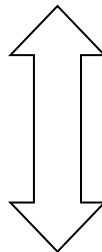
Customer Interview		
Sources (Code)	Total Participants	Sample Interview Questions
Undergraduate (PCU)	3 (Average age: 22)	<ul style="list-style-type: none"> <li>▪ Which Tencent products do you use, and how did it start?</li> <li>▪ How is your overall experience with Tencent products?</li> <li>▪ Why you choose Tencent products over others?</li> </ul>
Graduate (PCG)	3 (Average age: 26)	
Junior Faculty (PCF)	3 (Average age: 33)	

Onsite Observation		
Sources (Code)	Total	Sample Observation Sites
Photo (POP)	72 Pieces	<ul style="list-style-type: none"> <li>▪ Work stations</li> <li>▪ Regular team meetings</li> <li>▪ Exhibitions</li> </ul>
Video (POV)	53 Minutes	<ul style="list-style-type: none"> <li>▪ Regular team meetings</li> <li>▪ Corporate presentations</li> </ul>
Filed Notes (PON)	82 Pages	<ul style="list-style-type: none"> <li>▪ Chats during lunches and tea breaks</li> <li>▪ Chats during company tours</li> </ul>

## Appendix 5-7: Sample Quotes for an Iterative Process of Simultaneous Search and Reflection

Search Phase	
Searching broadly and sampling discriminately	<i>"The Internet market is filled with many opportunities. The competition is not about market share but about innovation and who can catch the next big thing. Although we have a big market share, we should never feel complacent. Essentially, we are just <b>a few opportunities away from obsolesce</b>, and we must ride on those opportunities."</i> CEO [Source: SPB]
	<i>"To gather new ideas, we make no assumptions and open to <b>all possibilities</b>...But when coming to further due diligence, we choose a <b>selective sets</b> and delve deep into them. Unlike competitors who often rush into new ideas, our due diligence is reasonably detailed, laying out what is likely to happen and what need to be put in place in order for the ideas to work. All these are based on prior experience."</i> Director, Entertainment Suite [Source: PTed]
Leveraging shared product instinct	<i>"The influx of new ideas is amazing; it is impossible to check everything. Often, we rely on what we call <b>product instinct</b> to decide which ideas worth further exploration (i.e. due diligence) and which ones to act upon...of course individual opinions can be biased and <b>we balance them</b> by involving multiple people."</i> Director, Internet Service Suite [Source: PTiD]
	<i>"Prior experience has taught us <b>important lessons</b>. In 2004, we imported a Korean shooting blockbuster with excellent design and technologies. But, it failed, simply because most of our customers played at Internet Cafés, a very noisy environment, while the game was designed for home play. From then on, imported games, despite how successful they were, will first go through a thorough localization. This has nearly <b>become an instinct</b>."</i> Line Manager, Entertainment Suite [Source: SIP]

*"Our teams often travel back and forth between search and reflection. For example, when reflecting on prior product development, we tend to **get new inspirations**; they can be a new functionality of an existing game or a new game; we then source for new information from the market to either confirm or extend these ideas"* Director, User Experience Research Center [Source: SIP]



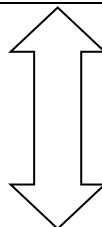
*"When we spot new opportunities in the market, the first thing we do is to refer back to our collective memory to see if there are any similar patterns in the past. This practice helps us make better sense of the opportunities and assess their potential more accurately... **History is like a mirror**. It gives us clarity on what we currently face."* Senior Line Manager, Entertainment Suite [Source: POV]

Reflection Phase	
Reflecting as refreshing	<i>"Some (products) succeed and others fail. This is very common. But, despite being a success or a failure, their (development) experience is a valuable asset. Some are summarized into cases, but more often, experience is shared at work by employees, who have witnessed the entire process. This sharing in action is also more effective as it <b>brings history to life</b>."</i> Product Manager, Internet Service Suite [Source: PTiD]
	<i>"NPD is risky. We must always first go through our own mistakes and then others. Although the requirements of NPD change every day, their fundamental principles do not change much and we have seen history repeating itself all the time. But, we must be able to <b>update the historical lessons</b> in relation to the new context. Otherwise, we will still fail on the same spot."</i> Vice President, Mobile Service Suite [Source: SIP]
Leveraging regular job rotations	<i>"The most valuable gains (in terms of experience) are the (growth of) employees themselves. We regularly <b>rotate them</b> so that they can share at different places and benefit more people. More significantly, sharing among people of different backgrounds opens <b>new perspectives</b> and allows <b>contemporary issues</b> to step in."</i> HR Director, Gatekeeper's subordinate [Source: PON]
	<i>"We <b>welcome job rotations</b> as staying with one product for too long is boring. Most of us are young and like to take on new challenges. Also, staying in one place is not good for career development as you may not be very <b>receptive to new changes</b>. To develop an acute sense of product opportunities and threats, or the so-called 'product instinct', we need a broad exposure."</i> Senior Engineer, Entertainment Suite [Source: PTeE]

