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Developing Sense-and-Respond Capability in a Mobile Service Firm Enabled by Dispatching Technology: An Action Research Study

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DEVELOPING SENSE-AND-RESPOND CAPABILITY IN A MOBILE SERVICE FIRM

ENABLED BY DISPATCHING TECHNOLOGY: AN ACTION RESEARCH STUDY

BY

Timothy Alonzo Crim

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

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ACCEPTANCE

This dissertation was prepared under the direction of the Timothy Alonzo Crim Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Executive Doctorate in Business in the J. Mack Robinson College of Business of Georgia State University.

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ABBREVIATIONS AND DEFINITIONS

CAR: Canonical action research principles, systemic guidelines as suggested by Davison et al. (2004)

C&C: Command-and-control hierarchical governance process

CMP: Commitment-management protocol, provides rigor and clarity to communications between customer and supplier and includes four task phases (define, negotiate, perform, and assess) and seven communication acts (offer, request, agree, report, accept, reject, and withdraw)

DE: Technology-enabled dispatching engine

DoD: United States Department of Defense

DDP: Delivery dispatching problem, an algorithm-based vehicle delivery dispatching approach

FST: Field service technician, a staff member of the subject company

IRP: Inventory routing problem, an algorithm-based vehicle delivery dispatching approach

LSG: Lottery Services of Georgia, the study's subject company

OODA: Observe, orient, decide, and act, a design of the US Air Force's fly-by-wire decision model that informs fighter pilots of the mental processes, learning, and actions needed to understand and react to the complex, rapidly changing response requirements of piloting jet fighters

RTDS: Real-time decision systems, algorithm-based mathematical models adapted to address dispatching and scheduling problems

S&R: Sense-and-respond adaptive managerial framework theory

SLA: Service level agreement that outlines field service performance metrics

STEP: Social and cultural, technical advances, economic trends, and political and regulatory analysis summary

SWOT: Strengths, weaknesses, opportunities, and threats analysis summary

VRP: Vehicle routing problem, or vehicle scheduling problem (VSP), an algorithm-based vehicle optimization solution

ABSTRACT

DEVELOPING SENSE-AND-RESPOND CAPABILITY IN A MOBILE SERVICE FIRM

ENABLED BY DISPATCHING TECHNOLOGY: AN ACTION RESEARCH STUDY

BY

Timothy Alonzo Crim

April 29, 2014

Committee Chair: *Dr. Lars Mathiassen*
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All organizations, including mobile services enterprises, must be able to adapt and respond to discontinuous and rapidly changing business environments. Although mobile service providers have considerable IT-enabled dispatching options, knowledge is limited on how to leverage these technologies to augment adaptive management practices that improve business performance and create customer benefits. Against this backdrop, my collaborative action research study adapted the framework and principles of sense-and-respond (S&R) adaptive enterprise design to help a mobile service provider, LSG, Inc., develop the transactional and transformational capabilities it needed to improve outcomes in providing field services for the State of Georgia's lottery terminals. The dissertation examines how LSG leveraged its recent implementation of IT-enabled dispatching technology both to augment restructuring of its managerial framework and to develop adaptive strategies and modular capabilities that let it systematically sense and respond to rapid and unpredictable changes in its business environment. The study gave LSG an approach for developing and implementing adaptive enterprise design processes using the S&R framework as a heuristic to identify, modify, and redesign the command-and-control (C&C) organizational architecture and

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operational routines; this effort was augmented by new dispatching technology. My research

revealed specific dynamic capabilities and guided senior managers' implementation of new

adaptive governance mechanisms, organizational learning processes, dynamic stakeholder

resource commitments, and modular "customer-back" resource customization strategies.

More generally, the research shows how adaptive enterprise design principles can transform

and address the specific discontinuity challenges that small service enterprises face, and

offers insights and understanding into how practitioner–researchers can use theory to

leverage firm resources and assets to co-create operational value with stakeholders.

INTRODUCTION

To compete in today's competitive markets and unpredictable business environments, enterprises operating with legacy organizational hierarchies must be able to transform their practices and develop new norms of adaptive behavior (Haeckel, 1999). Customers today are more informed and value convenience over loyalty (Lin, 2002), and customer demands are continuously redefining dynamic business environments. Fast changing technology and turbulent, discontinuous business environments demand that firms be both flexible and responsive in the face of uncertainty (Teece, 2007). Russell Ackoff indicates that the rate of change and increasing complexity create turbulent environments (Ackoff, 1994). This is particularly relevant for service businesses such as LSG, which must have present market awareness and prepare for future opportunities. Current profitable value creation and continuous market uncertainties require that enterprises develop capabilities to sense important opportunities, interpret endogenous and exogenous signals, operate in a shortened decision cycle, and reconfigure and deploy resources to create their "next act" for developing customer benefits. These conditions necessitate the development of "new tools" and "new leadership competencies" (Haeckel, 1999; Sambamurthy et al., 2003). Both are mandatory for survival.

Success requires structural change and resource reconfiguration to adapt business models that can leverage information technology (IT) and operational resources to design new capabilities. The enterprise must understand the value of customers and markets, and integrate this information with technical knowledge to become systematically adaptive (Ackoff, 1994; Haeckel, 1999). Understanding how to practically develop adaptive capability in specific organizational contexts entails challenges. Engaged scholarship offers a *collaborative participative* form of action research (Mathiassen, 2002; Van De Ven, 2007), in which

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"researchers and practitioners coproduce knowledge that can advance theory and practice in a given domain" (Van De Ven, 2006, p. 803). I chose this as the method of investigation for my research to examine and understand how LSG can leverage an IT-enabled dispatching engine (DE) and augment management capabilities to become more dynamically adaptive.

Stephan Haeckel's S&R adaptive enterprise design framework was used to guide this engaged scholarship research and develop a management protocol for adaptive transformation. Table 1 (Susman and Evered, 1978; McKay and Marshall, 2001; Mathiassen et al., 2012) summarizes the study's action research design. The research's *area of concern* under investigation (A) was reflected in the body of knowledge in the literature; the real-world *problem setting* (P) was attached to the problem-solving cycle and reflected the practical concerns in LSG's immediate problematic situation; the *conceptual framing* (F) was introduced through the research cycle to guide problem solving; the *method of investigation* (M) guided both the problem-solving and research cycles; and the *contributions* (C) include P, A, and F.

Table 1: Action Research Design

	Component	Definition	Description
A	Area of Concern	Mobile services enterprise adaptive transformation enabled by dispatching technology	• Develop a theory-based understanding of how the firm can be designed to become an adaptive enterprise to effectively provide mobile field services using an IT-enabled DE • Associated with the research cycle
P	Real-World Problem Setting	Practical, organizational alignment and coherent enterprise empowerment to manage discontinuities	• LSG mobile field IT services, Atlanta, Georgia • Develop LSG as a transformative adaptive enterprise with abilities to address C&C and S&R practices to improve organizational alignment and coherent empowerment capabilities to manage complexity • Leverage IT-enabled dispatching technology
PS	Problem-Solving Cycle	Produce practical outcomes	• Initiate interventions in collaboration with key LSG stakeholders • Identify organizational challenges related to implementing new dispatching technology used to manage complexity and uncertainty • Apply S&R enterprise design principles to promote adaptive transformation
F	Conceptual Theoretical Framing	Adaptive S&R enterprise design	• S&R theoretical framework informs understanding of dynamic capabilities in managing organizational transformation • Guides the (PS) cycle • Interprets data from (P) • Introduced through research cycle
M	Method of Investigation	Method guiding problem-solving and research cycles	• Qualitative process study • Engaged scholarship • Collaborative practice action research

	Research Cycle	Produce research outcomes	• Data sources include intervention workshops, staff meetings, interviews, field observations, and internal and external documents • Operational transformation analysis • Capabilities analysis using dynamic capability theory • Adaptive enterprise design using S&R theory
RQ	Research Question		• How can implementing new dispatching technology facilitate the transformation of a mobile service firm into an adaptive S&R enterprise?
C	Contribution	Problem (P) Area of concern (A)	• Practical process development for alignment and empowerment, and organizational learning of S&R capabilities that will increase the firm's operational value to transition from C&C to S&R • Theoretical insights into how mobile service firm practitioners can effectively use actionable theoretical knowledge of adaptive enterprise design for transformation enabled by dispatching technology

The dissertation is structured as follows:

Chapter II: provides an overview of the literature on vehicle dispatching in mobile service firms and LSG. The discussion describes the challenges of management, highlights the information consumed and produced, and lays the foundation for the study's contribution to adaptive organizational principles.

Chapter III: reviews the theory of dynamic capability and provides a foundation for applying that theory to illuminate LSG's resource base and capabilities, which can be adapted with learning mechanisms to respond to rapidly changing environments.

Chapter IV: presents the S&R theory and describes a process through which LSG can systematically learn S&R's transformative adaptive principles, augmented by IT-enabled capabilities. This will allow LSG to both recognize discontinuities earlier and modularly respond to them and to constant environmental change, thereby producing customer benefits.

Chapter V: describes the engaged scholarship action research methodology and provides an overview of research data collection and analysis at LSG.

Chapter VI: details LSG's problem-solving cycle context, specifying the sequence of interventions and the problem-solving process from the antecedent conditions to the study's outcomes.

Chapter VII: presents the study's results and key findings, identifying the changed managerial context and business design of LSG.

Chapter VIII: discusses the practical and theoretical contributions of adopting an adaptive business design for field services organizations. It also presents the required S&R tools, concepts, and leadership competencies for transformation.

Chapter IX: concludes the study with a discussion of the research limitations and summarizes the implications of knowledge creation from engaged scholarship and action research.

PROBLEM SETTING AT LSG

This chapter offers an overview of the literature on vehicle dispatching in mobile service firms. It then highlights LSG and the firm's key challenges, activities, and operational information. Finally, it provides a foundation for how this research contributes both to addressing LSG's challenges and to the existing body of knowledge on adaptive enterprise design for mobile services.

II.I Mobile Services Dispatching Research

Optimizing dispatching and scheduling to find a service vehicle fleet's optimal route for serving a given set of customers is one of the most studied optimization problems (Toth and Viro, 2002). The classical vehicle optimization routing, or VRP, was first formulated by Dantzig and Ramser (1959) and was enhanced by Clarke and Wright (1964). Most VRP or vehicle scheduling problem (VSP) solutions are adapted from the Clarke and Wright algorithm to deal with client-specific constraints (Toth and Viro, 2002). Many researchers have reported the benefits of providing IT-enabled dispatching services involving exact algorithms. The heuristic methods offer important insights into how scheduling processes affect mobile business practices (Dantzig and Ramser, 1959; Clarke and Wright, 1964; Minkoff, 1992; Toth and Viro, 2002); these approaches were enhanced by Clarke and Wright (1964), whose work included a solution model that designed a set of routes with minimum total routing costs for vehicle fleets. Another algorithm-based vehicle delivery dispatching approach uses a Markov decision process model. Although this model has limited routing dispatching applicability in real-life large dynamic fleet environments (Minkoff, 1992), the Markov model addresses VRP, delivery dispatching problems (DDP), and inventory routing problems (IRP) (Ignall et al., 1975; Minkoff, 1992). Additional

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literature focuses on real-time decision systems (RTDS), which are also algorithm-based mathematical models adapted to address dispatching and scheduling problems.

Increasing the integration of IT systems into both production and commercial processes has furthered the development of algorithmic models for real-world applications (Toth and Viro, 2002). In the mobile services industry, however, IT innovation adoption has lagged in both large and small firms (Kant et al., 2008). Still, adoption has occurred; Coca Cola Enterprises and Waste Management offer two examples of recent routing-optimized implementations. Coca Cola, which has the second largest vehicle fleet in the United States after the US Postal Service, implemented ORTEC, a vehicle dispatching software, in 2004 and realized cost savings of $45 million as well as improvements in customer service (Kant et al., 2008). Waste Management provides services to 48 states, the District of Columbia, Canada, and Puerto Rico; it implemented a vehicle dispatching and routing software that resulted in cost savings of $18 million in 2003 and more than $40 million in 2004 (Sahoo et al., 2005). Both firms developed an organizational process that partitioned problems into a set of sub-problems, which gave them efficiencies and increased their C&C enterprise governance by facilitating a successful tradeoff between operating costs and customer satisfaction or service quality.

The mobile services problem is naturally dynamic: scheduling and routing priorities must be continually revised (Durbin, 2003). The objective is to achieve a tradeoff between a firm's operating costs and its customer satisfaction or service quality by minimizing both travel time and the number of vehicles required to service the routes, while also balancing the workload among vehicles. The constraints are route travel time; the time window of stops; and vehicle efficiencies, including capacities. To increase C&C enterprise governance, each of these problems is partitioned into a set of sub-problems (Kim and Popov, 2005). Imperfect information

on origination, destination, coordination, and driver productivity often limit a firm's operation efficiencies and service optimization (Toth and Vigo, 2002). However, algorithm improvements, software development, and the increased availability of both global positioning system (GPS) and geographical information system (GIS) technology to coordinate route-point and customer proximity based on a specific location has greatly improved dispatching capabilities and efficiencies (Kant et al., 2008). Much of the literature highlights significant contributions to operational capabilities, but we have limited knowledge about how to leverage IT and existing mobile service operational principles with strategic business processes to help mobile services firms develop adaptive capabilities.

II.II Challenges at LSG

This dissertation examines LSG, a small technology services provider established in 1992. The following year, LSG began operations, providing field services for the implementation of a statewide lottery in Georgia. The workforce is comprised of thirty-two field service technicians (FSTs) located throughout the state; the FSTs have an average length of employment of more than seven years. LSG services include installation, maintenance, relocation, and removal of more than 9,000 computer lottery terminals and satellite communications systems in more than 8,000 retail locations throughout Georgia. The firm has a subcontracting relationship with a single customer who is the primary online lottery contractor for the state of Georgia. Performance metrics are outlined in a detailed service-level agreement (SLA) between the parties. The field service offering requires LSG to respond to terminal malfunctioning service calls in urban areas within two hours and in outlying rural areas within four hours before financial penalties accrue. Service calls are initiated by retail locations to the primary contractor and distributed to the FSTs electronically. LSG does not control the technological

communication components of the process. The company's daily objective is to deliver superior service by focusing on its core capabilities of dependability, efficiency, integrity, confidentiality, and high performance; to support this objective, LSG identifies and shares performance goals with members of its value chain. Dependable, prompt responses are the key success factors that affect retailer relationships, total performance, and profitability. In Georgia, there are very aggressive penalties for delayed responses to "down-calls," identified as "liquidated damages" in the SLA. The agreement identifies areas that have a response requirement of two hours or less and areas that must be responded to within four hours. The damages are somewhat negotiable; however, they accumulate on an hourly basis and can be very costly—both economically and to the business relationship. The foundation of the company's business success is in meeting and exceeding the expected service-level response requirements and standards.

LSG's legacy business model is effective in static, predictable environments. The firm has been operationally effective and understands the needs and values of its primary partner— and the service's retail end-users—and that has translated into a long-term partnership. The firm provides stakeholder value through the proven business model of fast, reliable field services at a low cost. As the primary contractor's field services manager put it, "*We have a true partnership with LSG. Their service advantage results from offering proven experienced technicians that provide prompt, reliable service. They have the ability to learn and implement new methodologies and technologies*." The business model imitates that of the primary contractor by having a physical location in the same office building. This has produced consultative communications capabilities between the enterprises that have helped them address problem situations and co-develop strategies to respond to changing customer needs.

LSG's major competitive challenge is that the primary contractor might discontinue the use of outsourcing services and provide field service internally. To reduce this competitive risk, LSG focuses on consistently exceeding the expected operating efficiencies of the SLA. LSG's single-customer focus has been historically successful, but it has limited the firm's efforts to explore new market opportunities. Also, at this point, losing that single customer would terminate the firm. Enterprise transformation is thus crucial, both to develop adaptive capabilities to respond to challenging environmental discontinuities and to develop operational value that will enable the firm's survival.

In 2010, LSG implemented an IT-enabled DE—developed by the primary contractor—to help its thirty-two FSTs. Previously, retail locations had initiated service calls through an underdeveloped customer-interface technology that was provided by the primary contractor and distributed to the FSTs through mobile technology. Prior to that implementation, LSG had no technology-based process to interface with customers, determine service-call prioritization, or identify call-routing metrics. Service technicians thus had no summative insight into their workloads, and overall efficiency was driven by the on-duty dispatcher's specific knowledge and experience. The goal of the DE technology adoption was to achieve the VRP/VSP objectives outlined by Toth and Vigo (2002):

- Minimize transportation costs

- Minimize the number of vehicles required to serve all customers

- Balance the routes for travel time and vehicle load

- Optimize utilization of assets (labor, vehicles, and resources)

- Give employees a productive and realistic workday

The adopted technology's operational aims were to minimize total costs and improve services to all customers by helping the firm's FSTs provide prompt customer service and minimize the firm's service-level penalties.

II.III Research Opportunity

LSG's investment in IT-enabled dispatching systems has improved its dispatchers' ability to efficiently assign calls; this, in turn, has improved the firm's service capabilities, reducing penalties specified in the operating SLA and producing operational cost savings. It has also produced more timely, consistent, and reliable services to retailers. Although many papers address VRP and VSP based on Dantzig and Ramser's seminal work (Toth, Vigo 2002), the literature rarely discusses organizational transformation processes and how to use IT-enabled dispatching to transform a service delivery firm from C&C into an adaptive enterprise that can grow and survive in discontinuous environments. It's widely known that IT-enabled technology minimizes the dispatcher dilemmas that lead to operational inefficiencies and creates data to optimize schedules, automatically scheduling the right technicians at the right times. The task for LSG managers is to enrich the data, create an organizational context for viable performance, and codify the data into meaningful information (Checkland and Holwell, 1998). Accomplishing this task is essential if LSG is to effectively and proactively address changes in both customer needs and the business landscape, and thereby identify new metrics of success (Haeckel, 1999). Given this backdrop, the dynamic capabilities framework (Teece et al., 1997; Eisenhardt and Martin, 2000) suggests that firms should build additional routines of sensing opportunities and threats, then seize those opportunities by reconfiguring the tangible and intangible assets required to grow and survive in discontinuous environments. The literature is rich in its descriptions of operational capability necessities, but its insights into such strategies are limited—as are its

recommendations for how to develop and implement them. Specifically, we need to know more about how to create knowledge in mobile services firms that leverages contemporary dispatching technology in a way that helps us redesign organizations structures, adjust business strategies, and develop new governance processes in turbulent and uncertain business environments.

The research question for my study is:

How can implementing new dispatching technology facilitate the transformation of a mobile service firm into an adaptive sense-and-respond enterprise?

Haeckel extends capability theories with an adaptive enterprise design framework, suggesting strategies and a protocol to develop S&R capabilities that can transform organizations by redesigning their operational functions and structures. He suggests a transformation—rather than a business reconfiguration—to develop new dynamic capabilities to change the organization. Hence, I adopted Haeckel's adaptive enterprise design framework (Table 2) to examine LSG and provide practical process development of capabilities for organizational alignment, empowerment, and collective learning to increase operational value.

Table 2: Command and Control—Adaptive Design (adapted from Haeckel, 1999)

Adaptive Framework	LSG Operational Design	Adaptive Design
Purpose	Enterprise-centric	Customer-centric
Strategy	Strategic plan of action	Strategic plan for action
Structure	Functional hierarchies of authority	System of modular roles and accountabilities
Governance	Command-and-control	Context-and-coordination

       The research also aims to provide theoretical insights into how managers can use actionable theoretical knowledge of adaptive enterprise design to transform their own enterprises from C&C to S&R and thereby manage and survive in rapidly changing environments. The adaptive capability design is particularly relevant to LSG and the lottery industry. In 2011, a US Department of Justice ruling changed a long-held position on the Wire Act of 1961, which prohibited all forms of wire and Internet wagering. This study's objective was to help LSG remain relevant despite the industry turbulence expected from such a ruling.

DYNAMIC CAPABILITY THEORY

This chapter describes the theory of dynamic capability, providing a foundation for understanding that theory and using it as an antecedent to illuminate the adaptive framework for transforming firm-specific assets and processes to respond to rapidly changing environments.

III.I Dynamic Capability Approach to Strategy

Dynamic capability theory extends the firm's resource-based view (RBV), which identifies attributes, resources, assets, and routines to generate new value by creating strategies that can lower costs or improve quality or performance (Teece et al., 1997; Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003; Teece, 2007). This "bundle of resources" is identified extensively in organizational literature as being distinctive, valuable, rare, inimitable, and non-substitutable (Eisenhardt and Martin, 2000). The literature also distinguishes between capabilities and resources. A *resource* is an asset or production input that a firm owns, controls, or has access to (Helfat, 2003), while an organizational *capability* is a high-level routine or set of routines and processes that confers a set of decision options (Zollo and Winter 2002) and positions that collectively encompass its competences. An organization's capabilities are thus the core strategic competences that define it, including its organizational processes of learning, coordinating, and integrating assets, as well as the corporate culture of values and beliefs that create the organizational governance system (Teece et al., 1997). *Organizational learning* is defined as the learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness (Zollo and Winter, 2002). Peter Senge (1997) defines it as the capability of individuals in the organization to continually expand and develop new and expansive patterns of thinking. The

RBV has limitations, including that it offers no insight into how and why certain resources produce operational advantages, particularly in environments that are *dynamic*—that is, environments that have rapidly changing technology and market forces.