## Appendix 5-8: Sample Quotes for an Iterative Process of Simultaneous Design and Execution

Design Phase	
Designing via a long-term and deep customer engagement	<i>"Innovation should never be entirely based on internal knowledge or (internal) research. That is a recipe for failure. Instead, we need to <b>open to customers as early as possible</b>. Gone are the days when companies lock people in a basement, force everyone sign up a none disclose agreement and secretly develop something that is going to astonish the world. It is fine that others copy our ideas. In fact, ideas are worthless. What matters is the ability to transform ideas into reality." Senior Producer, Entertainment Suite [Source: SIP]</i>
	<i>"Many brilliant innovations come from customers. For example, the size of the earlier version IM was reduced to 1MB after collecting customer feedback on bandwidth limitation, and user-lock functionality was introduced after learning that many customers access IM through public computers...These designs are small but have big impacts as they <b>come from deep understanding</b> of customers and reach to their soul." Product Manager, Internet Service Suite [Source: PTiM]</i>
Leveraging ubiquitous and social connections with customers	<i>"Most customers use our services extensively, from IM, to Space, to Micro Blog, and to shopping. Our connection with them is everywhere and we have <b>spared no effort</b> in improving this connection. We simply don't tolerate any feedback left without being addressed or addressed perfunctorily, like many of our competitors do. <b>Customers appreciate this</b> and they like to help, especially when knowing their suggestions will make differences to a product used by millions of people." Director, Internet Service Suite [Source: PTF]</i>
	<i>"<b>Tencent is everywhere</b>. Whenever and wherever I need to use some on the Internet, I come across Tencent. Using Tencent, you don't need to worry about OS platforms or Internet bandwidths as it opens to all kinds of situations....the company is an important <b>part of our lives</b>." Undergraduate Student, an Tencent Fan [Source: PCU]</i>

*"By our development approach, design and execution are really **difficult to separate neatly**. One cannot stand without constant support from the other. Hence, we often find ourselves fine-tuning the design while executing it." Line Manager, Entertainment Suite [Source: PTeM]*



*"This is a **Chicken-Egg issue**. While it is difficult to design when you don't have the product in hand, because customers will not give quality feedback, it's not easy to develop something without a design. Hence, we take a middle ground by **moving them together** incrementally." Product Manager, Internet Service Suite [Source: PCU]*

Execution Phase	
Executing via frequent milestones and tight schedules	<i>"To keep customer feedback alive, we <b>constantly update</b> the product, because if customers do not see changes, they will stop giving feedback. By breaking customer feedback into small pieces, we set frequent milestones and deliver <b>micro innovation each time</b>. Last year, we launched a product called Farmville, which underwent 23 updated versions in just a week and was eventually a sensational success." Senior Engineer, Entertainment Suite [Source: PTeE]</i>
	<i>"There was a time I switched from QQ to MSN as the latter was cleaner and QQ was a bit messy then. But now, I switched back, because QQ is getting much better in terms of user experience and useful <b>functionalities are frequently added</b>. On the contrary, MSN is stagnant. I complained a lot about the spamming issue, but nothing was done, not even a reply." Graduate Student, an Active Tencent User [Source: PCG]</i>
Leveraging regular inter-team exchanges	<i>"Our people should complement each other. We have adhered to this principle since the earlier days. It is an important agenda of our department...the exchange of employees is also intended to look for people that <b>complement each other</b> the best and put them <b>on urgent, critical products</b>." HR Manager, Gatekeeper's subordinate [Source: PON]</i>
	<i>"Many of us have experience working on multiple products. If they need help, we can come <b>on board with little training</b>...after a while, we have also been comfortable with the fact, when task priority changes, we need to put down our existing task and work on the more urgent ones." Senior Engineer, Internet Service Suite [Source: PTiE]</i>