The evolution of dynamic capabilities is guided by that kinetic environmental context (Teece et al., 1997; Eisenhardt and Martin, 2000; Zollo and Winter, 2002; Mathiassen and Vainio, 2007; Teece, 2007; Singh et al., 2011). Here, I define *dynamic capabilities* as processes that develop strategic routines to build, change, integrate, or reconfigure firm-specific resources and competencies to address rapidly changing environments (Teece et al., 1997; Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003); such routines also give senior managers the ability to alter their organizational resource base. Accordingly, firm-specific management capabilities, effective processes, and organizational learning must be adapted, codified, and deployed throughout the organization to address rapidly changing environments and gain competitive advantage (Teece et al., 1997; Eisenhardt and Martin, 2000; Zollo and Winter, 2002; Helfat and Peteraf, 2003; Mathiassen and Vainio, 2007; Fisher et al., 2010; Singh et al., 2010).

III.II Dynamic Capabilities in Organizations

In the 1980s, Michael Porter's model describing the "five forces" of competitive position was dominant. The model gives management a framework for developing a competitive strategy by relating the company both to its environment and the industry context in which it operates. The five forces are supplier power, barriers to entry, buyer power, threat of substitutes, and competitive rivalry. Porter's approach can help a firm find an industry position that best defends it against competitive forces (Porter, 1980). According to David Teece, however, the five-forces framework is of limited utility and has "inherent weaknesses in dynamic environments" (p. 1325, 2007). Teece argues that the five-forces model does not consider innovation and internal factors

that can constrain a firm's ability to sense opportunities and threats and thus recalibrate its strengths, weaknesses, and assets in dynamic environments (Teece, 2007). Relevant factors that the model ignores or underplays include technological opportunities, path dependencies, conditions, supporting institutions, learning, certain switching costs, and regulation (Teece, 2007). Teece indicates that, in contrast to the five forces, the dynamic capabilities framework's ambition is to explain the sources of enterprise-level competitive advantage over time.

Dynamic capability has various definitions (Table 3), and researchers have questioned its empirical nature. The consistent theme and differentiating component is asset reconfiguration based on a sensing and seizing of environmental signals. This differs from organizational capabilities that are collective activities or routines that give an organization's management a set of decision options for producing significant outputs of a particular type (Zollo and Winter 2002). Firms are often challenged to revise these routines and assets when faced with dynamic or unpredictable environments (March 1991; Eisenhardt and Martin, 2000). The new routines then form the foundation of a firm's knowledge base (Zollo and Winter 2002). To investigate such dynamically developed capabilities, the present study considered the various definitions of dynamic capability (see Table 3) and distinguished between transactional and transformational dynamic capabilities related to LSG's organizational and managerial learning processes, operational procedures, and governance systems development. *Transactional* management represents the current state of information management in an organization—that is, the consumption and production of process-level information—with the goal of matching information availability with a particular task's requirements (Tushman and Nadler, 1978). *Transformational* management occurs in response to a firm's specific environmental challenges. It involves analyzing workflows and technology usage, and—when necessary—changing the

organizational model to make practices more effective and efficient (Singh et al., 2011). In other words, transformation involves sensing, seizing, organizational learning, and creative resource configuration activities (Figure 1).

Table 3: Dynamic Capability Definitions

Source	Definition
Teece and Pisano (1994)	The subset of competences/capabilities that let the firm create new products and processes and respond to changing market circumstances.
Teece, Pisano, and Shuen (1997)	The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.
Eisenhardt and Martin (2000)	The processes that use resources to integrate, reconfigure, gain, and release resources to match and create market change shaped by learning mechanisms.
Zollo and Winter (2002)	A learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness.
Helfat and Peteraf (2003)	An organization's capacity to purposefully create, extend, or modify its resource base.
Teece (2007)	Dynamic capabilities can be disaggregated into the capacities to (1) sense and shape opportunities and threats; (2) seize opportunities; and (3) maintain competitiveness through enhancing, combining, protecting, and (when necessary) reconfiguring the business enterprise's tangible and intangible assets.

Figure 1: Dynamic Capabilities and Micro-Foundations (adapted from Teece, 2007)
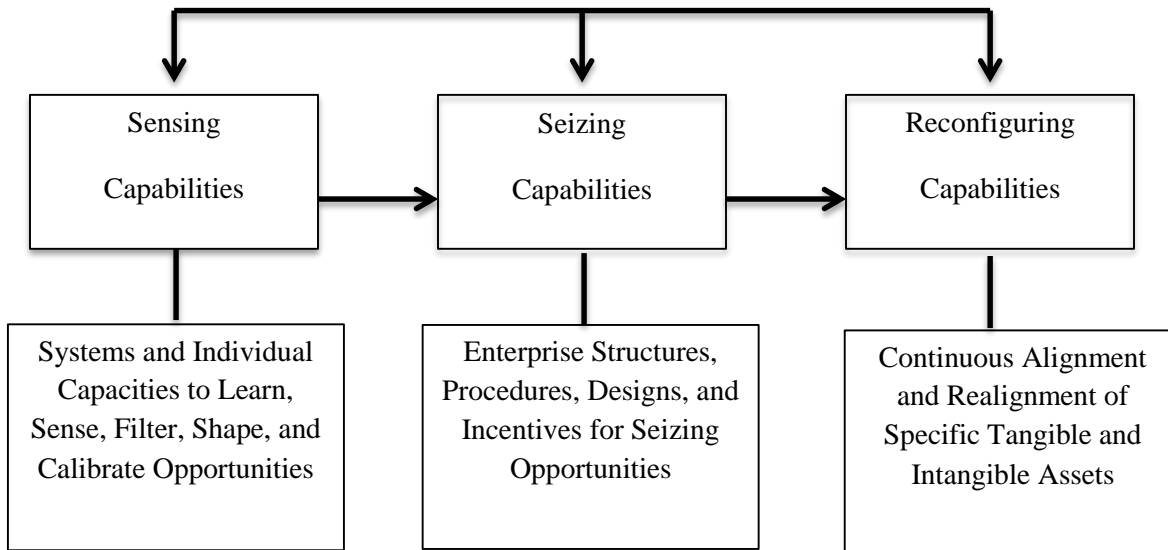
Sensing is exploring opportunities and threats through constant surveillance of markets, competitors, and technologies, and a willingness to adopt best practices (Teece p. 520). *Seizing* is formulating responses to opportunities using functioning systems that integrate the existing resource base of internally and externally operational processes with the customer's value chain. *Reconfiguring* is matching the firm's asset structure to its service strategy and organizational design, recognizing the congruencies and complementarities. Researchers have also referred to adaptive capabilities as exploration and exploitation (March, 1991) and ambidexterity—that is, the ability to simultaneously explore the adjacent customer value chain and exploit the installed base activity chain, enabling the firm to adapt and change (O'Reilly and Tushman, 2007).

Sensing and seizing are also applied in agility methods, which emphasize flexibility and responsiveness to change (Ramesh et al., 2011). In these first two phases, organizations sense opportunities for innovation and seize those competitive market opportunities. Agility methods facilitate this by encompassing both ambidexterity and the exploration and exploitation of market

arbitrage opportunities (March 1991; Sambamurthy et al., 2003). In the context of service organizations, "exploiting" service opportunities focuses on developing efficiency in customer processes, increasing productivity, controlling access to the installed base, and reducing the variance of competitors' reactions by creating a dominant design (Fischer et al., 2010). "Exploring" is about discovering new service opportunities beyond obvious customer needs.

Each of these methods offers distinct ways of learning and processing information that make up the organization's social system and are used to reduce complexity; all are arguably dynamic capabilities that guide leaders with relevant distinct competencies, processes, procedures, and organizational structures (O'Reilly & Tushman, 2007). Teece's third component—reconfiguring capabilities—is outside the scope of customer agility. In contrast, effectiveness, maneuverability, and self-adjustment are the sustained abilities to respond to continuous change. Organizations must also reconfigure assets, resources, and capabilities to adapt internal organizational structures to address environmental change, whether that change is a threat or an opportunity (Teece 2007). "It requires leaders to move resources away from mature and declining businesses toward emerging opportunities," (O'Reilly & Tushman, 2007, p. 16) in effect creating a new business model.

Changing the organizational architecture of sensing, seizing, and resource-reconfiguration portfolio requires a foundation of organizational learning capabilities. Corporate learning is a critical capability identified throughout the literature. It's also a necessary competence if a firm is to develop new governance systems based on a new values culture that can address continuous market changes. Roland Deiser (2009) states, "it is imperative for firms to reinvent themselves in these times of changing contexts. The capability to learn is required for survival" (p. 12). Deiser suggests that there are five forces driving the need to develop a dynamic

learning capability: (1) massive disruption of the business context; (2) the rise of the knowledge-based organization; (3) a competence-based view of strategy; (4) the growing importance of an organization's periphery; and (5) the transformation from self-contained C&C hierarchical organizations to networked co-creation clusters. Zollo and Winter suggest that dynamic capabilities "arise from learning" and that systematic learning methods reconfigure assets and operating routines, and renew competencies.

A primary objective of this study was to investigate, influence, and answer how LSG can develop capabilities to purposefully modify resources, create processes that learn, and produce new operational routines (Figure 2). LSG has demonstrated successful hierarchical operating processes. However, to remain relevant, senior managers must continuously develop new systems and systemic learning methods to bring about adaptive organizational changes and develop their firm's capabilities (Zollo and Winter, 2002). Teece suggests that sensing opportunities is an essential management skill that requires scanning, creation, learning, and interpretive activities, followed by filtering and synthesizing the data on a semi-continuous basis. Other descriptive studies suggest that value creation requires a renewal of core competencies, which are described as deeply held principles, ideals, and values expressed through our decisions, actions, and behaviors from collective learning in the organization (Prahalad and Hamel, 1990). Through collective learning, core competencies develop that let organizations sense changes in customer demands and quickly redeploy into emerging markets as needed. As Prahalad and Hamel (1990) state, "the real sources of advantage are to be found in management's ability to consolidate corporate-wide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities" (p.

5). Codifying and diffusing organizational learning through software, tools, or manuals are necessary to change processes and routines.

Figure 2: Dynamic Capabilities/Learning (adapted from Zollo and Winter, 2002)

```
┌─────────────────────────────────────────┐
│          LEARNING MECHANISM              │
│   Effective routines and experience      │
│   Co-evolution                           │
│   Knowledge articulation                 │
│   Knowledge codification                 │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│          DYNAMIC CAPABILITIES            │
│   Process R&D                            │
│   Restructuring, re-engineering          │
│   Post system integration                │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│          EVOLUTION OF OPERATING          │
│                 ROUTINES                 │
└─────────────────────────────────────────┘
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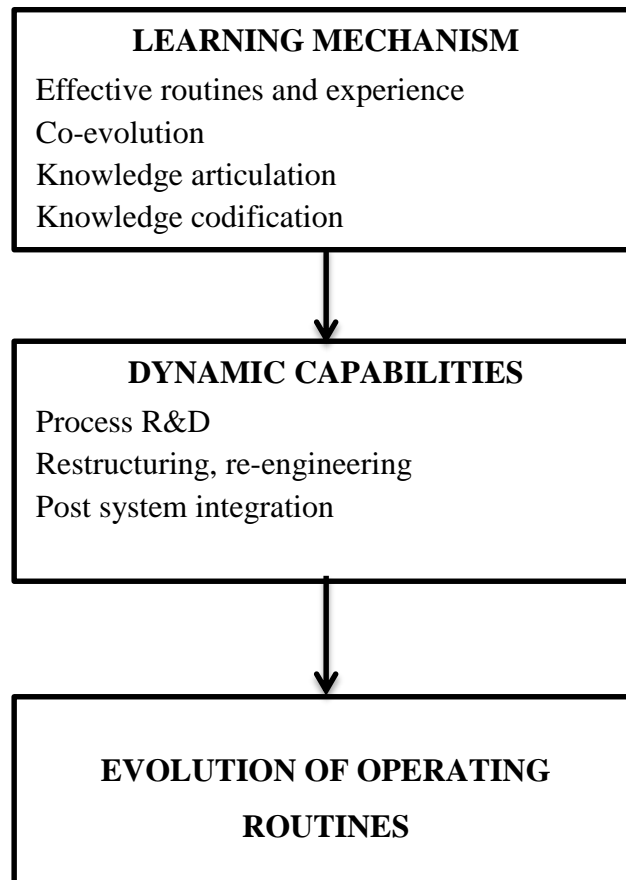
The literature is clear that the use of technological upgrades will be LSG's gateway for developing learning and value-creation mechanisms throughout the organization. Senior managers must continually develop capabilities to sense, seize, and reconfigure resources and operational routines if LSG is to continue creating market value and remain relevant in dynamic environments. It's also essential that they embed the value-creation knowledge throughout the organization.

What is minimized in the literature are actual methods that help firms develop and implement strategic systematic capabilities, knowledge development, and actionable organizational learning processes. How a firm develops the capabilities to purposefully create, extend, or modify extant assets and processes that it owns or controls (Teece, 2007; Helfat and Peteraf, 2003) is the fundamental question that LSG must answer. Haeckel's S&R framework uses the lens of adaptive enterprise design to provide a systemic approach to help senior leaders understand and develop new operational and dynamic business capabilities to build a transformational organizational context.

SENSE-AND-RESPOND THEORY

This chapter presents the foundations of the S&R managerial framework and describes the adaptive enterprise design principles that LSG adopted to develop systemic capabilities, competencies, and processes to redesign its purpose, strategy, structure, and organizational governance. These systematic transformation principles allow LSG to develop the capacity to adapt by developing capabilities to quickly process information and design a modular organizational structure capable of responding to complex and discontinuous environmental change.

IV.I Sense-and-Respond Framework

The S&R framework is based on systems thinking in an information economy characterized by unpredictable, rapid discontinuous change in the business environment. Haeckel notes that, "speed to market, customer intimacy, operational excellence, and organizational agility are not adequate strategic objectives in and of themselves" (Haeckel, 1999, p. xvii). Turbulent, discontinuous, and uncertain markets require a customer-centric governance system based on the premise that changes in the business, security, and technology environments are so rapid that they might exceed the firm's present capabilities to plan for and manage them. The S&R model suggests the development of modular, scalable, and interoperable modular response capabilities (Haeckel, 1999; Lin and Luby, 2005) to respond to emerging customer priorities.

Haeckel states that, "an enterprise's ability to adapt depends on how it processes information to formulate strategy in the face of uncertainty and having a modular organizational structure to respond" (Haeckel, 1999, p. xviii). The S&R model proposes that organizations be

designed as self-organizing, modular systems that can dynamically create and dispatch capabilities with accountability and purpose based on sensing and interpretation of "customer event-back" information. Such a model clearly contrasts with a singular firm-forward, hierarchal, mechanistic C&C strategy. In Haeckel's view, successful organizations must be flexible and adaptive, learning how to continuously identify and understand problems and opportunities as they occur and then reconfigure the business structure to customize responses quickly and appropriately, customer by customer, with systematic adaptiveness to realize authentic negotiated outcomes (Haeckel, 1999).

A principle construct of S&R theory identifies the need to sense and interpret meaningful data, thereby creating knowledge about changes in customer value zones and behaviors. Here, an organization must make investments in and make sense of the influences on its customers' businesses. It must also build value into its own business model as an open system that can develop new sensing capabilities. A second construct is to organize assets and capabilities as an adaptive modular system of roles and accountabilities that can be constantly reorganized around individual customer requests and rapidly dispatched to create a defined customer benefit. These constructs are the foundation for six core competencies, stated by Haeckel, that are required by the S&R managerial framework:

- **Know earlier:** use enhanced sensor networks to support better analysis and superior pattern recognition.
- **Manage by wire:** develop IT-enabled capabilities that will both augment human decisions with smarter and more flexible technologies, and manage comprehensive context linkages to increase decision clock speed.

- **Design organizations as systems:** train and empower leaders to provide organizational context, which Haeckel defines as an unambiguous declaration of purpose, policy constraints, and successive decomposition of purpose into interactive subsystems, or *roles*. The goal is to leverage a system's intrinsic properties to achieve and sustain alignment and coherent empowerment.

- **Dispatch capabilities from the customer back:** Because organization purpose is defined as a benefit to an external customer role—and because it is a system design—an S&R organization is unavoidably "customer-back" rather than "firm-forward."

- **Commitment management:** establish a dynamic governance system that creates and tracks capabilities-related commitments. By changing the focus from capabilities to roles that are accountable for using specified capabilities to provide specified outcomes for other roles, the organizational design becomes a social system in which the interactions are negotiations and renegotiations between people occupying those roles. A commitment-management protocol (CMP) is used to establish a common language and codify who owes what to whom.

- **Authentic and rigorous negotiations:** negotiate and renegotiate ways to satisfy original contractual frameworks to manage future changes and uncertainties.

Adaptive capabilities and management's development of the S&R core competencies are based on institutionalizing the following adaptive design principles (Haeckel, 1995). The first is to design a firm-specific governance mechanism that coordinates and provides a context for business behavior. The context is developed by three components: the reason for being, governing principals, and high-level roles and accountability design. Defining the *reason for being* goes beyond a conventional mission statement; it clarifies the organization's primary

rationale for existence. Next, the firm establishes boundary *governance principles* that establish

"what team members must always do or never do" to achieve the reason for being. Managers can

then provide an organizational model for alignment that coordinates shared organizational values

and increases coherence. This high-level design is the "organizational model" mentioned in the

previous sentence; the result is not predetermined workflow activities, but rather a system that is

designed by "successive levels of decomposition" from the organization's reason for being.

The second design principle is to represent organizational components as personal roles

and accountabilities. Each role is itself a subsystem, and is designed using the same design

principles. This principle defines the commitments and outcomes between team members and

stakeholders, assigning roles and responsibilities that identify the conditions of satisfaction of

key activities—essentially defining "who owes what to whom." This informs an understanding

of internal and external relationships in terms of outcomes.

The third principal is to design processes that make other processes learn. There is rich

literature on organizational learning that indicates that leadership must design the organizational

structures, policies, and processes that make companies learn (Argyris and Schon, 1978; Senge,

1990; Crossan et al., 1999). Haeckel states the organizational context itself must be reframed if

firms are to learn how to adapt to new variables (Haeckel, 1999). It's important to understand

that learning in static environments is distinct from learning in unpredictable and discontinuous

environments. Vera and Crossan (2004) inform us that, "in times of stability, organizational

learning processes serve to refresh, reinforce, and refine current learning, a task best suited to

transactional leadership" (p. 226). Also, organizational learning can occur individually,

collectively, or institutionally (Vera and Crossan, 2004). The S&R design is based on

institutionalized learning cycles that use an "adaptive loop," which is an iterative learning loop

that provides feed-forward and feedback co-knowledge development to facilitate transformational learning. Haeckel divides S&R learning's adaptive loop into four phases: sensing, interpreting, deciding, and acting. "The systemic learning requires more than adapting within the context, it requires adaptation of the context itself" (Haeckel, 1999, p. 82). Using IT to "manage by wire" and manage information rapidly, Haeckel offers the example of a jet fighter pilot who must rapidly sense and interpret environmental signals and changes to successfully fly the aircraft. Similarly, managers must use IT to augment capabilities to sense, interpret, make meaning from the "big data" environmental input to rapidly interface with customers and thereby co-develop knowledge and configure effective responses to survive.

The fourth principle is to develop a modular business design that dispatches capabilities from "customer events-back" to the organization. The modularity focus is a key construct of adaptive transformation in which customized response strategies initiate and become organizational structure. The universal and general CMP is used to ensure that inter-role commitments are modular, rigorous, and trackable. This makes it possible to snap together foundational dynamic capabilities and quickly tailor responses that create value for each customer. Because each role is a subsystem, the rules of system design apply to it at any level, making the design process scalable. Defining, tracking, and codifying commitments and outcomes improve organizational alignment and capabilities coordination. An IT-enabled CMP system provides the systemic rigor that can track and manage the internal and external commitments of alliances and partnerships. This requires more than rearranging products—it requires redesigning business processes, services, and capabilities based on understanding signals from sensing, tracking, and analyzing environmental data. Augmented by technology, modular customization is "the underlying logic of S&R" and lets managers supplement

traditional, predetermined C&C strategies with a dynamic S&R capability. This capability is particularly relevant for LSG, which aims to design new organizational capabilities to sense, interpret, and manage environmental complexities and discontinuities so that it can survive and develop new market opportunities.

IV.II Adaptive Learning Loop

A primary component of adaptive development is the design of a new organizational context using the adaptive learning loop. Haeckel suggests that the adaptive loop defines the S&R organization's basic behavior steps. The adaptive framework for business purpose, strategy, structure, and governance (1999, 2010) focuses on developing the abilities to *sense* environmental signals; *interpret* and translate that data into meaningful information that separates threats from opportunities; *decide* which collaborative capabilities and modular assets are appropriate to dispatch; and *act* accordingly. Rather than planning in advance how to use organizational capabilities to achieve a particular objective, the S&R framework challenges organizations to dynamically reformulate their strategy and redesign organizational structures in response to what is happening now in the business environment. By modularly linking roles and capabilities—replacing "command-and-control" mechanisms with "context-and-coordination" adaptive organizational leadership and governance (see Table 2)—the company standardizes linking capabilities and assets to respond to complex and unpredictable demand. That is, the organizational structure and resource configuration follow a strategy based on sensing and interpreting customer-driven environmental signals rather than implementing a reconfigured strategic plan. The adaptive loop facilitates organizational learning by its iterative nature. It follows the design of the US Air Force's fly-by-wire observe, orient, decide, and act (OODA) loop. The OODA loop decision model informs fighter pilots of the mental processes, learning,

and actions needed to understand and react to the complex, rapidly changing response requirements of piloting jet fighters. The flying-by-wire technological instrumentation augments sensing and interpreting and coordinates a pilot's desired action with the aircraft's capabilities. This is not autopilot; the technology augments, rather than automates, the pilot's capabilities for flight. That is, the pilots are not flying the aircraft directly but rather are flying the informational inputs and representations required for flight.

Haeckel's sense, interpret, decide, and act business learning loop (Figure 3) is similar to the OODA loop. The learning loop augments senior managers' capabilities to sense "what is going on" externally and interpret the environmental information and develop systemic action processes to manage in turbulent discontinuous environments. Augmented by technology, continuous adaptive loop iterations connect environmental information with the firm's resources and organizational capabilities. In the latter iteration, the challenge is to identify and develop a clear understanding of each customer's current problems; to quickly translate that knowledge into specific, appropriate actions to resolve each problem; and, finally, to track the results of those actions and learn from them.

Figure 3: Adaptive Loop
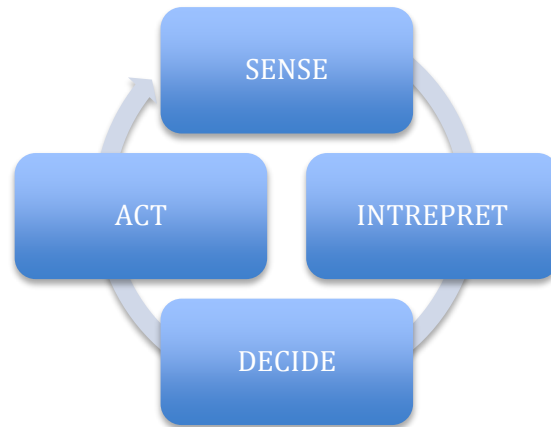
- *Sense***:** adaptive systems register implicit and tacit signals, as well as explicit needs and patterns of preference.

- *Interpret***:** context is applied to data, giving it meaning and transforming it into information. This requires systemic translation of apparent noise into meaning.

- *Decide***:** decisions transform knowledge into action—such as allocating resources as opposed to simply reaching conclusions.

- *Act***:** strategic choices about how resources should be deployed are communicated as a command, suggestion, or blueprint that commissions activity.

The adaptive loop system is driven by data. One of the model's critical steps is translating meaningful or relevant signals from the data's "apparent noise" generated by internal operations and environmental, industry, and customer-specific databases. The sensing opportunities arise from data aggregation and from transforming the data into information and knowledge. Adaptive systems register implicit and tacit signals, as well as explicit needs and patterns of preferences. The challenge is to identify and develop a clear understanding of each customer's current

problem and quickly translate that knowledge into specific appropriate actions to resolve each problem. Finally, by tracking the actions' results and learning from them, organizations can turn knowledge into systemic institutional learning. Such learning can occur with every iteration of the loop. In critical cases, it is possible to create organizational roles that are responsible for continually updating and refreshing the sense and interpret phases for decision making roles. By developing the capability of turning learning into action within the context, managers can change the organizational business context and design. This is very relevant for LSG's managers as they face challenging, dynamic environmental changes that require understanding and the ability to manage rapidly changing multisystem environmental and customer value data to become adaptable and survive.

IV.III Modular Resource Customization

The "underlying logic" of adaptable organizations is the process of mass customization— that is, tailoring responses to each customer by snapping together foundational capabilities, processes, products, services, or pieces of codified knowledge. This is object-oriented modularity, in which the potential for combining is created rather than predetermined. Systemic modular customization is foundational to the strategy-becoming-structure approach. To modify and redesign organizational systems and the portfolio of capabilities, Haeckel suggests you should first identify a relatively stable organizational processes using an organizational adaptiveness assessment and commit to continuously improving them. The idea of disaggregating, not integrating, elements into modular components that can be dispatched to create responses to specific customer requests is the adaptive objective. Haeckel employs Ackoff's definition that, "a system design is a collection of elements that interact to produce an effect that cannot be produced by any subset of those elements." Modular organizational
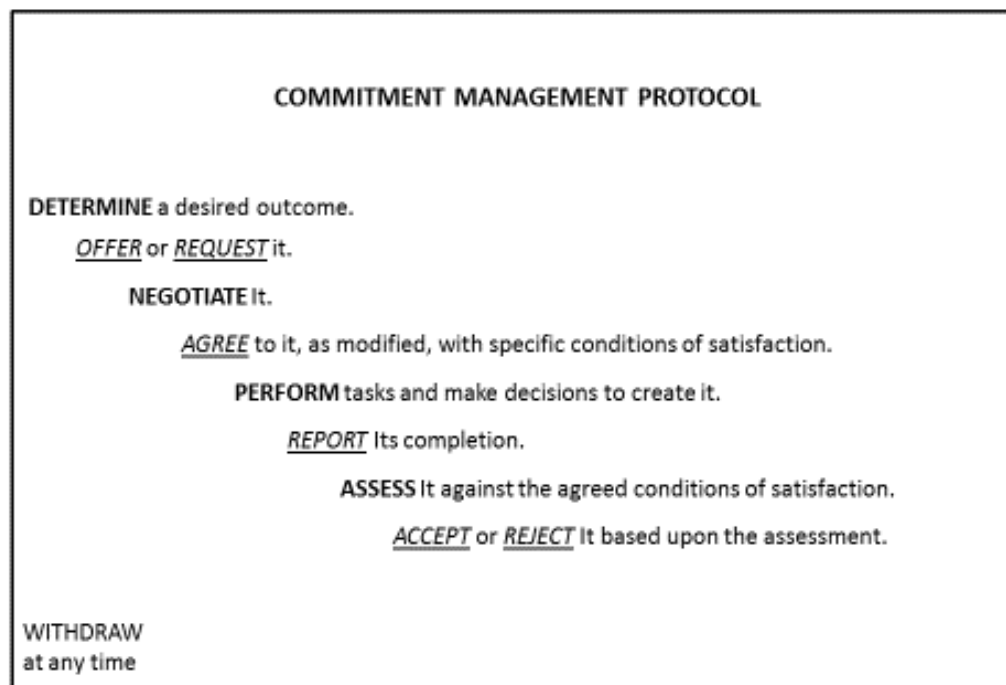
responses can be rapid, customized, and scalable. Organizational modularization should be distinguished from product modularization, in which a product can be customized with various modifications. S&R organizations modularize business functions to create responses tailored to specific customer requests (Haeckel, 1999) with speed, flexibility, and effectiveness. Some firms use a systems integration model to reconfigure pools of capabilities to match changing customer requests. Michael Shank indicates in Haeckel's *Adaptive Enterprise* that the most significant barriers to modular mass customization are inflexibility; customization expense; rigid information systems; change management resistance; embedded management skills and attitudes; difficulties understanding customers' real needs and values; and suppliers' inability to match customization requirements. The most important factors in achieving mass customization are modular processes for rapid responses, lean production, successful IT integration, fanatical customer focus, and flexible supplier partnerships. Modularity is the essential capability that empowers the organization without making it more complex.

IV.IV Commitment-Management Protocol

Organizational modularization requires disaggregating business assets, processes, resources, and capabilities into individual components. It also requires a standardized communication linkage to recombine them and orchestrate responses. The CMP system provides an interface to connect the modules. Managing internal and external capabilities as a single system enhances sensing and responding capabilities. The protocol (Figure 4) is critical in that it provides rigor and clarity on the module interactions and processes. Enabled by technology, the protocol provides the coordination and context to minimize ambiguity and misunderstandings. The CMP's formal structure—developed by Fernando Flores and Alan Scherr at IBM and extended by Haeckel—is the implementation mechanism for S&R organizations. The protocol's

activities lifecycle has four task phases: define, negotiate, perform, and assess; and seven communication speech acts: offer, request, agree, report, accept, reject, and withdraw, any of which can be done at any time. The protocol effectively uses internal and external modular capabilities, which is significant because it is difficult for one organization to invest in all the resources and develop all of the processes and capabilities needed to respond to dynamic markets. The protocol is also effective in collaborative strategic alliances with other organizations using resources and governance structures from multiple sources. The tool has several advantages, including scalability, risk reduction, decision speed, and organizational learning. Using it, senior managers can develop a new rigorous governance system that creates the context by clarifying and tracking the modular resource commitments required to satisfy the conditions of the desired outcomes and adaptive design.

Figure 4: Commitment-Management Protocol

COMMITMENT MANAGEMENT PROTOCOL

DETERMINE a desired outcome.
OFFER or REQUEST it.
NEGOTIATE it.
AGREE to it, as modified, with specific conditions of satisfaction.
PERFORM tasks and make decisions to create it.
REPORT Its completion.
ASSESS It against the agreed conditions of satisfaction.
ACCEPT or REJECT It based upon the assessment.

WITHDRAW
at any time

RESEARCH METHODOLOGY

This chapter describes the overall research methodology that was used to investigate LSG's transformation into an adaptive enterprise. It begins with a discussion of the research design of engaged scholarship, followed by the specific collaborative action research that was used to inform the practical problem solving, and then with how leveraging a DE technology served to develop systemic relationships. The discussion reveals this process study's collaborative, iterative approach and its dual focus on practical problem solving and S&R adaptive enterprise design research.

V.I Engaged Scholarship

Environmental uncertainty that stems from complex problems and change requires a methodology to increase the capabilities of researchers and practitioners. Andrew Van De Ven and Paul Johnson propose that the engaged scholarship method lets "researchers and practitioners coproduce knowledge that can advance theory and practice" (Van De Ven and Johnson, 2006, p. 803). This is a bridge between knowledge for theory and knowledge for practice, which has been described as a *knowledge transfer problem*. Van De Ven states that, "the method of engaged scholarship is for the expansion of the capabilities of scholars to study complex problems and creates or coproduces the kind of knowledge that advances both science and practice" (Van De Ven, 2007, p. 9). In every practice setting, practitioners can presume on their practical experiences for only a minimal time before the situation changes and they must learn new knowledge and skills (Jarvis, 1999). Jarvis informs us that practitioners must adapt their practices—by learning theoretical constructs and using tacit knowledge—to effectively

manage dynamically changing business environments. Such reflective organizational learning (Vera and Crossan, 2004) can lead to systemic improvement and development of sustainable competitive advantages. LSG's engagement of a practitioner–researcher motivated the initiation of this collaborative research process study.

There are four forms of engaged scholarship (Van De Ven, 2007): 1) informed basic research, which describes, explains, or predicts a phenomenon; 2) collaborative basic research, in which power sharing among researchers and stakeholders focuses more on mutual interests than on informed basic research; 3) design and evaluation research, which examines normative questions dealing with the design of policies, programs, or models used for solving practical problems of a profession in question; and 4) action research, which uses systematic interventions to study and treat a specific problem in the problem setting. Another way to classify engaged scholarship is adopted from Mathiassen's (2002) collaborative practice research, which recommends that researchers "establish well functioning relations between research and practice" (p. 5). The research goals for this LSG study are to: 1) develop an understanding of systems development; 2) build new knowledge that can inform stakeholders and support the current practice; and 3) determine the commitments required to improve practice, focusing on organizational changes through problem solving in response to specific needs. In any case, the objective is to produce actionable knowledge that specifies the intended consequences, the action sequences to produce the consequences, the causal relationship between actions and consequences, and relevant governing values for the action designs (Rapoport, 1970; Susman and Evered, 1978; Baskerville and Wood-Harper, 1996; McKay and Marshall, 2001; Mathiassen, 2002).