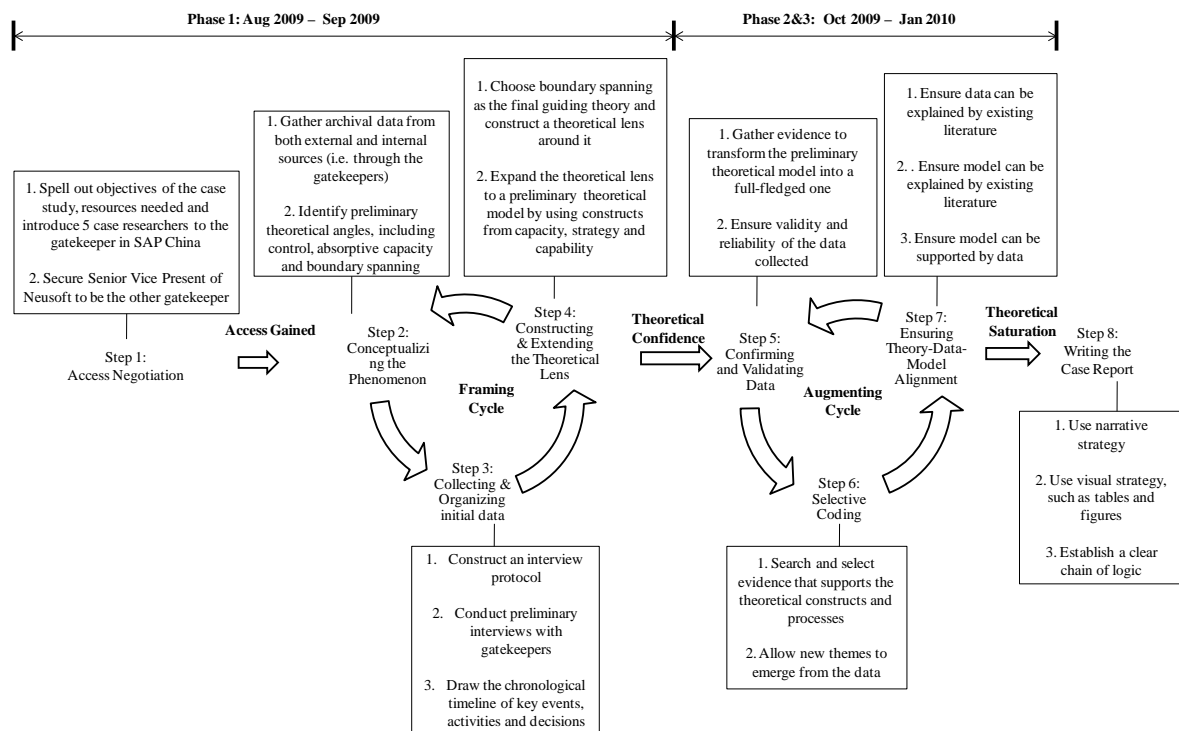
## Appendix 5-9: Definition of Constructs in the Theoretical Model

Constructs	Definition	Sources
<i>Syntopical Observation</i>	Syntopical observation refers to the practice of gathering information from the external world from multiple sources, identifying the important opportunities via a set of themes, and framing them by referring to the prior knowledge	Adapted from (Adler and Van Doren 1972)
<i>Collective Information Filter</i>	Collective information filter refers to the interaction of different mental models and knowledge structures that functions as a lens to identify critical issues and visualize the future	Adapted from (Prahalad and Bettis 1986)
<i>Embedded Innovation</i>	Embedded innovation refers to the innovation that draws upon joint commitments, transformational engagement, and latent customer needs	Abstracted from (Simanis and Hart 2009)
<i>Intimate Customer Network</i>	Intimate customer network refers to the collection of customer relationships built upon social capital, high trust and mutual responsibility	Abstracted from (Simanis and Hart 2009)
<i>Iterative Development</i>	Iterative development refers to the practice of developing a product through repeated cycles and small portions at a time	Adopted from (Larman 2004)
<i>Resilient Resource Network</i>	Resilient resource network refers to the resource structure made of a set of actors who are flexible and proactive in adapting to the irregular and turbulent resource demands	Adapted from (Reinmoeller and Van Baardwijk 2005)
<i>Situated Introspection</i>	Situated introspection refers to the practice of reinterpreting, updating and reusing existing knowledge in relation to the emergent opportunities	Self-defined
<i>Fluid Knowledge System</i>	Fluid knowledge system refers to the continuous interactions among a dynamic and diversified group of individuals	Adapted from (Schreyögg and Sydow 2010)
<i>Improvisational Sensing</i>	Improvisational sensing refers to the material convergence between search and reflection; this convergence enables groups/organizations to sense without predefined plans.	Adapted from (Miner et al. 2001)
<i>Improvisational Responding</i>	Improvisational responding refers to the material convergence between design and execution; this convergence enables groups/organizations to respond without predefined plans.	Adapted from (Miner et al. 2001)
<i>Improvisation</i>	Improvisation refers to the material convergence between exploration and exploitation; this convergence enables groups/organizations to sense and respond without predefined plans.	Self-defined