V.II Action Research

The action research guidelines are particularly relevant for examining LSG and the goals of initiating change, diagnosing emerging needs, planning and taking action, evaluating the results, and most of all, for organizational learning throughout these processes that produce actionable knowledge.

Kurt Lewin at the University of Michigan's Research Centre for Group Dynamics developed action research as a mode of social research to study the resolution of critical social problems within the field theory framework (Lewin 1946). Lewin's approach combined the "generation of theory with changing the social system" as researchers act on or in that social system (Susman and Evered, 1978). Action research was intended to address some of positivism's shortcomings and to both change a system and generate critical knowledge about it (Rapoport, 1970; Susman and Evered, 1978; Baskerville and Wood-Harper, 1996; McKay and Marshall, 2001; Mathiassen, 2002).

Action research is described as the researcher's active and deliberate self-involvement in the context of an investigation in which he or she is a key participant (Rapoport, 1970; Susman and Evered, 1978; Baskerville and Wood-Harper, 1996; McKay and Marshall, 2001; Mathiassen, 2002). Susman and Evered (1978) offer six beneficial characteristics of action research:

- *Future-oriented*: researchers purposefully act to solve practical concerns of people.
- *Collaborative*: researchers are not detached observers who merely comment, analyze, or criticize; instead, they actively participate in both the research and problem-solving aspects of a problem situation.

- *Implies system development*: researchers encourage development of a system's capacity to facilitate, maintain, and regulate the cyclic process of diagnosing, action planning, action-taking, evaluating, and specifying learning.

- *Generates theory grounded in action*: although theory offers a guide for both diagnosing a problem situation and identifying the appropriate action to take, the actions themselves can inform theory once they're evaluated.

- *Agnostic*: researchers cannot fully theorize about or prescribe actions ahead of time, as actions are subject to reexamination and reformulation based on the consequences of other actions taken throughout the research process.

- *Situational*: each research situation is unique, and researchers act based both on a current understanding of the problem situation derived from stakeholder interactions and on achieving consensus on planned actions.

Similarly, Baskerville and Wood-Harper (1996) suggest that action research is characterized by: 1) its multivariate social setting, 2) its highly interpretive assumptions about observations, 3) intervention by the researcher, 4) participatory observation, and 5) the study of change in the social setting.

V.II.i Action research dual cycles. This study followed McKay and Marshall's (2001) suggestion that research occur through two parallel and interacting cycles: problem solving and research. Such a duality facilitates management of the interdependence of action and research in both practice and theory. Specifically, this research used the collaborative practice (Mathiassen 2002) type of action research. In collaborative practice research, the aims are to (1) understand, develop support for, and improve specific practices within organizations; (2) strive for a close interaction between practitioners and researchers; and (3) use action research as the dominate

approach (Chaisson et al., 2008). Accordingly, this research was iterative, collaborative, and had organizational problem solving and theory development as its primary goals. In the problem-solving cycle, the researcher identifies the problem, plans problem-solving activities, implements and evaluates them, and then either amends the action plan or exits the cycle, depending on the intervention outcomes. The research cycle focuses on testing and generating theory: the researcher begins with an initial theoretical framework; plans, designs, and implements actions; and then monitors and evaluates the outcomes. If the actions address the research question in a satisfactory manner, the researcher exits the cycle.

The LSG study followed the problem-solving cycle's iterative steps of using an IT-enabled DE implementation to make sufficient organizational process improvements and thereby help the firm become adaptable and survive, and the research cycle of contributing to the theoretical insights into how practitioners in mobile services firms can effectively use actionable theoretical knowledge of adaptive enterprise design.

V.II.ii Canonical action research principles. To address the study method's rigor and relevance, canonical action research (CAR) principles served as systemic guidelines as suggested by Davison et al. (2004). CAR is iterative, rigorous, and collaborative (Davison et al., 2004). Its rigor has two key components:

- Iterating through carefully planned and executed intervention cycles aimed at developing a detailed picture of the problem situation and moving closer to the problem's solution
- Engaging in a continuous process of problem diagnosis so that planned activities are relevant to finding the solution

The interventions require that the researcher build a relationship with the client and then plan, execute, observe, and reflect upon the actions. A successful project obtains an intimate

view of a specific problem situation and thereby produces findings that are relevant to clients and inform knowledge.

The LSG study was guided by the five CAR principles:

- Researcher–Client Relationship

- Cyclical Process Model

- Theory

- Change through Action

- Learning through Reflection

Davison indicates that the researcher–client relationship helps the client understand how CAR works and benefits the organization. He further suggests that the cyclical process model helps insure that the project has systemic rigor, which is a defining characteristic of CAR. The action research model originally proposed by Susman and Evered (1978) has five stages— diagnosis, planning, intervention, evaluation, and reflection—whereas McKay and Marshall more recently proposed a model with two parallel, simultaneous interacting cycles (see Figure 5). Davison et al.'s (2004) approach focuses on the relationship between diagnosing and acting, and on the essential use of theory to dynamically adjust the process based on ongoing evaluations. Two advantages of the cyclical process are (1) it is relevant to both the research and business communities, and (2) it prevents the researcher from getting lost in a rich and voluminous amount of data.

Figure 5: Dual Imperatives of Action Research (McKay and Marshall, 2001)

Problem-Solving Cycle
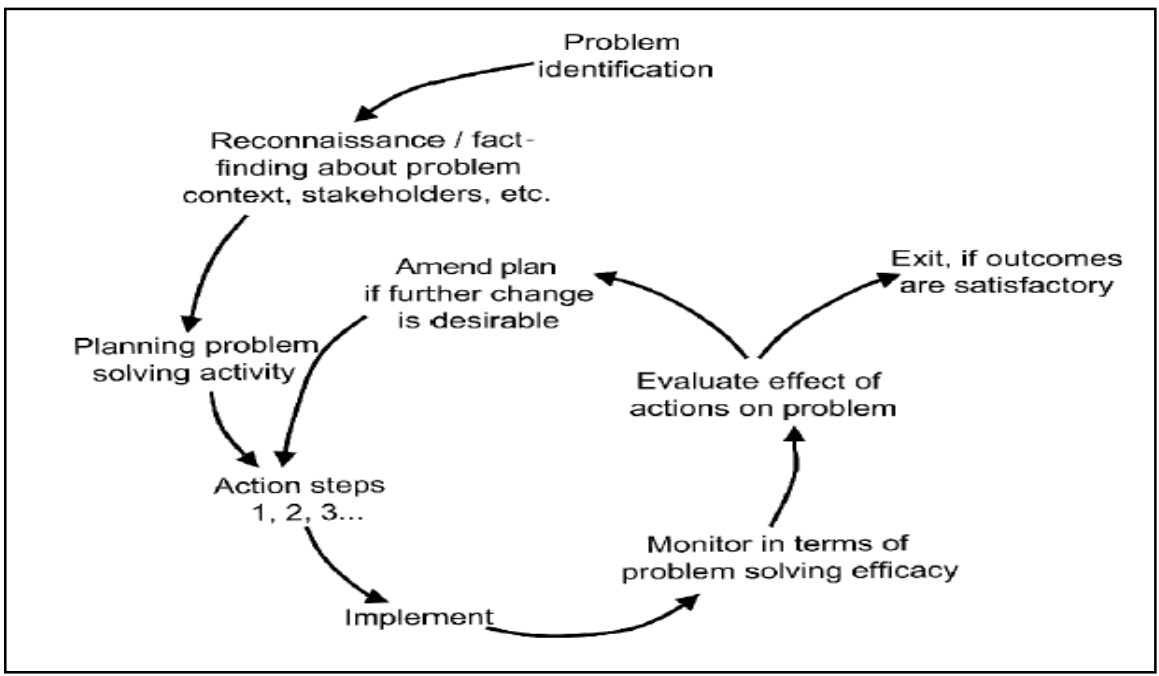
Research Cycle
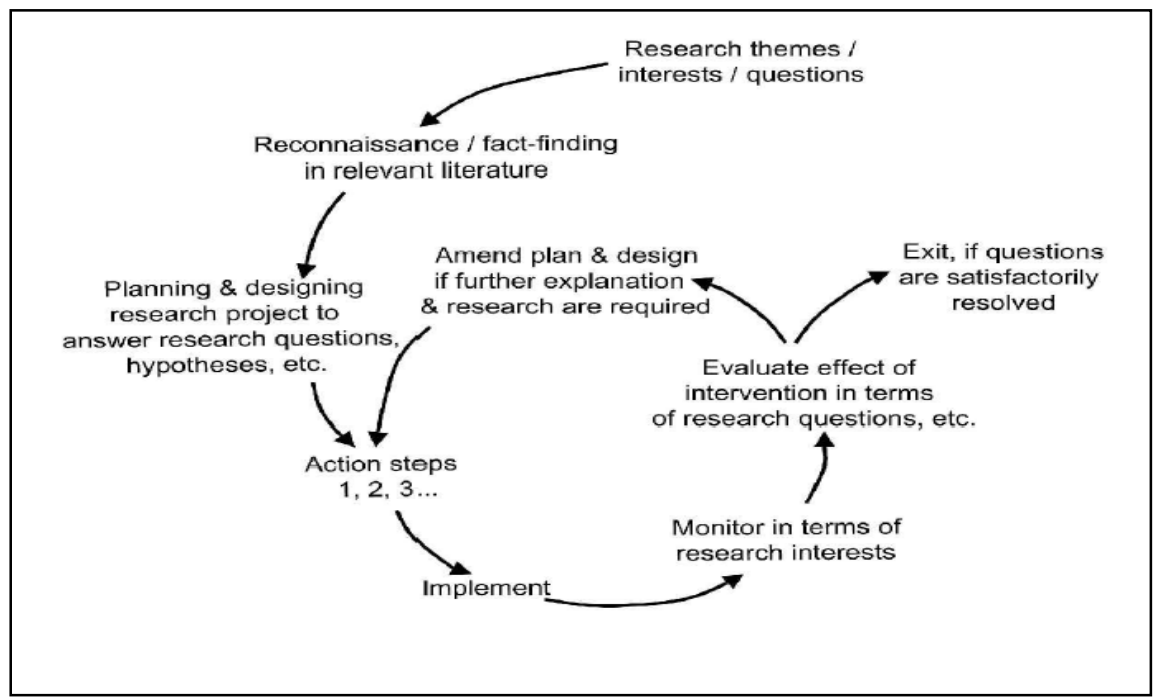
To enhance action research's rigor and relevance, Davison proposes that researchers address theoretical principles by answering the following questions:

1. Were the project activities guided by a theory or set of theories?

2. Were the domain of investigation and the specific problem setting relevant and significant to the interests of the researcher's community of peers and the client?

3. Was a theory-based model used to derive the causes of the observed problem?

4. Did the planned intervention follow from this theory-based model?

5. Was the guiding theory—or any other theory—used to evaluate the intervention's outcomes?

The first two questions suggest that action researchers must rely on one or more theories to guide their activities. One of the LSG study's goals was to increase understanding of how to manage organizational transformation using engaged scholarship. The third and fourth questions encourage researchers to use theoretical principles to frame the problems and guide the intervention. The final question focuses on how research outcomes are evaluated in terms of these guiding theories. The company's capabilities were identified using dynamic capability theory. Then, the S&R transformation process was implemented with interventions using the lens of adaptive enterprise design.

The change-through-action principles focused on actions and interventions aimed at changing the current situation. For meaningful action to occur, participants must share a common understanding of the organizational situation and the research context. The researcher–client agreement with LSG specified and guided the problem-solving component to develop operational process improvements and organizational alignment to meet the new environmental survival challenges and complexities. Also, by using new dispatching technology, the company

will be able to enhance organizational learning and organizational transformation. The research focus was clarified through discussions with LSG stakeholders about organizational transformation based on the need to develop dynamic capabilities that go beyond C&C, agility, and ambidexterity to becoming an adaptive S&R enterprise (Haeckel, 1999). Senior managers and stakeholders invested in LSG's viability made explicit commitments. The agreement and S&R's primary research principles require clear and explicit definitions of internal and external relationships. The S&R theory's governing principles and adaptive high-level business design require that roles and responsibilities for the consequences of actions be explicit. The measures are the negotiated outcomes of who owes what to whom and the conditions of satisfaction from the change in the structures, processes, and organizational context.

Table 4: Criteria for the Researcher–Client

Criteria	Applied to LSG
1a. Did both the researcher and client agree that CAR was the appropriate approach for the organizational situation?	Yes
1b. Was the focus of the research project specified clearly and explicitly?	Yes
1c. Did the client make an explicit commitment to the project?	Yes
1d. Were the roles and responsibilities of the researcher and client organization members specified explicitly?	Yes
1e. Were project objectives and evaluation measures specified explicitly?	Yes
1f. Were the data collection and analysis methods specified explicitly?	Yes

The CAR principles extend the original model by Susman and Evered (1978) that identifies five stages: diagnosis, planning, intervention, evaluation, and reflection. Subsequently, McKay and Marshall (2001) outlined a model that has the practical problem-solving cycle and

the theoretical research cycle operating concurrently (Figure 5). This LGS study adopted the McKay and Marshall model from an engaged scholarship perspective to address the practical organizational issues of providing the business design and organizational context to manage environmental uncertainty using theory-based knowledge. The iterative characteristics of the model's interventions and workshops began with the diagnosis, or fact-finding stage, during which the current environmental context was determined. This was the primary data collection phase. The researchers had access to company historical data and attended monthly meetings. Information and knowledge from the problem-solving cycle were also available for the research cycle. The models were followed, going from diagnosis, planning, intervention, data collection, evaluation, and reflection through to the exit of the study.

Table 5: Criteria for the Cyclical Process Model

Criteria	Applied to LSG
2a. Did the project follow the CPM or justify any deviation from it?	Yes
2b. Did the researcher conduct an independent diagnosis of the organization?	Yes
2c. Were the planned actions based explicitly on the results of the diagnosis?	Yes
2d. Were the planned actions implemented and evaluated?	Yes
2e. Did the researcher reflect on the outcomes of the intervention?	Yes
2f. Was the reflection followed by an explicit decision on whether or not to proceed through an additional cycle?	Yes
2g. Were both the exit of the researcher and the conclusion of the project due to either the project objectives being met or some other clearly articulated justification?	Yes

The research cycle (McKay and Marshall, 2001) was guided by the principle of theory presented by Davison et al. (2004). The initial LSG intervention focused on the company diagnosis and considered operational efficiencies and processes prior to and after implementation of an IT-enabled DE. The study used dynamic capability theory to identify LSG's systems, processes, and strategic routines, and the internal and external resources it used to generate and create outcomes (Teece et al., 1997; Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003). To guide the interventions and frame the research problems through the action planning, evaluation, and reflection phases, the study followed the S&R theoretical framework (Haeckel, 1999; Mathiassen and Vainio, 2007). The study identified consistent operational efficiency gains from time periods following the IT-enabled DE's implementation. It also found organizational and structural factors that limited LSG's opportunity to develop new markets. The company's hierarchical management and board structures—while minimizing organizational complexity—did not position the company to adapt and respond to new discontinuous and complex market environments. Managerial workshops were conducted to explicitly discuss the intervention outcomes, including the researchers' reflections. Subsequently, having presented the outcomes, it was mutually agreed that the study would end.

Table 6: Criteria for the Principle of Theory

Criteria	Applied to LSG
3a. Were the project activities guided by a theory or a set of theories?	Yes
3b. Was the domain of investigation and the specific problem setting relevant and significant to the interests of the researcher's community of peers as well as the client?	Yes
3c. Was a theoretically based model used to derive the causes of the observed problem?	Yes
3d. Did the planned intervention follow from this theoretically based model?	Yes
3e. Was the guiding theory, or any other theory, used to evaluate the outcomes of the intervention?	Yes

During the study's diagnosis phase, the guiding methodology of engaged scholarship action research and S&R adaptive enterprise design theory were chosen to inform the researchers' process and to evaluate and guide LSG's course of action to adapt the organization's C&C structure and processes to S&R. The research was particularly relevant because it had the advantage of a practitioner–researcher relationship, which allowed access to current industry and insider company data. From the workshops and interviews, it was mutually agreed that upon completion of the IT-enabled DE implementation, action plans would be evaluated. As noted earlier, there were efficiency gains, but the firm also needed to adapt to the change in the primary contractual agreement going from a multi-year to a monthly agreement. The company thus had to design new business strategies, structures, and governance to maintain existing value relationships while concurrently being flexible and adaptable to dynamically and quickly create new opportunities. To do this, the firm had to empower employees and eliminate dysfunctional routines—without creating a more complex organization. This is adaptive rather than technical change. Table 7 summarizes the criteria for the change actions.

Table 7: Criteria for the Principle of Change through Action

Criteria	Applied to LSG
4a. Were both the researcher and client motivated to improve the situation?	Yes
4b. Were the problem and its hypothesized causes specified as a result of the diagnosis?	Yes
4c. Were the planned actions designed to address the hypothesized causes?	Yes
4d. Did the client approve the planned actions before they were implemented?	Yes
4e. Was the organization situation assessed comprehensively both before and after the intervention?	Yes
4f. Were the timing and nature of the actions taken clearly and completely documented?	Yes

The fifth CAR principle is learning through reflection. Monthly supervisor meetings were used to update and discuss the practical implications of theory and change progress. As Davison et al. (2004) indicates, CAR learning involves information from internal and external sources that enables restructuring of organizational routines. Reflective learning informs further practical interventions but also re-informs existing theory, thus fulfilling the action research dual imperatives. I suggested that leadership implement ongoing interventions at LSG to focus on designing a specific S&R context based on implementing organizational changes in the reason for being, governing principles, and the business S&R structural design. Learning is dynamic and constrained by context (Schon, 1983), and developing and adapting context is the responsibility of leadership (Haeckel, 1999).

Table 8: Criteria for the Principle of Learning through Reflection

Criteria	Applied to LSG
5a. Did the researcher provide progress reports to the client and organizational members?	Yes
5b. Did both the researcher and the client reflect upon the outcomes of the project?	Yes
5c. Were the research activities and outcomes reported clearly and completely?	Yes
5d. Were the results considered in terms of implications for further action in this situation?	Yes
5e. Were the results considered in terms of implications for action to be taken in related research domains?	Yes
5f. Were the results considered in terms of implications for the research community (informing/re-informing theory)?	Yes
5g. Were the results considered in terms of general applicability of CAR?	Yes

The learning mechanisms are critical for organizational transformation to build and dynamically reconfigure a firm's assets and resources. This study applied adaptive enterprise principles within the iterative CAR methods and provided an understanding of how IT-enabled dispatching technology can augment organizational learning and result in transforming LSG into an S&R enterprise.

V.III Process Study

LSG's need to manage in a rapidly changing operational environment motivated this action research process study. As Van De Ven (2007, p. 22) informs us, studies of organizational change tend to focus on two questions: What are the antecedents or consequences of the change? How does a change process emerge, develop, grow, or terminate over time? Variance models address causal conditions, explaining the antecedent events and input factors of independent

variables that explain the outcome of dependent variables, or "what causes what." Process models capture both the question of how issues and mechanisms emerge and the sequence of events over time (Van De Ven, 2007). The LSG research was guided by empirical evidence, including archival data, staff meetings, observations, and semi-structured interviews (Miles and Huberman, 1994). The data became information that was used to develop diagnostic strategies and knowledge that was used to implement organizational change theory and collaborative learning useful to both the academic and practitioner domains (Susman and Evered, 1978; McKay and Marshall, 2001; Davison et al., 2004; Mathiassen, 2002; Myers, 2009).

The LSG study was a practitioner–researcher project in which I was one of the researcher interventionists and the firm's senior manager. This practitioner–researcher arrangement was particularly aligned with action research's dual imperatives and structural definitions, offering both a practice and a research orientation. The manager–researcher position was also advantageous in providing an existing understanding of LSG's challenges, processes, and political dynamics, along with access to rich theoretical data to address the firm's organizational concerns of systems improvement, organizational learning, and change management. Bias and subjectivity issues were critically examined to ensure that they did not distort the outcomes. In the study, we planned and used strategic management workshops, along with the archival data, to develop the knowledge base and understand the corporate context to diagnose the firm's change management and adaptive survival problem. We considered alternative theories; after an initial examination, we decided to use and build on Haeckel's S&R theory following the engaged scholarship action research model to collaborate with LSG and its stakeholders in examining and developing the firm's adaptive capabilities (Susman and Evered, 1978; McKay and Marshall, 2001; Haeckel, 1999; Davison et al., 2004; Mathiassen, 2002; Van De Ven, 2007).

V.IV Data Collection and Analysis

The LSG research was motivated by the problem of stagnated growth and the need to adapt the company's IT-enabled dispatching capabilities to address industry and environmental discontinuities. Following prescribed research methods, the data collection and analysis concluded in 2013 (Miles and Huberman, 1994; Myers, 2009). The mapping technique included qualitative data from workshops conducted with stakeholders, as well as staff meetings, interviews, field observations, and documents that were generated by internal and external sources. The information in Table 9 outlines the primary and secondary data sources. (Chapter 6 describes the diagnosis from the interventions, as well as the process account, how the data was evaluated, and the outcomes; Table 11 offers a summary of the data collection and analysis.) The study addresses the practical problem of how LSG managers can use IT-enabled dispatching to adapt and survive in a discontinuous environment; it also seeks theoretical research insights into how mobile service firms can effectively use actionable theoretical knowledge of adaptive enterprise design to become S&R enterprises. Given LSG's recent IT implementation and the subsequent discontinuous events—including the firm's service contract expiration—the study used Haeckel's S&R adaptive managerial framework as a heuristic to match collected empirical evidence and provide the framework for managerial development and solutions. Following the engaged scholarship, CAR and S&R protocols were implemented over a twelve-month time period (Haeckel, 1999; Van De Ven, 2007; Davison et al., 2004). The study used multiple information sources, research models, researchers, and theory-based methods to triangulate on the problem and research.

Table 9: Data Sources at LSG

Primary Data Sources	Secondary Data Sources
Workshops (5) **Staff meetings (10)** **Semi-structured interviews (8)** • Managing Partner • Field Services Manager • Customer Operations Manager • Field Service Supervisors **Field observations (~100)** • Dispatch engine data • Penalty reports • GPS data • Follow-up of service calls	**Internal documents (~100)** • Technician daily activity reports • Project implementation notes • Meeting notes • Archival performance data **External documents** • Industry data • https://www.ibisworld.com • http://www.lefleurs.com

The data analysis used contact summary sheets for field contacts as a planning guide to suggest codes and orient the data and qualitative data analysis methods outlined by Miles and Huberman (1994), specifically identifying the main concepts, themes, issues, and questions during interviews and contact with the participants. The research data followed McKay and Marshall's dual cycles in Figure 5 and was performed concurrently with the problem-solving cycle. The data collection was followed by a data-reduction phase, in which the data was selected, summarized, and coded for analysis and for presenting observations and findings. This process is not a singular event; as Miles and Huberman (1994) indicate, it can be iterative, taking place during multiple action steps throughout the study's duration. Data collection was a selective process of what to capture. The next step was data display, which refers to the creation

of the graphs, tables, and figures that organize and frame the information for analysis and presentation to LSG managers. The final step in the analysis strategy was identifying patterns, alignments, and irregularities determined by the data. As Figure 6 indicates, the data conclusions, data display, and data reduction analysis occur in an iterative process throughout the data collection process.

The coding framework identifies the C&C and S&R managerial framework constructs. Regarding *purpose*, the first construct, LSG was found to be enterprise-centric, emphasizing operational efficiency instead of pursuing a value design based on customer outcomes. Second, in terms of *strategy*, LSG's processes were legacy, based on past planned responses rather than responses designed for emergent creation of customer value. Third, LSG's *structure* had functional hierarchical top-down mechanistic controls. The S&R structure emphasizes designing a system of modular disaggregated functions that can be customized based on individual customer needs and value. The fourth construct is *governance*. The C&C behavior emphasizes institutionalized, linear processes; in contrast, S&R design creates context and coordination that identifies the firm's purpose and governing boundary principles, which in turn empower decision making throughout the organization and guide coherent negotiated outcomes. Contact summary sheets and notes supplemented the audio recordings and first-level coding, while second-level pattern codes recorded observed behaviors, norms, relationships, and local meanings that related the data to the research objectives of adaptive transformation.

Figure 6: Data Analysis Strategy (adapted from Miles and Huberman 1994; Singh, 2011)
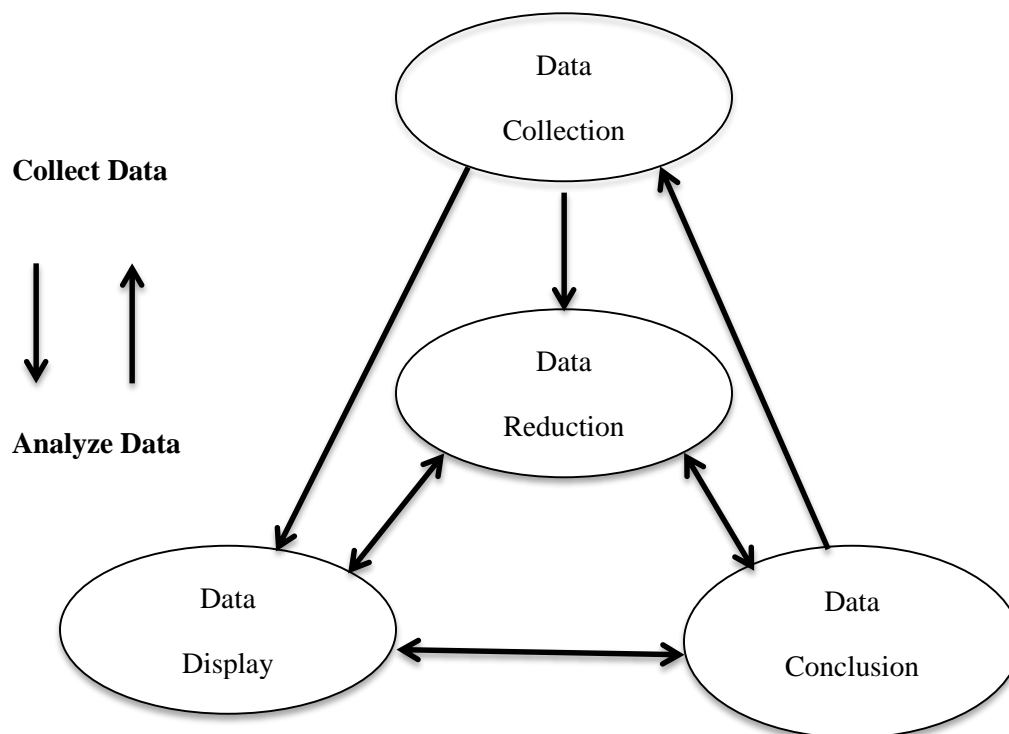
The practitioner–researcher conducted semi-structured, in-person interviews at LSG. Evidence was collected from multiple sources to enhance data quality and facilitate the research. In addition, the data included direct observations—which were part of normal operating evaluation procedures—and evaluated performance metric data captured prior to and following the dispatching technology's 2010 implementation. Following completion of the action research project, all interviews, workshops, and presentations were transcribed; this data was then coded to facilitate interpretation. Miles and Huberman (1994) suggest creating a preliminary list of pattern codes to help tie the data directly to the study's research questions and important concepts. The pattern codes considered tasks, activities, and different roles associated with the

operational cycle and management perspectives. Data was analyzed in relation to

transformational challenges identified by LSG following the S&R organizational coding

framework (Table 10).

Table 10: Coding Framework

Organization Framework	Managerial Capability	Adaptive Definition
Purpose	Command and Control	Enterprise-centric (operational efficiency)
	Sense and Respond	Customer-centric (customer value)
Strategy	Command and Control	Strategic plan of action (legacy processes and planned responses)
	Sense and Respond	Strategic structure for action (customer events and value drive responses)
Structure	Command and Control	Functional hierarchies of authority (efficient and predictable responses)
	Sense and Respond	System of modular roles and accountabilities (decentralized capabilities for customized responses)
Governance	Command and Control	Command and control (institutionalized linear processes to create value)
	Sense and Respond	Context and coordination (organizational purpose and governing principles guide negotiated outcomes)

The study's problem solving and research cycles were guided by McKay and Marshall's

(2001) dual imperatives of action research, the protocols from Davison et al.'s, (2004) CAR, and

Haeckel's S&R framework. The coding indicated that LSG had a clear C&C culture measured

by purpose, strategy, structure, and governance. The strategy and structure measures showed that

LSG had some adaptive characteristics and lesser amounts of purpose and governance. The

company's focus on operational efficiency and institutionalized linear processes has been successful in previous non-turbulent environments, but constrains growth and management in rapidly changing ones. Chapter 6 provides a more detailed analysis of the problem and research cycles, and Chapter 7 details the results.

PROBLEM-SOLVING CYCLE

This chapter describes the problem-solving cycle at LSG, including the antecedent conditions that motivated the study. The chapter provides a process account of the various interventions that were initiated in collaboration with key LSG stakeholders to develop operational systemic improvements that meet the challenges and complexities related to implementing new dispatching technology, organizational learning, and adaptive organizational transformation. The chapter concludes with a discussion of the S&R system design principles that LSG used to formulate a survival strategy.

Table 11 summarizes the following account of the diagnosis, action planning, action taken, action evaluation, organizational learning, and outcomes at LSG.

Table 11: Problem-Solving Cycle

Phase		Research Activities
Antecedent Conditions		• In 2010, LSG adopted an IT-enabled field services DE, which presented an opportunity to examine and improve the firm's capabilities and operations. • During the study in 2013, the firm reached the end of a multi-year contract; this presented new competitive and disruptive challenges that required organizational resource alignment with new governance principles to address complexity and uncertainty. • The study gave LSG managers a practitioner–researcher/theory-based perspective from which to redefine the corporate context and management practices, and learn new adaptive diagnostic strategies to survive in complex and rapidly changing discontinuous market environments.

Phase	Participants	Research Activities
Diagnosis (Nov-2012; Feb-2013)	Researchers	• Examined processes prior to and following the new IT implementation, focusing on scheduling and routing priorities that affected asset utilization, optimization and employee productivity • Examined the firm's technical capabilities and resources, including strengths, weaknesses, opportunities, and threats (SWOT); social and cultural factors; technology advances; and economic trends • Used political and regulatory constraints (STEP) analysis to identify essential structures, routine practices, and productivity outcomes • Framed the study's practical problem-solving cycle to provide insights and inform the S&R theory-based research cycle
Action Planning & Taking (Feb–Mar 2013)	Researcher LSG Managers	• Conducted interventions and workshops with stakeholders to analyze skills and define LSG's enterprise capabilities in bi-weekly meetings with managers • Introduced S&R adaptive design framework • Developed S&R context, including the reason for being, new governing principles, and high-level business design • Performed adaptiveness assessment and constituent analysis to create a roles and accountabilities diagram that maps how firm resources are connected to conditions of satisfaction and expected outcomes • Introduced modularity process design to facilitate decentralization of dispatching to manage by wire • Used S&R organizational analysis to identify LSG's purpose, strategy, structure, and governance
Evaluation (Apr-May 2013)	Researcher LSG Managers	• Introduced the CMP and adaptive loop • Developed the process-critical four-phase adaptive learning loop and the CMP • Explicated four S&R framework components— purpose, strategy, structure, and governance—as

		a basis for transforming LSG from C&C to S&R • Conducted workshop to reinforce learning and understanding of the S&R principles
Outcomes (May–Nov 2013)	Researchers LSG Managers and Staff	• Addressed S&R core competencies • Implemented additional IT to sense and know earlier and to decentralize the dispatching system • Designed the organization as a system of modular capabilities • Developed CMP with customer-back perspective • Developed systems integrator position for further decentralization of dispatching functions • Created dynamic governance system and used the adaptive four-phase loop to produce operational coherence • Developed new policies and procedures to address the transactional and cultural transformation challenges and changes by codifying new adaptive characteristics and governing principles for organizational empowerment and learning

VI.I Antecedent Conditions

The LSG research study was motivated by factors that afforded LSG an excellent opportunity to explore how a technological change might enable operational capability development and coproduce knowledge that could be used as a precursor to survival and growth. The specific discontinuities in the firm's business environment made an adaptive S&R approach feasible for examining and developing the strategic capabilities required to meet current market commitments and survive in a turbulent environment.

Two factors motivated the study. First, in 2010, LSG and the firm's business partner adopted an IT-enabled field services DE. The foundation of LSG's business success is that it meets and exceeds the response requirements and standards in its operating SLA. Prior to its recent adoption of new IT-dispatching technology, LSG's field service dispatching was primarily a manual process initiated by a business partner (Figure 7). Although inherently inefficient, this

arrangement had successfully supported the firm's hierarchical C&C organizational structure. The system required dispatchers to determine multiple subjective variables when receiving a service-call request that adversely affected scheduling optimization and operating efficiencies. The dispatching process lacked four key components:

- An automated mechanism to monitor site-specific service performance

- Metrics to determine call prioritization

- A mechanism for efficient FST routing and scheduling

- Automated customer interfacing

Several of the FSTs indicated that, "when calling the dispatching call center, the productivity of your day is dependent on who is on that day." The significant variability in the experience levels and knowledge base of the dispatching associates effects systemic response efficiencies and customer satisfaction.

Second, during 2013, LSG's multi-year field services contract with its sole business partner terminated. Historically, the firm had operated with multi-year agreements and entered into negotiations prior to termination for multi-year renewals. Now, however, the situation had changed. In place of a multi-year renewal, ongoing discussions led to a verbal agreement of a month-to-month continuance, with consideration for annual renewals at an undetermined future date. The expiration presented a discontinuity and new competitive challenges and highlighted new risks related to the concentration of the firm's revenue sources. These events made senior managers acutely aware of the need to maintain transactional operating processes that address the current market demands, as well as the need to adapt their business model to be transformative to sense and act to develop new opportunities. What LSG (and any firm in a

similar environment) needs is to redesign its systems infrastructure, business plan, and business processes to respond to the new organizational context.

Figure 7: LSG Call Process Structure Prior to IT-Enabled DE
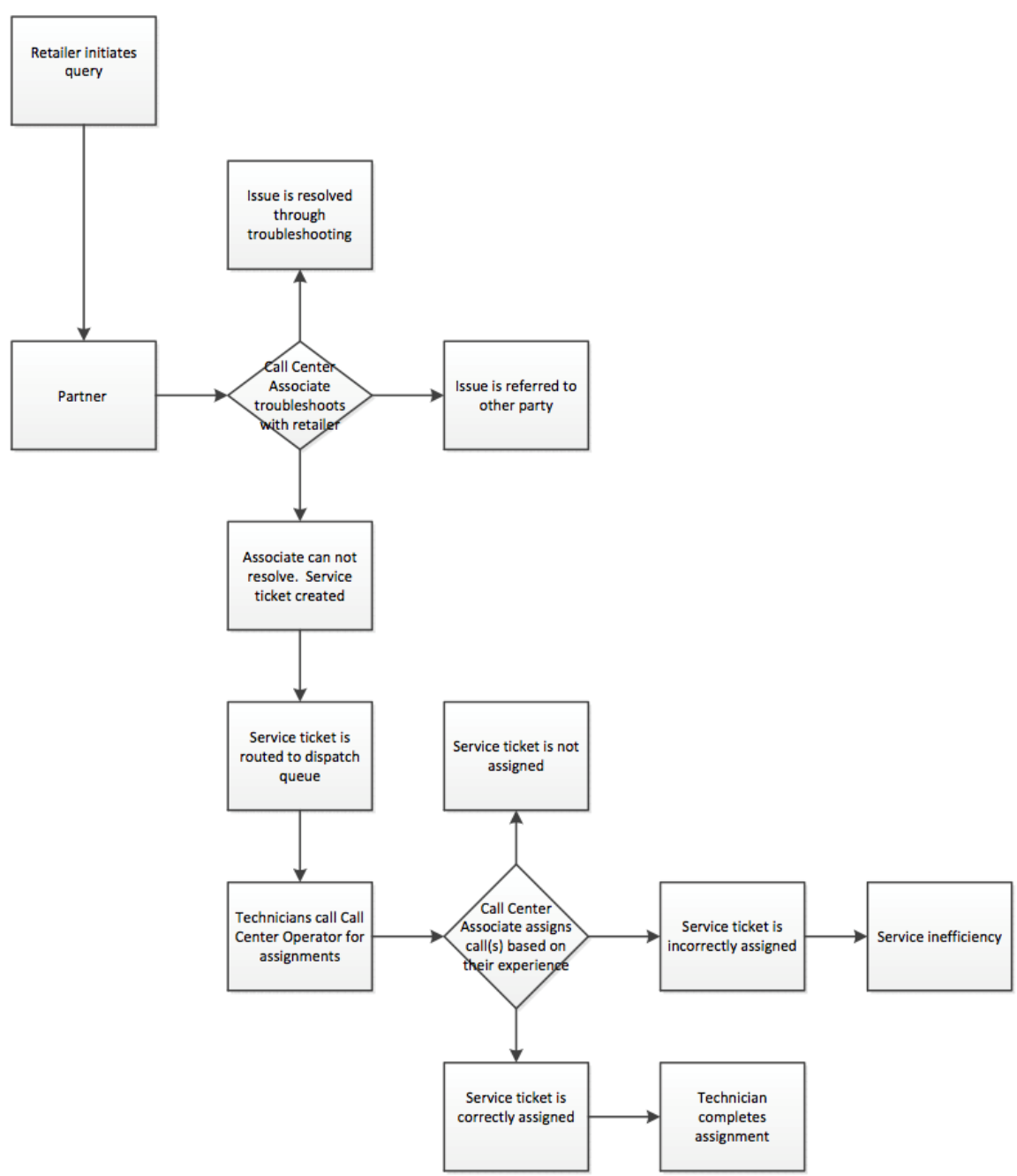
VI.II Diagnosis

In the study's initial intervention workshops, the goal was to understand and define the corporate context prior to and after the new IT implementation. This allowed examination of LSG's technical capabilities, physical resources, human resources, and organizational processes to understand and link operational performance with business strategies. The managers at LSG performed the first series of analyses in November 2012, which provided the data for the initial workshop in December 2012. We reviewed archival performance metrics, current policies and procedures, essential structures, and daily routine practices. Findings indicated that the firm had historically provided superior field service delivery and, like many firms, was locked into operating structures and processes from past conditioned success. The context was one of operational efficiency, with action plans governed by a C&C hierarchy. The measured performance metrics examined indicated excellent operational efficiencies, procedures, and profitability—suggesting that no identifiable problems existed with meeting the current market demands. However, the firm lacked an actionable plan to develop the capabilities needed to identify new growth markets and manage in a changing environment.

The firm's one primary customer is the State of Georgia, for which it provides lottery field services through a subcontracting agreement. Growth has been a function of the lottery's expanding retail base and statewide success. Georgia ranks number three in all national lotteries in terms of highest per capita sales; in 2012, it was the eighth highest nationally in the total dollars returned for education to beneficiaries. The State of Georgia was ground breaking in its formula for funds contributed to specific state educational programs. The statewide performance has resulted in high terminal usage and service requirements, along with a terminal population that has continually expanded, growing from 4,000 in 1993 to approximately 8,500 in 2012. This

growth has driven LSG's slow but methodical expansion. The low-growth strategy resulted from the company initially losing the bid for the largest market service area in 1993. The firm subsequently won the field services contract for a smaller, less desirable market area. This was beneficial because, from the start, the more desirable market area had lower profit margins and required greater cost-saving strategies. LSG had few exemplars of best practices as, at that time, only a few firms provided lottery field services in the US. These circumstances allowed LSG to develop efficient operating strategies and capabilities. The Georgia market also presented geographic service delivery issues due to the variability of locations and density of terminal populations in large metropolitan areas, with outlying small-town areas having relatively few terminals. The firm's organizational learning of the industry's efficient business practices resulted in LSG developing a highly efficient operation and eventually winning the contract to provide field services for the entire state. No additional service areas have been developed, and the firm has no emerging market or acquisition experience.

The foundation of LSG's business success is that it meets and exceeds the response requirements and industry technical standards. The operational SLA has specific response requirements of two hours in metropolitan areas and four hours in outlying rural areas. There are significant penalties for not meeting the response times; historically, the company has performed very well, with a response performance measure that is consistently higher than ninety-five percent. One of LSG's success factors is that it focuses effort and resources to recruit and retain FSTs who live in the lottery's seven identified district areas and thus are generally familiar with the geographic area and the most efficient travel routes that can provide logistical advantages. Also, the company has embraced the latest in GPS technology. Each FST is equipped with a mobile GPS telephone device, making the dispatching function more efficient and resulting in

operating cost savings. The company's capabilities are "fast reliable service, extensive product knowledge and support, government and regulatory compliance, integrity in performance, and commitment to qualified, experienced employees." Management emphasizes "building the long-term partner relationship" and being a "strategic ally." The firm's management structure, customer service visits, and operational routines are aligned with their primary partner's business location and value plans. These linkages translate into high levels of customer satisfaction and the economic value of knowing that a reliable service provider can "make our customer's systems work" statewide. The FSTs' average length of service with the company is 7.1 years and the supervisors' average length of service is 9.4 years. The senior field services manager has 21 years of specific lottery field services experience. Table 12 shows the SWOT and STEP summary performed as part of the study's diagnosis phase.

In 2010, the firm adopted an IT-enabled DE. Although it does not offer specific route guidance optimization, this new DE builds an optimized schedule to improve efficiency and performance through cost reductions in service work, planning, and travel, and by minimizing penalties and maximizing operational control. The DE's operating evaluation criteria are to develop a service-call location and queue, and indicate:

- FST availability
- Scheduled work hours
- Case load
- Average drive time
- Average service-call repair time

In terms of key features and functionality, the DE:

- Develops route building and case load per tech, per scheduled work hours

- Sends communications to techs with case numbers and suggested work order to reduce penalties and driving distance

- Reprioritizes cases when new cases arrive with higher priorities than the tech's current cases

- Sends a communication to indicate when a case is removed from a tech

- Removes cases from the mobile application and sends a Notification Message of Removal

- Runs constantly in the background to build the optimal schedule as conditions change and new cases arrive

Table 12: SWOT and STEP Summary

Strengths	Weaknesses
Industry experience, technician experience, operational efficiency, organizational structure, financial resources	Management succession, leadership development, board structure, marketing, new business development
Opportunities	**Threats**
New horizontal markets, volume and scope economies	Technology innovation, contract duration, loss of key staff, sustaining capabilities

	Opportunities	Threats
Social and Cultural Factors	Contribution to educational revenues Customer interface enhancement, organizational learning	Industry perceptions, C&C, hierarchal management
Technological Advances	Adaptive and operational governance design, dispatching and communication technology upgrade adoption, optimization measures for external market and internal performance information	New terminal service requirements
Economic Trends	Increased retailer locations	General economic trends, decline in retail locations, loss of contractual agreement
Political and Regulatory		Increased industry regulatory requirements and legislative changes, including the 2011 Department of Justice online telecommunications ruling and 2013 Georgia coin amusement machine gaming legislation

The initial DE technology had one primary weakness: it did not address the exact positioning of an FST at any point in time to optimize routing or scheduling accordingly. Also, supervisors and the field services manager had to further augment the dispatching process through manual inputs and overrides when call volume was high. LSG met regularly with the DE technology developers to address the efficiency and functional IT problems and subsequently invested in a separate GPS system to insure efficient operational practices. The IT-enabled DE brought measurable efficiencies in the call process (Figure 8) and technological capabilities, but it was not in itself a sufficient driver of strategic growth or transformation.

Operationally, the technology helped LSG gain efficiencies from the implementation in the second quarter of 2010 in the measurable performance metrics of total service visits (Table 13), as well as in maintenance service problem areas, vehicle miles driven, and operating costs.

Figure 8: Call Process with IT-Enabled DE Implementation
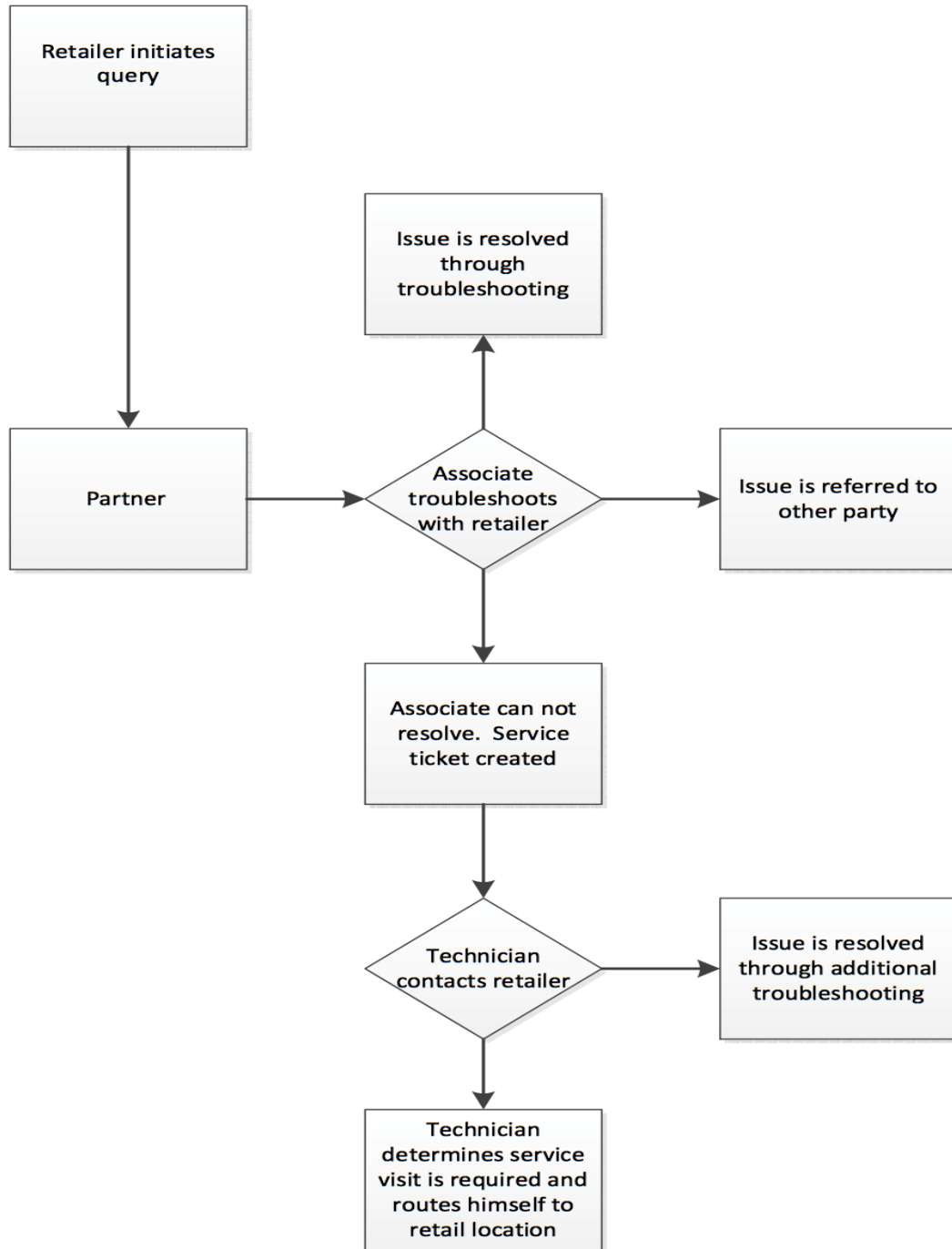
Table 13: LSG Total Service Visits Performance Summary
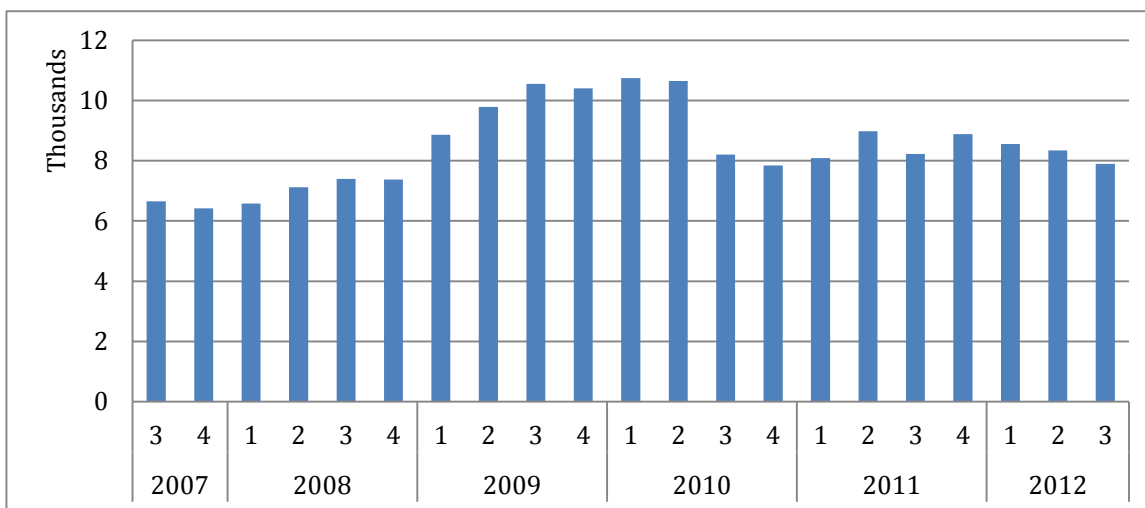
After evaluating LSG's capabilities and resources, the study's diagnostic recommendation was to examine the firm's IT competence and map internal and external stakeholder alliances against the backdrop of the new IT-enabled DE. The analyses indicated that, to achieve business transformation, the firm must exploit the technology throughout the organization by changing internal processes and structures to integrate the IT capabilities, redesign business processes, and the corporate scope (Venkatraman, 1994). LSG has no significant collaborative alliances outside of the partnership agreement that can provide transaction cost advantages such as economies of scale, new market penetration, or speed advantages (Coase, 1937). Continual adaptive organizational design capabilities were required for LSG to align its strategies and structures to produce growth in dynamic environments.

VI.III Action Planning and Taking

The researchers developed an action planning and action taking-workshop in December 2012 to further identify and align LSG's capabilities and improve its strategies and operational context. The goal was both to enable the firm's survival in a changing environment and to

position the company for responsible growth. As Table 12 shows, the activities sought to inform

decisions and suggest options for improving LSG's capabilities by defining external

opportunities and threats, and identifying internal strengths and weaknesses, along with

environmental and technological factors. Initially, the workshops focused on ensuring effective

implementation and use of the IT-enabled DE; we then introduced the S&R theoretical

framework to redefine the operational context developed when the company adopted new

dispatching technology.

Prior to the IT investment, LSG experienced growth from the contractual increases of the

retail base of Georgia's terminal population and internal expense controls, which produced lower

operating expenses and transaction costs. However, LSG's centralized dispatching and service-

call scheduling and routing, provided by an outside source, was inefficient and unsystematic.

These operational deficiencies affected FST effectiveness and did not support an organizational

framework to optimize performance or maximize growth opportunities. LSG lacked IT-enabled

routing mechanisms and metrics to prioritize calls. Because the firm's FSTs had to contact the

dispatching operator for call assignments, they:

- Lacked insight into their workloads

- Were often routed incorrectly

- Were only as efficient as the operator on duty

Moreover, LSG had no mechanisms to track FST drive time or time on site. These factors

resulted in slow response times, high levels of downtime, increased planning and travel costs,

SLA penalties, and FST inefficiency. Also, the company was vulnerable in not having full

operational control of the dispatching process. By contractual agreement, LSG's business partner

had designed and managed the service-call dispatching function. This business model has

historically worked well for all stakeholders. However, in the environment of rapid changes in technology and non-linear customer value demands, the IT-enabled DE had been slow to evolve and—more specifically—it constrained LSG's growth. As Figure 7 shows, the call process is initiated by a customer query into the call center; an analysis then identifies problem areas before the call center dispatcher routes the query. The diamond shapes in Figure 7 represent the manual dispatcher interactions. The call center dispatcher's experience was the primary determinate of operational effectiveness, efficiency, and customer satisfaction, as well as whether the SLA requirements were met.

In the second intervention, held in February 2013, I introduced the S&R adaptive design framework to examine LSG's business strategy, structure, and governance processes, as well as to develop new business strategies and designs that could transform the organizational service areas into S&R adaptive design. I used Haeckel's organizational adaptiveness assessment tool to evaluate ten dimensions: organizational purpose; strategic scope; value capture; the strategic control point (how competitive advantage is established and maintained); coordination and control; authority to act (empowerment); objective setting; decision making; strategy formulation; and resource management. LSG managers assessed the organizational behavior and management dimensions on a scale of 1 to 4, where 1 relates closely to C&C, and 4 indicates adaptive S&R characteristics. LSG's measures were close to 1 on all categories except one, confirming management's emphasis on hierarchal C&C organizational management and structure.

Table 14: LSG Internal Adaptiveness Assessment* (adapted from Haeckel, 2005)

Dimension	Command and Control	Sense and Respond
Organizational Purpose	1	
Strategic Scope	1	
Value Capture	1	
Strategic Control Point		3
Coordination and Control	1	
Authority to Act	2	
Objective Setting	1	
Decision Making	2	