## Appendix 5-10: Summary of Key Constructs in Boundary Spanning

Constructs	Definition	Source
Boundary Spanning	Boundary spanning is a collection of externally oriented activities embracing important external stakeholders. These activities include managing requirement changes, negotiating project scope, acquiring key resources and so on.	(Ancona 1990)
Boundary Spanner	A boundary spanner refers to an individual who gathers information externally and disseminates it internally. Every individual with the required skills has the potential to become a boundary spanner, either by designation or by emergence. However, individuals without these skills, even if they are designated, may fail to take the boundary-spanner role in practice.	(Tushman and Scanlan 1981a; Tushman and Scanlan 1981b)
Boundary-spanning Capacity	The capacity refers to the sum of every individual's boundary-spanning skills (i.e. technical and communication skills). It reflects organizations' potential in boundary spanning.	Self-defined; following the definition of Absorptive Capacity (Cohen and Levinthal 1990)
Boundary-spanning Strategy	The strategy refers to the patterns of externally oriented activities that an organization demonstrates over a period of time.	(Ancona 1990; Ancona and Caldwell 1992)
Boundary-spanning Capability	The capability refers to organizations' external business processes that bridge the internal and external boundaries. In the ITO context, the capability refers to the processes that ease the organizational and national boundaries between vendors and clients.	Self-defined; following the definition of Dynamic Capability (Teece et al. 1997)

## Appendix 5-11: Case Study Protocol and Research Design



A Structured-Pragmatic-Situational Approach for Conducting Case Studies Adopted from Pan and Tan (Pan and Tan 2011)

Research Design	Description
<b>Strategy</b>	Inductive method, case study
<b>Main Data Collection Method</b>	Semi-structured interviews
<b>Other Data Sources</b>	Archival data and direct observation in the field
<b>Organization</b>	<ul style="list-style-type: none"> <li>✓ Neusoft, one of the largest domestic IT service providers</li> <li>✓ SAP China, subsidiary of one of the largest international IT service providers</li> </ul>
<b>Informants</b>	Total (25): Neusoft (11) and SAP China (14) Breakdown: Top Managers (5); Middle Managers (10); Junior Staff (10)
<b>Theoretical Bases</b>	Boundary-spanning capacity and boundary-spanning strategy
<b>Research Question</b>	How do ITO vendors align boundary-spanning capacity and strategy?

## Appendix 5-12: List of Interviewees, Positions and Ranks

Neusoft		SAP China	
Position	Rank	Position	Rank
✓ Senior Vice President, overseeing the entire Dalian operation, one of the founders	Top Manager (TM)	✓ Senior Director, administrating Global Support China Center and joining it in 2004	Top Manager (TM)
✓ Permanent Party Secretary, governing the Toshiba Printer OS Project* and joining Neusoft in 1997	TM	✓ Senior Manager, administering Support Advisory Division (SAD)	TM
✓ Senior Director, administering Toshiba Printer OS Project	TM	✓ Support Manager A, administering message services related to CRM and joining the center in 1997	Middle Manager (MM)
✓ Assistant Director, assisting the senior director to implement strategic decisions	Middle Manager (MM)	✓ Support Manager B, administering message services related to Logistic	MM
✓ Manager A, communicating between Toshiba and internal (i.e. Window PM)	MM	✓ Technical Manager, administering Technical Cause Analysis Division	MM
✓ Manager B, communicating between Toshiba and internal (i.e. Window PM)	MM	✓ Interaction Manager, administering customer hotline	MM
✓ Technical Lead A, administering internal development	MM	✓ Onsite Manager, administering onsite support	MM
✓ Technical Lead B, administering internal development	MM	✓ Adviser A, advising customers on potential threats (i.e. Support Advisory Division)	Junior Staff (JS)
✓ Developer A, coding and debugging	Junior Staff (JS)	✓ Adviser B, advising customers on potential threats (i.e. Support Advisory Division)	JS
✓ Developer B, coding and debugging	JS	✓ Consultant A, handling CRM related messages	JS
✓ Developer C, testing	JS	✓ Consultant B, handling Logistic related messages	JS
		✓ Consultants C, handling customer calls	JS
		✓ Technician A, analyzing and solving root causes	JS
		✓ Technician B, analyzing and solving root causes	JS