Strategy Formation	1	
Resource Management	1	

* On a scale of 1 to 4, where 1 relates closely to C&C and 4 indicates adaptive S&R characteristics

The following adaptive actions were suggested:

- Incorporate personal accountabilities and procedures in business process design, with negotiated conditions of satisfaction

- Design a firm-specific governance mechanism that coordinates and provides a context for business behaviors

- Design a modular process that uses mass customization to tailor responses to each customer by snapping together foundational processes and products

- Design processes that make other processes learn (individually, collectively, or institutionally)

To leverage these insights and implement the S&R framework, the following adaptive design activities were followed:

- An organizational adaptiveness assessment was conducted

- An analysis and identification of internal and external constituents was carried out, including what LSG owes to whom and why

- A firm-specific governance mechanism was designed to coordinate and provide a context for business behaviors by developing the reason for being and formulating new governing principles

- A high-level business design development was initiated, identifying a cognitive map of key roles and accountabilities with authentic negotiated outcomes and conditions of satisfaction with stakeholders

- The CMP and iterative adaptive loop was introduced to identify how the firm might sense and interpret data and environmental signals so as to systemically develop actionable knowledge to create value for customers

- A modular process design was introduced to tailor rapid responses to each customer and facilitate dispatching system decentralization, which allows for a customer-back-driven strategy and structure design

- Organizational analysis was conducted using S&R organizational framework of purpose, strategies, structure, and governance

Following the DE implementation, performance measures improved and some technical challenges diminished. However, the primary adaptive challenge remained: How could LSG modify the hierarchal C&C management structure and design an S&R adaptive organization based on modular commitment management? The literature and statements by managers

indicated the problem was in LSG's emphasis on efficiency, predictable embedded structural processes, and linear sequential activities.

In the third intervention, conducted in March 2013, I took the next steps and initialized adaptive design actions to begin building an S&R organizational context. The essential purpose was established, expressing what the organization exists to do. The reason for being is not what an organization must do to exist; rather, it is the essential organizational purpose of the business design. Significant effort was required to clearly express what LSG exists to do, versus what it must do to exist. It is the essential purpose that defines outcomes (Haeckel, 1999). This is a key distinction that guided the S&R adaptive development process. LSG managers suggested the following: *"LSG exists to provide its partner with the delivery of terminal network maintenance and service that enables its partner to create enhanced revenue for the State Lottery Corporation."* The reason for being is the "North Star" and essential purpose for adaptive enterprise development.

Having generated the reason for being, the next S&R context component was to establish the governing principles—that is, unambiguous statements of the boundaries of behavior (Haeckel, 1999). The governing principles are prefaced by what the organization will always and never do. The critical contextual element of empowerment emanates from the governing principles. Governing principles are distinct from guiding principles; governing principles are "organizational operating imperatives" that establish the reason for being. At LSG, *"we will always, identify a range of resources for rapid responses to terminal network services with stakeholders; we will always, share sources of opportunities to enhance the revenue of stakeholders; we will always, invest in capability and systems development to respond to individual customer requests; we will never, be unresponsive to the changing business requests*

and needs of stakeholders." These governing principles and the essential purpose are the first

and second components of the template to define LSG's adaptive organizational context. They

describe the philosophy and the values that guide the company's actions, but are also a way of

thinking—they unambiguously define the company's conduct. The governing principles are not

time based, and they can change as the organization adapts, reflecting its evolving values and

aims. Haeckel indicates that all governing principles should:

- Establish the boundaries of behavior, activities, decisions, and accountabilities

- Begin with "we will always" and "we will never"

- Be qualitative rather than quantitative

- Apply to all groups and units

- Lend themselves to objective tests for compliance

- Be likely to endure for at least a few years

- Be devised by policy-making executives

- Include serious system consequences for violations

Governing principles are qualitative, value-based objectives that set the boundaries of

behavior and are measured by what must always or never happen. The study's third management

workshop also aimed at redesigning the firm's governance mechanisms. The intervention

objectives were to provide the foundation for adaptive design methodology to focus on

outcomes. LSG has historically focused on internally measured efficiencies to determine success.

However, adaptability requires internal and external delivery of outcomes that align with the

firm's essential purpose and customers' values. The S&R context's third component is designing

a high-level business design that originates from the essential purpose or reason for being. It is

"not an organization chart," but rather is the coherent depiction of the interactions of the

systemic parts as a whole (Haeckel, 1999). This allows managers to highlight relationships and outcomes, developing the capability to deal with complexity without making the organization more complicated. A critical understanding for adaptive transformation—particularly for small businesses—is to be able to develop a coherent, scalable business design. Such a design that includes modularity capabilities can grow and empower staff members to manage complexity using strategies that go beyond the simple designs and responsibilities of the business origins.

The reason for being, governing principles, and high-level business design define the organizational context. The next step in the adaptive business design process was to identify and coordinate interactions within the S&R context. The organizational responsiveness from the empowered staff members requires outcome accountability agreements, which are coordinated by establishing roles and accountabilities connected through commitments of satisfaction. I performed a constituent analysis to identify LSG's internal and external commitments and why they exist (see Table 15).

Table 15: Key Constituent Analysis of LSG

What Outcome Is Owed	To Whom	Why Constituent Values the Outcome
Quality delivery of network maintenance, consumables delivery	State lottery	Continuous availability of consumer service, revenue for education
SLA fulfillment, commitment to retailers to deliver network maintenance, deliver consumables	Partner	Generation of revenue for education to meet network contract requirements

The constituent analysis provided the foundation for defining roles and accountabilities (Figure 9) in terms of commitments, and provided perspective to leaders on the interrelationships

of the system as a whole and its relationship to the reason for being. S&R is founded, in part, on systems theory (Ackoff, 1994; Haeckel, 1999). The high-level business design of context is a function of systems design in that it depicts the interrelationships and roles as a whole. Haeckel points out that all parts of the system and accountabilities and outcomes must serve the reason for being: *"LSG exists to provide its partner with the delivery of terminal network maintenance and service that enables its partner to create enhanced revenue for the State Lottery Corporation."* As Figure 9 shows, the S&R adaptive system design for LSG is very different from the typical process design in Figure 7. The ovals are the roles and the directional arrows are the outcomes, showing what is owed and to whom—that is, it shows the commitments and why the organization and roles exist. The first ovals represent the state lottery and the revenue opportunities owed to retailers, and the state education funding that retailers supply to the state lottery. The next ovals are the partners and the interrelationships with LSG; unidirectional arrows represent commitments and outcomes necessary to achieve the reason for being. Figure 7 shows inefficiencies in the process organizational representation, which uses linear relationships to produce outcomes. These inefficiencies are especially clear when compared to the S&R systems design in Figure 9, which codifies the negotiated outcomes of interactions and conditions of satisfaction to produce outcomes related to the reason for being.

Figure 9: LSG Roles and Accountabilities S&R System Design
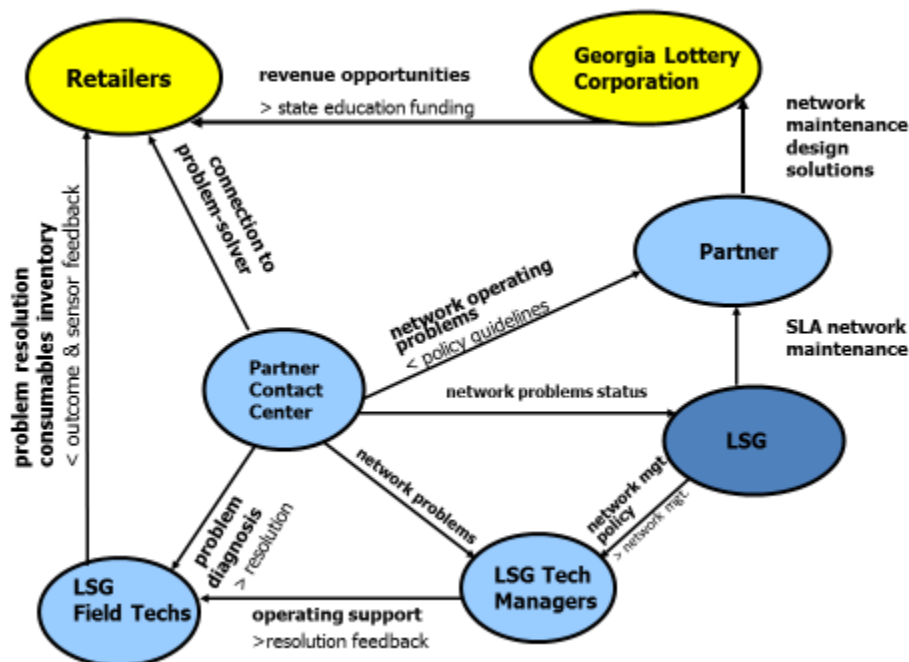
VI.III.i Commitment-Management protocol. The next step in adaptive design that Haeckel suggests is to establish a protocol as a standard language that codifies commitments and accountabilities.

The CMP provides rigor and clarity for communicating the authentically negotiated commitments (Figure 4). A fourth workshop conducted in April 2013 introduced the CMP and its four task phases of define, negotiate, perform, and assess, as well as its seven communications of offer, request, agree, report, accept, reject, and withdraw. The workshop also identified an opportunity to leverage the IT-enabled DE to support the CMP process to identify the firm's capabilities, and communicate and respond to customer's conditions of satisfaction.

The other adaptive CMP characteristics and capabilities that LSG managers needed to understand was the propagation of the governing principles and the organizational enabling of the modular capabilities. The CMP model's task phases and communication requirements facilitate the identification of capabilities that empower organizations to manage rapid change and achieve outcomes. Thus, augmented by the IT-enabled DE, LSG managers can develop capabilities to "mange by wire" and significantly increase the organization's capacity to turn data into information and produce knowledge to adapt its scale and scope, enabling it to adapt to rapid change. That is, the firm now has the tools to develop organizational capabilities to survive—as well as the adaptive capacity to grow. The communications are aided by the adaptive loop to sense, interpret, decide, and act.

The adaptive foundations were established at LSG with context, coordination, roles, and accountabilities that have modular capabilities from the CMP. The organization was then able to understand the S&R adaptive loop (Figure 3). The loop's four steps—sense, interpret, decide, and act—are driven by sensing data from internal and external probes and sources. Interpreting is the next step in the adaptive loop; it applies context to the data. This assists firms in making choices by identifying both the important qualities of things and their potential relationship value. Deciding is the transformation of knowledge into action through decisions about resource allocation. LSG's IT connectivity to customers is a key factor here; it must be developed to drive the CMP, which will facilitate the decision process. The last step is acting on the knowledge by actually allocating resources rather than simply reaching conclusions. Action is making strategic choices about how resources should be deployed and communicated to commission activities. The CMP's communicating and task requirements create the potential for modular action

strategies. The adaptive challenge for LSG is identifying and understanding environmental problems, and quickly applying knowledge into emerging, customer-specific value opportunities.

In the final management intervention conducted in May 2013, I introduced the adaptive organizational framework, which was used to code the research (Table 10) and provide an overview of C&C and S&R managerial capabilities as they relate to the organization's purpose, strategy, structure, and governance. The organizational components' interrelationship creates an adaptive business design with capabilities and capacity to survive in accelerating environments of change and position the organization to respond to customer needs for growth. The May 2013 workshop also introduced three successful models of S&R adaptive design implemented at IBM, Xerox, and the US Department of Defense (DoD). The DoD adopted the S&R model, claiming that it offers "adaptable, agile, scalable, and interoperable response capabilities" (Lin and Luby, 2005). The DoD uses the S&R model as part of Network Centric Operations, which empowers local commanders with information and a coordinated mechanism that proactively detects events, aligns operations with strategy, integrates planning and execution, and supports sustainment (Lin and Luby, 2005). Xerox used the S&R adaptive principles to design and respond to a customer satisfaction crisis. Senior managers designed the organization's Sentinel customer satisfaction solution, which has been implemented in twelve languages and twenty-nine countries worldwide using the S&R design.

IBM's S&R example was particularly relevant to LSG. The Business Enablement Solutions organization that reported to the CIO of IBM Global Services developed a reason for being, governing principles, and role and accountability design with conditions of satisfaction to develop new projects outcomes. The organization established the following reason: "The IBM Application Delivery Team exists to deliver high-quality application development and

maintenance services within terms of the contract resulting in high customer satisfaction, low costs and additional business opportunities." The results of the IBM initiative provided improvements in customer satisfaction, over-achievement of revenue targets, improved cycle times, and improved employee morale (Forno, 2012). This is an excellent model to guide LSG in its development of organizational context.

VI.IV Evaluation

Prior to the IT implementation, LSG's service-call scheduling and routing were inefficient and problematic, which was reflected in the relatively high service-call levels for four quarters prior to the implementation. During that time, we found no unusual variability in the external components that may have impacted service calls. Managers indicated that inefficiencies in the dispatching functions contributed to the call volume and could have been significantly improved from the process in Figure 7. Operationally, the technology helped LSG gain efficiencies in total service visits following its 2010 implementation (Figure 8); efficiencies also increased in other measurable performance metrics, including service problem areas, vehicle miles driven, maintenance, and operating costs. The performance metrics confirmed improvements in the measured categories of service visits (Table 13), consumable deliveries, and improvements miles driven.

The study's diagnostic and planning interventions were evaluated, relating S&R principles to LSG's C&C organizational management framework of purpose, strategy, structure, and governance (Table 10). The organization has developed the foundational S&R components of context—the essential purpose and reason for being, governing principles, and high-level business design—that address the purpose and strategy components. However, the organization still faces challenges with the adaptive structure. In monthly manager meetings and

organizational meetings, S&R learning activities and competencies are discussed and developed. The firm is revising its operational policies and procedures documents to establish a coherent empowerment and organizational alignment that complement the S&R principles and will include compensation incentives for managers that meet adaptive objectives. The outstanding S&R design component is the CMP (Figure 4). The organization is creating a systems integrator position to facilitate the coordination of capabilities and resources, and the position will have project manager responsibilities for new business development. LSG has not had multiple customers or strategic alliances outside of the primary customer and partner relationship, and the new position will significantly enhance that capability. The organization is also investing in additional IT and marketing data development capacities to increase customer interface capabilities and identify growth opportunities. The S&R framework that was initially implemented for transformation is also being used to strengthen LSG's transactional relationships resulting from management's commitment to S&R capability development and increased adaptive design consciousness. LSG, like other firms, is facing the difficult challenges of transformation that require a fundamental change in organizational functions and structures (Ackoff, 1994). It will be an evolving process for LSG to integrate the S&R principles with C&C legacy practices and develop the competencies necessary for adaptive transformation.

The study's final workshop conducted in May 2013 also focused on organizational learning and leveraging the IT-enabled DE to provide linkage for capabilities and codification of new coproduced knowledge. Organizational learning is a key component of adaptive enterprise design to establish organizational alignment of collective activity for the firm. The senior managers have begun to systematically generate, modify, and codify LSG's operating policies and routines. This process of learning requires more than just adaptation within a given context;

it requires continual adaptation of the context itself (Haeckel, 1999). Organizational learning suggested by Argyris and Schon (1978) and Senge (1990) involves planning, implementing, and reviewing actions. The adaptive learning emerges from aligning governing principles, carrying out action strategies—and then taking adaptive actions through a feedback loop—and reflecting on the consequences of the action. LSG's reason for being, governing principles, and new business design creates the context and informs the senior managers in situations of rapid change; this gives LSG the transformational foundation it needs to become an S&R enterprise. The monthly supervisor meetings and quarterly management meetings have agenda items that identify these actions and are producing knowledge and understanding of adaptive governance for LSG. Continuous workshops are required to institutionalize the development of flexible, adaptive, and productive organizational capabilities for transformation. The IT-enabled DE can be used to codify the adaptive process, but the study indicates that expansion of IT capabilities beyond the firm's existing systems is required to redefine the business network and scope, modularize dispatching, and develop the transformational adaptive principles for growth.

VI.V Outcomes

The five interventions and managerial workshops were planned and implemented over a twelve-month period to develop an understanding of LSG's operational and management processes. Using an engaged scholarship action research framework, the research built a situational awareness and introduced adaptive systems design principles to identify and create dynamic capabilities and build a new organizational context at LSG for transformation from C&C toward an S&R adaptive design for responsible growth. We examined four management framework components—purpose, structure, strategy, and governance that together formed the organizational capabilities necessary to become adaptive. We introduced LSG to six core

competencies that are required to be an adaptive enterprise. First, the research examined the

implementation of an IT-enabled DE, which was adopted to improve operational efficiencies and

help LSG more quickly assimilate information and leverage capabilities and thereby become an

S&R enterprise that can sense and respond to opportunities earlier. This initial intervention also

indicated that LSG was a C&C-managed organization with a hierarchical structure. The firm did

not have S&R organizational adaptive capabilities, and it focused on efficiency and reaction to

customer requests. Second, we augmented LSG's sensing and responding capabilities by

suggesting that the IT-enabled DE be used to manage new information to "managing by wire"

using the adaptive loop. LSG's recently adopted DE provided some service optimization, but the

technology was lacking a significant customer interface that would rapidly sense and interpret

customer event-back data and communications. Additional, expanded IT capabilities are required

to further decentralize dispatching and empower supervisors. Third, we introduced the

organization to a system of organizational design elements with personal accountabilities that

interact by producing strategic context. LSG had a C&C hierarchical organizational structure

emphasizing efficiency. The interventions designed new firm-specific governance mechanisms

that provide a context for business behaviors by developing the reason for being, governing

principles, and a top-down, high-level business design with roles and accountabilities that

authentically negotiate conditions of satisfaction and outcomes. Fourth, we developed

foundational understanding of systemic modular dispatching capabilities from the customer

event-back. LSG had predictable, efficient, and linear operational strategic activities. Using

S&R's modular processes from the CMP and developing a systems integrator position will allow

rapid customized responses that facilitate further decentralization of the dispatching system. This

will also aid in organizational alignment, scalability for growth, and complexity management,

without making the organization more complex. Fifth, senior managers are learning to develop the technology assisted CMP to not only track commitments but also to diagnose existing processes by defining roles, establishing customer supplier relationships, and sequencing communication acts and task phases internally and externally. Sixth, LSG is creating a dynamic governance system that identifies and integrates capabilities and tracks commitments by defining roles and accountabilities to inform one another of desired outcomes. This is augmented by the adaptive loop, which is used as a template to sense, interpret, decide, and act to design structural processes and customer response requirements.

LSG's culture has begun to change as a result of the study's interventions and workshops. The new policies and procedures being developed will aid in operational coherence and communications by codifying new adaptive characteristics and principles. Organizational learning will be enhanced with the planned continuation of adaptive development workshops. The organization has an acute awareness of shifts in the environment—from regulatory to technological changes to the changing business plans of partners—and the need to redesign and retool for survival and growth.

RESULTS

In this chapter, the problem-solving cycle at LSG is analyzed and discussed using the S&R managerial framework of purpose, strategy, structure, and governance capabilities. The analysis indicates that LSG after the interventions is not exclusively a C&C or an S&R enterprise, but rather has characteristics of both. The data suggests that this evolving hybrid architecture of transactional C&C capabilities and adaptive transformative S&R capabilities will best help the enterprise produce customer value and promote growth.

VII.I Analysis Overview