\* Toshiba Printer OS Project is a typical project of Neusoft. In this study, we look at its organizational dynamics through this exemplary project.

### Appendix 5-13: Sample of Selective Coding of Interview Data

Example Quote	Key Phrase	Constructs	
<p>“When we recruit, we don’t expect everyone can speak Japanese. For Neusoft, our primary focus is on technology. We need to make sure the people we hire can program well. Intensive coding experience is highly appreciated.” – Senior Vice President, overseeing the entire Dalian operation, Neusoft</p>	<p>...we don’t expect everyone could speak Japanese... our primary focus is on technology.</p>	<b>Polarized Capacity</b>	<b>Alignment Form</b>
<p>“We have training courses all year long for our staff to upgrade their skills. They can learn from the very basic programming, such as C, C++, and Java, to those at the more advanced levels, such as enterprise architecture. We also have some communication training, but it is meant for managers who need to meet clients regularly. For the rest, that is not important.” – Senior Director, administering Toshiba printer OS development project, Neusoft</p>	<p>...communication training is meant for managers... For the rest, that is not important</p>		
<p>“Window PMs are the superstars of the team. They have rich experience in technology and are also familiar with the Japanese culture. They have no problem with communication. Sometimes, we hire local Japanese nationals as Window PMs. But those people must also have a rich technical background (as well). To assume this role, the individual must be good at both technology and communication.”– Assistant Director, assisting the senior director to implement strategic decisions, Neusoft</p>	<p>To assume this role, the individual must be good at both technology and communication</p>	<b>Centralized Strategy</b>	
<p>“Not everyone in the team is allowed to communicate with the client. Only Window PM can do so. Information circulation, either outbound or inbound, must go through the Window, who will vet the information to make sure the content is professional and presentation is up to the Japanese standards. On the other hand, we don't want clients to see too much of the inside. Their contact point should be limited at the Window PM.”- Permanent Party Secretary, governing the Toshiba Printer OS Project, Neusoft</p>	<p>Information circulation, either outbound or inbound, must go through the Window.</p>		
<p>“In the beginning, we needed a lot of experienced and highly trained technical people. At that time, we were not interested in fresh graduates; we didn’t have the time or resources to train them. Most engineers then were recruited from the university-affiliated research labs. They were very experienced and competent.”- Senior Vice President, one of the founders, Neusoft</p>	<p>... (Early) engineers were recruited from university-affiliated research labs.</p>	<b>Develop Polarized Capacity</b>	<b>Alignment Path</b>
<p>“When I joined (Neusoft), there was no standard communication protocol. Communication was rather unregulated. Since 1996, the company has gone through a major transformation. Project management moved from the research-lab style to a more professional style. The Window-communication structure was developed at that time. It was largely based on our own strengths and weaknesses.”– Permanent Party Secretary, governing the Toshiba Printer OS Project and joining Neusoft in 1994</p>	<p>...the Window communication was developed...based on our own strengths and weaknesses</p>	<b>Design Centralized Strategy</b>	
<p>“Our outsourcing model (i.e. the Window Communication) requires many good engineers with intensive coding experience. Graduates from the market do not suit our model well as they are trained on a very broad scale. Thus, we built up our own IT Institute. The curriculum is purely focused on coding. Students get very solid training in writing codes, it is like second nature to them, and they can fit into our model very easily.” – Senior Director, administering Toshiba Printer OS Project, Neusoft</p>	<p>..We built up our own IT Institute. The curriculum is purely focused on coding... it is like second nature to them...</p>	<b>Strengthen Polarized Capacity</b>	



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