To initiate the analysis, research data was analyzed and coded using the four S&R organizational framework dimensions of purpose, strategy, structure, and governance as the foundational components for adaptive organizational transformation. I evaluated each dimension by identifying the management characteristics as being either hierarchical and C&C or adaptive and S&R. The coding framework (Table 10) was applied in three steps. First, I analyzed how C&C characteristics and S&R characteristics were evident at LSG before the interventions. Second, I analyzed how each of the five interventions addressed existing C&C practices and aimed to implement improved S&R capability. Third, I analyzed changes in C&C and S&R characteristics after the interventions and as a basis for future strategizing. Also, along with the coding framework, I used an additional adaptiveness organizational assessment tool developed by Haeckel to examine ten organizational dimensions of LSG for adaptiveness (Table 14). LSG managers assessed the dimensions of organizational purpose, strategic scope, value-capture, strategic control points, coordination and control, empowerment, objectives, decision making, strategy formulation, and resource management. The results indicated that the firm was more

C&C than S&R in all but one category—strategic control point, which addresses the firm's intent to establish and maintain competitive advantage. This provided additional information and fuller insight into LSG's organizations adaptive characteristics.

The data of LSG's corporate-stated organizational purpose, operational strategies, structure, and governance processes indicates that the firm's managerial and organizational framework exhibit a hierarchical C&C orientation. Such an orientation has been successful for LSG in the historically stable operating environment, which rewards having efficient mechanisms in markets with predictable value requirements. LSG's adaptive strategies and governance characteristics were limited before this action research, which represented a challenge in the emerging environment of rapidly changing regulations and unpredictable technology. The company was increasingly facing an environment in which survival depends on LSG changing its purpose, strategies, structure, and governance values from enterprise-centric to more customer-centric, where strategies are driven by customer-back collaboration rather than predetermined firm-forward action plans. The functional hierarchical structure therefore had to be reengineered into an adaptive system of modular roles and accountabilities, with a governance system that is flexible rather than rigid and that is also hierarchal, but in a way that develops and coordinates the organizational context (Haeckel, 1999).

VII.II Purpose

Prior to the interventions, LSG's purpose emphasized operational efficiencies and predictability, as indicated by the historical operating data and statements in LSG's corporate literature, "our daily objective is to provide superior efficient service and performance by focusing on the company's core value." The performance metrics that were analyzed confirm management's objective. LSG's operational focus does not align with adaptive design. The

company's essential purpose is the reason for being statement, which is the foundational first step in creating the organizational context for adaptability. The statement had to become customer-centric, stating what the organization exists to do—not what it must do to exist (Haeckel, 1999).

Table 16: Purpose C&C – S&R

Managerial Framework	Research Phase
Purpose	**Enterprise-Centric: C&C** • Dependable, prompt service delivery driven by SLA performance metrics • Lower transaction costs to improve margins and profitability
	Customer-Centric: S&R • Develop collaborative relationships to create value for customers and stakeholders

The interventions initiated a new reason for being and essential purpose at LSG. The second S&R action planning workshop conducted in February 2013 proposed a very specific definition of what the organization exists to create or do, not what it must do to exist; this is a key distinction. The reason for being and essential purpose is as follows: "LSG exists to provide terminal network maintenance and service that creates enhanced revenue for the Georgia Lottery Corporation for state education programs."

VII.III Strategy

LSG's daily objective is to provide superior performance by focusing on its core strengths of dependability, efficiency, confidentiality, and high performance. The firm has defined itself by performance metrics, number of service calls, and response times. Dependable,

prompt responses have been the key factors that affect the company's contractual relationship, total performance, and profitability. Meeting the SLA performance measures with speed and efficiency prevented LSG from accruing aggressive penalties for delayed responses to "down-calls" identified as "liquidated damages." The foundation of the company's business success is that it meets and exceeds the response requirements and standards. LSG's firm-forward strategic plans have been successful, but they are not adaptable; the predictable C&C strategies are limiting the company's growth opportunities. Transformative adaptation to new changes in the legislative and technological landscape is required for LSG to survive. Creating an organizational context that is flexible, with coherent behaviors, is required. To overcome LSG's vulnerability—that of not having additional revenue sources outside of the current contractual agreement—requires an adaptive S&R-responsible growth strategy.

Table 17: Strategy C&C – S&R

Managerial Framework	Research Phase
Strategy	**Strategic Plan of Action: C&C** • LSG is defined by efficiency performance metrics, number of service calls, and response times • Used preplanned, firm-forward processes and decision making • Lower transaction costs improve margins and profitability
	Strategic Plan for Action: S&R • Dynamic systems design of the business model to adapt to rapid and unpredictable environmental change • Develop strategy as structure for interactions, including customer event-back decision making

The strategy intervention workshop introduced systems design. As Haeckel (2010) informs us, systems design is "a collection of elements that interact to produce an effect that

cannot be produced by any subset of those elements." The system design builds from the reason

for being by developing the boundary governing principles and the relationships of the roles and

accountabilities system. It also identifies how progress is measured with conditions of

satisfaction, which is a necessary condition for S&R adaptability. LSG's previous growth and

opportunities have been a function of increases in the state's lottery retail base. The company's

competitive advantage has been product knowledge, reliable performance, and a commitment to

qualified, experienced employees. The new S&R relationship strategy for sustainability requires

co-creating value with customers based on customer-back collaboration. The key to this is LSG

being defined not by the delivery of field services, but rather in terms of offering customers the

economic value of reassurance that their terminal systems will work. LSG has developed new

organizational adaptive operating procedures that clarify FST authorities and accountabilities

with empowering governing principles (discussed in Chapter 6). The objective is to begin

internally, then initiate authentic negotiations externally and produce organizational alignment,

customer benefits, and value. Haeckel indicates that the collaboration with customers will

produce knowledge that will increase LSG's value as a stakeholder to its customers. This

"information exchange" leads to the development of new dynamic capabilities, allowing LSG to

understand customer value, meet unidentified needs, and address changing market conditions.

VII.IV Structure

LSG was established and has successfully operated as a hierarchical organization. The

data for the structural workshops confirmed that the company was operated using linear and

reliable C&C structural designs. The event that effected LSG's structural change prior to the

research interventions was the adoption of an IT-enabled DE discussed in Chapter 6. Figure 7

shows the dispatching process prior to the IT-enabled DE implementation; it lacked both a

comprehensive interface to facilitate communication with customers and prioritization metrics

for routing service calls. Operating efficiencies were therefore driven by the dispatcher's

knowledge and experience. The two diamond sections in Figure 7 are the points of dispatcher

involvement and customer interfacing, which were problem areas that generated inefficiencies

for LSG. Performance challenges resulted from the dispatching inconsistencies. Uncertainty and

a lack of understanding existed on how multiple relationships effected the production of

outcomes. FST commented that the knowledge gaps of some dispatchers "produced conflicts of

call prioritization and routing" that increased the probability of service delays and translated into

penalties. LSG lacked organizational alignment and understanding of the roles and

accountabilities within the system as a whole, as well as the interdependencies that effect

performance. As Figure 8 shows, the IT implementation changed the call process and brought

improved labor costs, fuel cost savings, lower SLA penalties, and higher customer satisfaction

(indicated by the favorable feedback responses from district retail managers).

The customer–company interface has moved from the dispatchers to the FSTs, utilizing

the partner contact center shown in Figure 9 which enhances LSG's abilities to sense and

interpret customer preferences. The new DE produced significant efficiencies, including

schedule and route guidance optimization and cost reductions in service work and travel by

optimizing the dispatching operational and structural controls. It also gave management a

foundation to start building the new context of the reason for being, governing principles, and the

high-level business design by providing coherent behavior, organizational alignment, and

empowerment for FSTs.

To be transformative and an S&R organization, a firm's purpose and structure must be

redesigned—so that its strategy and customer information directs the structural design—to adapt

and respond. At LSG, the additional benefit from the IT-enabled CMP is that it enables
modularity, in which "strategy can become structure" (Haeckel, 1999). LSG can now modularize
the business functions and strategies to create capabilities that can be dispatched based on
specific customer requests. This is a pillar of the S&R design.

Table 18: Structure C&C – S&R

Managerial Framework	Research Phase
Structure	**Functional Hierarchies of Authority:** • Efficient functional hierarchical organizational structure with centralized layers of managers and supervisors • Network of capabilities
	System of Modular Roles and Accountabilities: • Strategy becomes customizable structure with empowered decision makers throughout the organization that link modular roles and service capabilities around customer requests to produce defined benefits and outcomes • Interoperable and coherent at scale

VII.V Governance

LSG's C&C governance processes are driven in part by the success of the firm's
performance metrics, as well as its efficient and functional centralized management. Having
supervisors and FSTs with long average lengths of employment in a historically static
environment has worked well. However, the present environment's regulatory, legislative, and
technological uncertainties, along with the contractual strategies of LSG's business partner, place
the firm's survival at risk. Prior to the intervention, LSG's corporate documents—including the
policies and procedure manual, which all employees reviewed and signed—made clear
declarations of the company's quest for functional operational efficiencies. The strategies and

embedded C&C practices produced positive operational outcomes. Although annual sales have been relatively stable, the margins have improved, reflecting the efficiencies. The linear sequential value chain minimized internal and external transaction costs and management complexities. This was a successful formula within a corporate context with minimal equivocality. LSG and the lottery industry in general have historically had minimal disruptive competitive pressures and the technological changes have been predictable generational developments. However, the 2011 US Department of Justice ruling and the 2013 state legislative changes in Georgia have opened up Internet and mobile gaming channels, which has introduced additional complexity and uncertainty in the industry. More specifically, LSG's long-term contractual agreement is expiring and the company's survival is dependent on making fundamental changes and designing adaptive governance and responsible growth strategies.

Table 19: Governance C&C – S&R

Managerial Framework	Research Phase
Governance	**Command and Control:** • LSG defined by efficiency performance metrics • Mechanistic, slow-changing efficient decision processes • IT-enabled dispatching system and new initiatives implemented with legacy organizational design • Discontinuities now are being met by operationalization of modified rules and processes being institutionalized with new behavior norms and a new IT-enabled dispatching system **Sense and Respond:** • Context: reason for being, governing principles, high-level business design (interaction of the critical elements) • Coordination: high-level business design, commitment-management system • Hybrid organizational structure developed for transactional C&C technical change and transformational adaptive S&R change • IT enabled CMP, a dynamic systems design of the business model, introduced to track the dynamic status of "who owes what to whom"; also makes roles modular, and propagates governing principles • Identify specific employee skills and resources for adaptive action and modular responses • Continuous leadership development for orchestration of all organizational capabilities • Continually identify opportunities and threats using IT-enabled dispatching to gather, process, and model data, and monitor organizational system to manage by wire using organizational adaptive loop learning • Survival and growth driven by value creation for stakeholders • Monitor organizational structure alignment with purpose, including communication and incentives with FSTs

The S&R governance workshop conducted in May 2013 built on the purpose, strategy, and structural interventions. It focused on implementing the following principles of (1) designing

firm-specific context for business behavior, (2) incorporating roles and accountabilities in the business design, (3) designing a CMP with modular capabilities that codifies conditions of satisfaction, and (4) designing processes that make other processes learn using the adaptive loop. The organizational context was expanded from the development of the essential purpose and reason for being to developing the boundary conditions, or behavioral ground rules, of the new organizational policies. The third component of the business context is crafting the high-level business design. "The high-level business design originates from the stated purpose the system exists to achieve," that is, from the reason for being—not from a list of capabilities (Haeckel, 1999, p. 128). A top-down redesign of LSG's governance structures was now possible to fully develop a new context. The workshop focused on the interactions of the company's functional relationships and desired outcomes, rather than specific problem solving. We reviewed LSG's essential purpose—to provide terminal network maintenance and service that creates enhanced revenue for the Georgia Lottery Corporation for state education programs. We then reviewed the governing principles of what the company "will always and never do" to achieve the reason for being. These are the boundaries of action, and are LSG organizational imperatives.

The next step was to introduce and establish the CMP. This workshop introduced and defined the capabilities of management coordination. Coordination combines the elements needed to manifest the reason for being, and the roles and accountabilities, with a commitment-management system to create modular response capabilities. The CMP (Figure 4) provides the rigor and clarity and makes the S&R governance system possible. Defining LSG's internal and external roles and accountabilities (Figure 8) to produce negotiated outcomes, then tracking the commitment's dynamically changing status, provides the S&R system's rigor. The CMP is the linking mechanism of dynamic capabilities and makes the roles modular, which will be the

foundation for growth. A prerequisite, however, is to empower employees. To start the process,

we clarified LSG's roles and accountabilities. The S&R role and accountability architecture

defines the interactional relationship between customer and supplier based on commitments to

outcomes. Accountability is established by meeting the conditions of satisfaction of "who owes

what to whom." These are not ambiguous lists of activities, but rather defined essential outcomes

that contribute to the reason for being. The only mandatory conditions are deadlines and

alignment with organizational governing principles. Haeckel indicates that they can take various

forms:

- Deliverables that guarantee minimum performance

- Acceptable boundaries for measurement (that is, return on investment)

- Definition of mandatory behaviors

Figure 8's process design diagram shows task boxes sequenced by arrows indicating how

time-oriented outputs are to be created. Even after the implementation of the IT-enabled DE, the

process design improved efficiencies but does not specify the essential customer interactions

necessary to achieve outcomes and valued results. Although adequate in a static environment,

this is not adaptable to manage or anticipate change. Figure 8 shows the S&R adaptive system

design for LSG, which is very different from the typical process design. The ovals are the roles,

and the directional arrows are the outcomes; together they show what is owed and to whom. This

shows both commitments and why the organization and roles exist. The first ovals represent the

state lottery and the revenue opportunities owed to retailers, as well as the state educational

funding that retailers supply to the state lottery. The next ovals are LSG's partners and their

interrelationships. The unidirectional arrows represent the commitments and outcomes necessary

to achieve the reason for being.

The research data results indicate that, prior to the interventions, LSG's purpose, strategies, structure, and governance operational characteristics were hierarchical C&C. As a result of the interventions, LSG is evolving into a hybrid S&R adaptive organization. The company's field services industry still requires transactional value creation in the current environment with capabilities and systems to maintain the present niche of predictable customer needs and demands. Still, efficiency and functional sequential activity are essential in an environment that demands transformation.

Understanding that transformation does not and should not happen at once, Figure 10 represents LSG's evolving hybrid S&R orientation by first identifying the contractual framework of the customer (state lottery), partner, and LSG. The roles of each stakeholder and the interactions in each role are the ovals, with arrows connecting the roles and accountabilities by outcomes. The directional arrows have no time sequence of action, but indicate who owes what to whom. The three stakeholders interact in the field service process as follows:

Customer

- Retailers contact the Contact Center with requests for service

- The Contact Center provides some services over the phone

- FSTs provide other services on site

- Partner provides contractual network solutions to the customer

Partner

- Senior Managers provide policy guidelines

- Contact Center presents operating problem status to Senior Managers

- Contact Center creates service ticket and inputs the service requests into the DE, which refers network operating problems to LSG Senior Managers, Supervisors, and FSTs

LSG

- Senior Managers provide network maintenance policy and operating support to Partner, Supervisors, and FSTs

- Supervisors provide Senior Managers with network management

- FSTs provide problem resolution to Retailers, and resolution feedback to Contact Center, Supervisors, and Senior Managers

- Retailers provide LSG outcome and sensor feedback

Figure 10: LSG S&R Hybrid Roles and Accountabilities
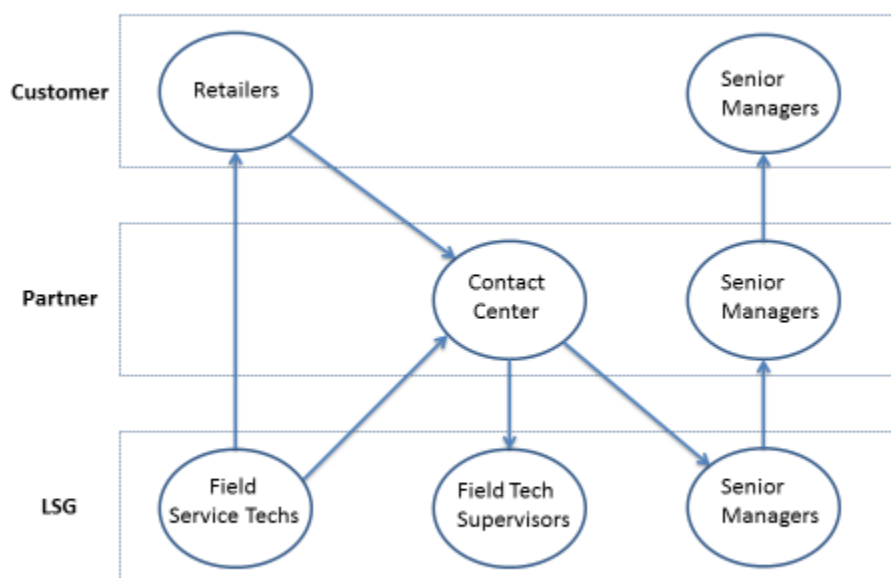
The accountabilities between LSG, the partner, and customer are created as commitment agreements. Haeckel suggests using an IT-based protocol to coordinate the commitments that will align with the reason for being and the essential purpose discussed in Section 6.5. The CMP, (Figure 4) through the four tasks phases (define, negotiate, perform, and assess) and the seven

communications (offer, request, agree, report, accept, reject, and withdraw), provides rigor and clarity to this governing process. By clarifying and defining the roles, specifying the outcomes and conditions of satisfaction, and sequencing the tasks, the CMP also develops modularity capabilities. For LSG, this means further empowering FSTs and decentralizing the dispatching function. In addition to adopting the IT-enabled DE, LSG is going to be expanding the technology capabilities that will enhance the managing-by-wire capabilities to gather more detailed data; this will also augment the CMP and the adaptive loop of sensing, interpreting, deciding, and acting to make meaning of environmental changes. The enhanced IT capabilities implementation and expansion will also permit the codification and design of organizational learning, driven by the adaptive loop to respond to change.

The adaptive organizational learning process has begun at LSG and is guiding the company's transformation from C&C to a hybrid S&R governance. In addition to defining its new reason for being and establishing new dynamic capabilities, LSG has new governing principles, roles, and accountabilities; protocols to empower; and leaders and employees with expanded IT-enabled capabilities to sense, interpret, decide, and act upon commitments to create customer value. A subsequent adaptiveness assessment done by the managers after the interventions indicated that three of the ten dimensions (Table 20) now have S&R characteristics, as compared to one prior to the interventions (Table 14), indicating the evolving transformational S&R hybrid characteristics at LSG.

Table 20: LSG Internal Adaptiveness Assessment Post Intervention

(adapted from Haeckel, 2005)

Dimension	Command and Control	Sense and Respond
Organizational Purpose		3
Strategic Scope		3
Value Capture	1	
Strategic Control Point		3
Coordination and Control	1	
Authority to Act	2	
Objective Setting	1	
Decision Making	2	
Strategy Formation	2	
Resource Management	1	

Scale of 1 to 4, where 1 relates closely to C&C, and 4 indicates adaptive S&R characteristics

DISCUSSION

In this chapter, I discuss the practical and theoretical contributions of adopting the adaptive enterprise design framework as a process to transform LSG into a more S&R field services organization. The chapter provides insights into how practitioners can use theoretical actionable knowledge for adaptive transformational design. It also discusses the theoretical concepts we used at LSG to design practical evolutionary processes for organizational alignment, empowerment, and customer-driven strategies to help the firm manage change and minimize organization complexity.

VIII.I Adaptive Design at LSG

The practical problem at LSG was to figure out how a mobile service firm augmented by IT-enabled dispatching can develop the necessary dynamic S&R capabilities to manage in turbulent environments. This study used the S&R adaptive design framework as a theory-based process of engaged scholarship that allowed us to co-create actionable knowledge to transform LSG's service operating capabilities. The CAR method outlined in Chapter 5 (Susman and Evered, 1978; Davison et al., 2004) provided systemic guidelines that addressed the research's rigor and relevance. The collaborative and iterative (Mathiassen, 2002) activities followed planned and executed intervention cycles detailing LSG's problem situation and moving the organization toward adaptive S&R design capabilities. The dual imperative of my action research identified the theoretical objective—to identify the organizational capabilities necessary for organizational alignment, coherent empowerment, and organizational learning that would help mobile services firms first survive, and then thrive, in turbulent environments. Further, the S&R framework and continuous process of problem diagnosis, required by the CAR protocol,

revealed that organizations must develop transactional C&C capabilities and continuously evolve

as hybrid adaptive organizational structures with S&R capabilities to be relevant and survive in

environments that are rapidly changing and becoming increasingly more complex. The research

results add to the theory of management an understanding that S&R adaptive enterprise design

can be effective and necessary in helping leaders understand how to develop modular capabilities

and thereby transformation their organizational systems designs of purpose, strategy, structure,

and governance.

VIII.II LSG Dynamic Capabilities

Implementing the theoretical framework to increase LSG's operational value by creating

context and coordinating systems that transition it from a C&C to S&R enterprise has theoretical

foundations in systems theory. Emery and Trist (1965) inform us that "in general to think in

terms of systems seems the most appropriate when understanding the nature of the

interdependencies constitutes the research task" (p. 21). The S&R theory's adaptability and

effectiveness is about a systems design that links capabilities that can be structured and then

dispatched based on a specific customer value need. Haeckel (2010) suggests that the

organization should operate as a systems architecture. Russell Ackoff (1994) also suggests that

we consider the "enterprise as a system" because in environments that are undergoing rapid

change managers must understand what changes within the organization are required and why.

LSG's environment is undergoing an accelerating rate of change, and complexity will continue

to increase. As with most organizations, LSG's enterprise-level challenge is determining how

best to manage and survive the qualitative and quantitative uncertainties of the turbulence with

legacy C&C management theories (Haeckel, 1999). LSG has identified dynamic capabilities that

sense and seize opportunities and threats using efficient and established systems, procedures, and

technology usage in stable and slow-changing market circumstances and environments and—when necessary—reconfigure some resources to make practices more effective and efficient as dynamic capability theory informs us (Teece et al., 1997; Eisenhardt and Martin, 2000; Zollo and Winter, 2002). LSG has agility methods that make the organization flexible and responsive, encompassing both ambidexterity and exploration and exploitation capabilities (March, 1991; Sambamurthy et al., 2003; Ramesh et al., 2011) to meet the SLA requirements and limited customer demands. The existing capabilities of efficiency and operational effectiveness are necessary for transactional effectiveness but are constraining in markets with rapidly changing conditions, emerging technology applications, and adaptability requirements.

The capability theoretical methods describe distinct requirements of organizational learning and information processing that make up the organization's social system and are required to reduce complexity (Teece et al., 1997; Eisenhardt and Martin, 2000; Zollo and Winter, 2002), and they argue for dynamic capabilities and leaders who will guide the relevant and distinct competencies, processes, procedures, and organizational structures (O'Reilly & Tushman, 2007). Haeckel's S&R adaptive design provides a practical framework for transformation.

VIII.III S&R at LSG

The practical contribution of my research is in giving LSG actionable knowledge of how leaders can systemically co-develop transformational knowledge and implement processes to actively begin evolving to become adaptive—and thus meet the challenges of Georgia's unpredictable field services environmental events. LSG adopted the prescribed adaptive design framework and has developed hybrid transactional and transformational foundation capabilities that will help the company survive. The firm's context and managerial framework of purpose,

strategy, structure, and governance were the units of analysis for management to develop S&R capabilities. LSG developed three core S&R competencies that outline the design principles it is using for successful adaptive capability development and transformation to become an S&R enterprise (Haeckel, 1999; Shank, 1999):

- A *customer interface*: Adopted an IT-enabled DE and made additional IT investments. The key sensing elements to capture and process data from customers and thereby determine their value preferences.

- A *configuration (dispatching) system*: Established systems project management positions and resource integration responsibilities for lead FSTs—augmented with additional technology—that creates the modular capability required to respond to customer requests. This is the primary source of knowledge about how to reuse and reconfigure organizational capabilities, augmented by additional IT dispatching capacity.

- A *CMP system:* New policies and procedures have been developed with enterprise-wide inputs to reflect S&R capability development. Managers and supervisors are holding quarterly meetings internally and externally with customer district managers to continually learn about and develop the CMP (Figure 4). Their goals are to define the roles, establish customer-supplier relationships, and further develop the LSG adaptive loop (Figure 11) systems, identifying the firm's existing and required capabilities, then modularly redesigning the organizational structure to respond, adjusting resources as needed.

Figure 11: LSG Adaptive Loop
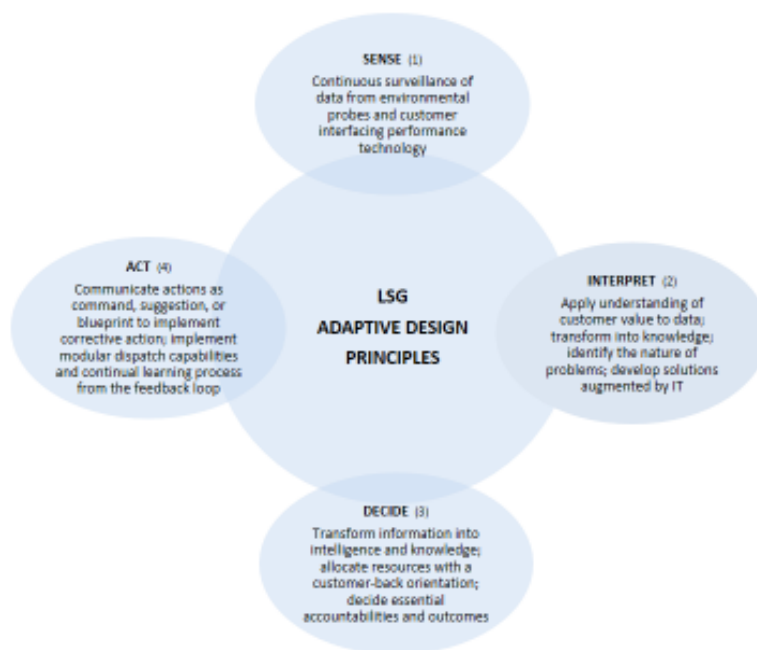
LSG's adaptive loop defines several crucial behaviors. The first behavior is sensing from the continuous interfacing and surveillance of customer, industry, regulatory, and environmental probes. The signals will come from data generated by the additional IT investment, which will supplement the DE and the customer meetings with the district managers across the state. LSG will consider the customer's verbal and nonverbal physical, emotional, cognitive, and social environmental signals. This effort will produce a significant amount of data, which LSG will have to warehouse and then mine to "make meaning out of apparent noise." Next is the interpreting behavior: the data is part of the hermeneutic process of applying context using data reduction techniques (Figure 6) along with traditional financial models, forecasting models, and enterprise models to reveal patterns and gain insights. Next is deciding, which is the bridge that

transforms knowledge from the environmental signals into the organization's action and response. Antecedent and transactional events will be reflectively interpreted, along with current condition appraisals, to determine the resources needed and how they will be deployed to create the outcomes of additional customer value. The S&R customer event–back thinking and orientation is key for adaptive loop decision making. Finally, the action behavior communicates the strategic choices. LSG's efforts for organizational alignment, coherent empowerment, and IT investments to manage by wire are critical and will influence successful modular actions. My study of LSG's adaptive transformation illuminates a shifting from C&C hierarchical management to a hybrid form of S&R and C&C capabilities, going from conventional IT-enabled management tools to mobile cloud-based analytics and technologies. The *Adaptive Enterprise* framework has informed our understanding of this organizational shift using prescriptive reflective organizational learning that has guided the redesigning of LSG's business infrastructures and business strategy portfolios. Figure 12 shows the addition of a "reflect" phase to LSG's adaptive loop in Figure 11. Reflection is an important component that incorporates specific learning from the translation of action phase experiences into actionable meaning as the iterations continue into the sensing phase of the next cycle. The imperatives of action research are also fulfilled by informing the practical interventions and re-informing existing theory.

Figure 12: Extended LSG Adaptive Loop with Reflection
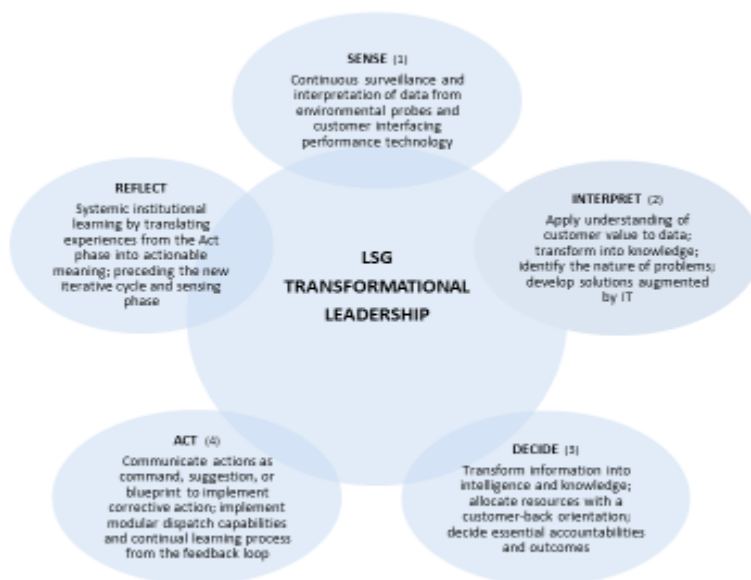
Each of LSG's organizational frameworks—purpose, strategy, structure, and governance—now include managerial S&R characteristics along with some of the original C&C characteristics. A post-intervention organizational adaptiveness assessment was performed that re-evaluated the ten dimensions of organizational purpose, strategic scope, value capture, strategic control point, coordination and control, authority to act, objective setting, decision making, strategy formulation, and resource management. We compared the results to LSG's pre-intervention organizational adaptiveness assessment, in which the categories were all closer to the 1 value measure (indicating C&C characteristics). The new assessment showed that all categories have moved closer to the 4 value measure, indicating S&R characteristics. Haeckel's adaptive enterprise design gives LSG insights, systems development concepts, and practical

frameworks that let them build knowledge that can improve organization design and practice. It provides an open systems architecture for managers to develop the competencies required to identify and reconfigure tangible and intangible assets and thus more successfully manage dynamic environmental change. To survive, the company must continually improve its flexibility, accountability, governance principles, and organizational learning capabilities to sense and respond to environment change. This research has coproduced actionable knowledge with LSG, which has increased its organizational alignment, coherent empowerment, and capacity to better manage the changing environment without adding internal hierarchal complexity. The theoretical research outcomes indicate how adaptive organizations can have hybrid C&C transactional capabilities and enhanced S&R transformational capabilities, which will create an essential structure that uses modularizing management protocols to configure capabilities dynamically and position them for survival and growth.

CONCLUSIONS

This study focuses on research in action; it aims to provide a sequence of events to address the practical concerns of a problematic situation, as well as to test the hermeneutic theoretical goals of adaptive enterprise design. In this chapter, I discuss the implications for both practice and research. I also present the study's limitations and conclusions.

IX.I Practical Implications

In stable environments, LSG's experience and legacy C&C organizational architecture and operational efficiencies are a competitive advantage. In the present turbulent and rapidly changing environment, however, success and survival depend on an adaptive business model with dynamic modular capabilities. IBISWorld.com (2014), a leading publisher of business intelligence, notes that:

"The electronic and computer repair services industry will grow marginally over the next five years… to the detriment of repair services, this trend will lead to a higher rate of product replacement, resulting in downward pressure on industry revenue."

This projected industry revenue discontinuity—coupled with the specific market and partner relationship changes that LSG is experiencing—requires that the firm incorporate adaptive capabilities into its purpose, strategy, structure, and governance in order to remain relevant.

The study was initiated to explore LSG's operational context after the implementation of an IT-enabled DE. Through iterations of the CAR cyclical process model, a diagnosis identified additional adaptive capability requirements for the organization to survive in turbulent environments. Following the diagnosis, we examined how planning was constructed and actions

were implemented, and we identified the need for customer-back outcome evaluations and theory-based reflective learning at LSG as requirements for adaptive transformation. The first of the action research study's dual imperatives was to contribute practical problem-solving strategies to LSG. To this end, our management and leadership improvement initiative included leveraging the implementation of the IT-enabled DE and developing S&R adaptive design capabilities for continuous action learning. The S&R adaptive framework has given LSG managers a strategy and blueprint to develop into an adaptive social system, and change the firm's functional and structural capabilities.

One of the practical lessons learned is that C&C and adaptive S&R are not mutually exclusive; the results of transformation can be—and in some cases should be—to achieve a hybrid organizational state. Hierarchical C&C characteristics are necessary for managers to efficiently optimize asset utilization of labor, vehicles, and resources. Indeed, the study indicates that LSG's purpose, strategy, structure, and governance principles require both transactional C&C and transformational S&R capabilities for the company to survive during uncertain times and develop opportunities for growth. LSG's hybrid transformational change is more than a reconceptualization; it is an evolutionary redesigning process. LSG leadership and managers have developed an awareness of the requirement for continuous environmental surveillance, diagnosis, interpretation, and improvement of processes beginning with the identification of the key capabilities necessary to realize its essential purpose for being. The managers have established a new systems integration position, which includes the authority to modularize resources and coordinate responses to customer requests. The position will be augmented by an additional IT dispatching system that will operate in tandem with the current system.

What is required beyond this study's interventions is ongoing organizational learning to continually orchestrate and adapt the firm's purpose, policies, governance, and essential structures capabilities. The capacity to continually evolve operational S&R capabilities that develop coherent empowerment and organizational alignment requires dynamic leadership—not just more and better management. LSG's leadership must be held accountable for the creation and clarity of context; the reason for being and its governing principles; and coordination of the high-level business design (Haeckel, 1999). To achieve this, LSG's leaders must be self-reflexive (Coghlan and Brannick, 2010) and use theory-based knowledge with experience to develop strategy and operational tactics. Leadership is responsible for learning, developing, and guiding the organization through the fog of uncertainty by clearly answering three questions: Why are we here? How do we relate to one another? What limits our discretion to act? (Haeckel, 1999). In addition to creating a viable organizational context, establishing a commitment-management system, and having the right people in the right positions, the hybrid organizational design must instill capabilities for new value creation. To do this, leadership must overcome the normal resistance and barriers to change—including inherent risk aversion and cultural inclinations to cling to habits (Kotter, 1995). LSG leaders also must be cognizant of the internal and external competing values related to organizational focus, structural preference, and managerial concerns in the operationalization of strategy. Along with cognitive motivations and strategies, the leaders must consider the heart when redesigning LSG's cultural organizational systems (Neher, 2012). In so doing, they can better meet the objectives of coherent empowerment and organizational alignment for dynamic customization of capabilities to customer responses.

The study's practical contribution has produced an additional benefit that will develop value creation capabilities—my own emerging leadership consciousness as a practitioner–researcher. This new awareness has guided a break in my long-standing behaviors and understandings of the responsibilities for self-efficacy and leading change. Overall, the study has helped stakeholders identify new role-related accountabilities, new behaviors, new adaptive approaches, and the new attitudes required to lead in dynamic, complex, and turbulent environments. Although this study applied the S&R principles and the CAR methodology principles in LSG's organizational context, they are also applicable in any personal leadership context in which leaders are confronted with adaptive challenges that require operational and cultural change.

IX.II Research Implications

The study had the dual imperative suggested by McKay and Marshall (2001) of two parallel and interacting cycles: a problem-solving cycle and a research cycle. The study's research cycle was guided by the five CAR principles discussed in Chapter 5 and the S&R adaptive design theoretical framework discussed in Chapter 4, to sense, interpret, decide, and act to produce change through action at LSG. The research started the organization's evolution from a hierarchical C&C organization toward a hybrid organization with S&R characteristics. The contextual diagnosis, planning, intervention, evaluation, and reflection offer research benefits that provide theoretical insights and awareness into how mobile service organizations can use actionable theoretical knowledge of adaptive S&R enterprise design to survive and thrive in rapidly changing environments. The practical and research contributions include organizational learning and reflection as a principle of the CAR model, and LSG's organizational learning of the S&R adaptive principles for managing change. Figure 12 shows the addition of reflection to

the adaptive loop that provides an alignment of engaged scholarship and canonical action research methodologies with the S&R framework. The research also gave me as a practitioner–researcher the self-reflective learning opportunity that I can use for leadership and management development in other contexts. Mezirow (1991) identifies three forms of reflection produced by action research: 1) the content of what was constructed, planned, acted on, and evaluated; 2) the process of constructing the research; and 3) the premise reflection, which is an inquiry into the underlying assumptions of the organization's culture. As Jarvis (1999) states, "discovery learning is the beginning of research" (p. 18) and action research includes problem-based learning by adding practical relevance to the idea of "life-long learning" and to the researcher's evolution as a "reflective practitioner."

This study's research provided theoretical insights into the practitioner–researcher–leader relationship by broadening the parameters of how I think. My capacity for adaptive leadership has been greatly enhanced to "know more and perform better" by adopting a theoretical body of knowledge and then applying it to practice and co-creating knowledge by developing "reflection-in-action." Jarvis (1999) states that, "this is not the theory in use (Argyris and Schon, 1978), which conveys the idea of something quite static, but rather an evolving theory and their own body of current knowledge as they continue to develop their own practice" (p. 20). The study identifies the path of LSG's evolutionary development with organizational learning, group learning, and individual leadership renewal, providing insights to transform functions and structure from a C&C hierarchical culture enabled by IT into a hybrid operating culture with dynamic S&R adaptive capabilities for creating customer value.

IX.III Limitations

There are certain limitations to every research process (Jarvis, 1999). Van De Ven (2007) suggests that "no form of inquiry is value-free and impartial: instead each model and perspective is value-full" (p. 14). In this study, the limitations relate to the generalizability of the research and the choice of the theoretical foundations and framing.

The study's generalizability might be viewed as not meeting the conventional scientific requirements of evidencing causal variation with statistical methods. However, there is "an appreciation of a temporal sequence of events with antecedent input conditions and ending outcome results" (Van De Ven, 2007, p. 146). The objective of this process research was to solve a current practical problem while expanding social scientific knowledge and using different criteria for generalizability. I focused on LSG's specific context, and the findings are restricted to the time and place of the research. The study's methods, however, are generalizable to a multiplicity of contexts that can be examined by following the research's frameworks and guidelines to understand the development of adaptive leadership and organizational design during complex, high-velocity changing environments. Jarvis (1999) states that, "the use of documentary evidence forms a link between the qualitative and the quantitative" (p. xiii). For gathering empirical evidence, I used qualitative data analysis methods suggested by Miles and Huberman (1994). To insure rigor and relevance, I used CAR's diagnostic strategies and principles for organizational change suggested by Davison et al. (2004), as I discuss in Chapter five.

Another characteristic of this work is that I was, as Jarvis (1999) describes, in the practitioner–researcher role, which offers a relationship between practical knowledge and theory. To address the "role duality," organizational political complexities, and insider bias concerns

(Coghlan, 2001), this research involved an expert researcher and expert practitioner; to achieve balance between rigor and relevance, I used the designs of collaborative practice research suggested by Mathiassen (2002). Through dialog and collaboration, I aimed to obtain an unbiased understanding of the research opportunity as well as a heightened awareness—through a triangulation of data sources, multiple methods and investigators, and stakeholder feedback—to aid in the understanding and transferability of our findings to other contextual settings.

Other theoretical frameworks could have been used to examine LSG and produce interesting and relevant research. I believe that engaged scholarship and action research are particularly relevant because of the collaborative, participative form of action research, which provides a methodology that coproduces knowledge that can advance both practice and theory. Dynamic capability theory was introduced for the study because it encompasses multiple organizational capability theories—such as agility, ambidexterity, and exploration and exploitation—that provide an implied foundation for adaptation. Finally, it is the S&R framework that provides a protocol of how organizations and leaders can transform the culture to adapt to discontinuities and turbulent environments and create value.

IX.IV Conclusion

The CAR principles provide enterprises and leaders the theory-based opportunity to learn the action research characteristics of being future-oriented and collaborative; emphasizing systems architecture development and theory grounded in action; being open to reexamination and reformulation; and basing actions on stakeholders' interactions. The S&R adaptive loop and CMP framework provide a praxis with four adaptive design principles: 1) create a specific governance mechanism that coordinates and provides a context; 2) incorporate personal roles and accountabilities that define commitments and outcomes that identify conditions of satisfaction;

3) design systemic processes that learn, augmented by IT, and promote not only adapting within the context but adaption of the context itself; 4) develop a modular business design that dispatches dynamic capabilities based on "customer-back" communication. This awareness and strategic operational blueprint for tactical leadership is necessary for successful actions of value creation. LSG and its leadership are now better able to sense, understand, and create synergistic value connections between the hybrid transactional C&C capabilities and the transformational S&R capabilities to comfortably act in the fog of environmental uncertainty and change.

This research also codifies the active learning and evolution of the study's practitioner–researcher as a "reflective practitioner." An idea and prescription that I have adopted—and that most business enterprise leaders should adopt—is to understand and maximize value creation. Cultural and organizational transformations require continuous reflective learning and leadership development. Augmented by IT, firms must attach theory to strategy and thereby align their dynamic capabilities and create coherent empowerment. Organizations can then systemically customize organizational responses to customer's demands with strategic, value-creating actions.

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