

AN INVESTIGATION INTO THE PREDICTORS OF ADOPTION AND UTILIZATION
OF INFORMATION-SHARING NETWORKS
BY LOCAL LAW ENFORCEMENT IN THREE STATES

by

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ABSTRACT

A major change in longstanding police organizational behavior is increasingly evident in the recent emergence of computerized information-sharing networks in public safety. From both theoretical and empirical perspectives, a better understanding of the determinants that can explain and predict the rise and growth of this new and significant development in American policing is needed. A highly limited body of empirical studies has endeavored to validate effective predictors of adoption and utilization of electronic information-sharing networks by local law enforcement agencies. Utilizing an integrated theoretical framework largely built upon Rogers' diffusion of innovations theory, sixteen hypotheses were tested through logistic regression and multiple regression analyses of survey research data collected from local law enforcement executives in the three states of California, New York, and Georgia. Qualitative research organized and conducted through targeted telephone interviews with twenty law enforcement executives across the three study states and with responses to open ended questions within the study survey instrument aided in the examination of these hypotheses. 66.7% of the cases of agency adoption of information sharing were correctly classified by the predictors within the logistic regression model. Adoption was positively influenced by a chief executive who demonstrated strong leadership and possessed more extensive experience in law enforcement. Adoption was negatively affected by increasing the opportunity to experiment with this innovation and advancing age of the chief executive. Both quantitative and qualitative findings confirmed that law enforcement agencies that exhibited dedicated leadership are more likely to adopt information-sharing networks. 19.4-25.9% of the variation in the outcome variable of adoption was explained by the predictors within the logistic regression model.

Utilization was negatively impacted by growing autonomy of police organizations within the network but benefited from innovation attributes such as the acquisition of an advantage in crime fighting capabilities and reduced complexity in employment of the information-sharing network. 9.1% of the variation in utilization of information-sharing networks could be explained by the predictor variables included within the multiple regression model. Qualitative research also cross-validated the positive effect of gaining an advantage over the criminal element as influential to utilization. A greater advantage in preventing and solving crimes, higher levels of inter-organizational trust between police agencies, and enthusiastic executive leadership were found by the qualitative inquiry to enhance both adoption and utilization. Knowing in advance which theoretically informed and empirically validated antecedents can facilitate or impede adoption and utilization of information integration networks could enable policymakers and law enforcement administrators to optimize strategies to attain successful outcomes.

This work is dedicated to my mother Jenny Saviak and my wife Carol Saviak. My mother's love, sacrifices, and commitment to my education have transformed my life and made my dreams possible. My wife's love, encouragement, and unyielding belief in me saw me through a lengthy and difficult journey through the Ph.D. program and this dissertation.

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CHAPTER ONE: INTRODUCTION

The longstanding absence of effective electronic information-sharing networks linking disparate governmental and law enforcement entities to facilitate access and exchange of records and data has been cited as a major policy failure which substantially contributed to the September 11th terrorist attacks (9/11 Commission, 2004; Markle Foundation, 2003; Reynolds, Griset, & Scott, 2006; Scott, 2006; and Zaworski, 2004). Historically, the unquestioned and fundamental organizing principle for two centuries in this country was that public safety was largely a local problem with a single agency response required. Even with the advent of international and national transportation, communication, and computer networks, law enforcement largely remained a localized, technologically disconnected, and fragmented operation for most of our nation's history.

As new modes of transportation, technology, and communication facilitate greater mobility, criminals and terrorists have increasingly violated the traditional jurisdictional and operational boundaries of governments and law enforcement agencies. The historically fragmented, localized, and technologically disconnected system of American law enforcement offered opportunities for criminals and terrorists to exploit coordination and information gaps in order to criminally offend and commit acts of terror (9/11 Commission, 2004; Reynolds et al, 2006). The activities of "multi-jurisdictional offenders" who intentionally seek to exploit the historic lack of information sharing among public safety organizations by operating across jurisdictional boundaries and targeting inter-organizational holes may be persuading law enforcement to recognize the need to engage in inter-organizational collaborations. Greater awareness of emerging threats may have advanced the idea that increased integration of law

enforcement agencies, through multi-jurisdictional information-sharing technology networks, can be highly valuable. Information sharing could enable those charged with protecting our country and communities in the 21st century to close the critical communication, information, and technological gaps that went largely unaddressed throughout the 20th century.

Problem Statement

Those responsible for law enforcement and homeland security now have historic and unprecedented volumes of available data through the rise of information technology. Overall, most data that is collected and retained in the more than eighteen thousand disparate databases of local law enforcement agencies across the country goes unshared (9/11 Commission, 2004; Markle Foundation, 2003; Reynolds et al, 2006; Scott, 2006). Disconnected databases may hold vast volumes of potentially actionable data but cannot provide significant support for decision makers when they are developing effective public safety strategies, allocating resources, targeting offenders, and seeking to move with the speed of adversaries in a constantly changing, complex, and turbulent external environment (9/11 Commission, 2004; Markle Foundation, 2003; Scott, 2006; Reynolds et al, 2006; and Zaworski, 2004).

In an effort to bridge the gap, a number of law enforcement agencies in several states have begun to adopt and employ information-sharing networks marking a major change in public policy and longstanding organizational behavior. The current body of theoretical and empirical research is inadequate to fully explain this new development (Skogan & Hartnett, 2005). Existing research is insufficient in its ability to identify and validate the determinants that can explain and predict why these law enforcement agencies are increasingly adopting and utilizing information-sharing networks while others are not.

The United States government has articulated a nationwide goal of total information integration within law enforcement at all levels and investing significant financial resources towards this national objective (9/11 Commission, 2004). Both policymakers and the criminal justice research community should be intensely interested in what set of potential conditions is necessary to foster or undermine initiatives aimed at greater information sharing within law enforcement. This study has sought to address the research question of identifying and validating the predictors of adoption and utilization of information-sharing networks systems by American law enforcement organizations. Having examined this research question, this study has made a significant contribution to the expanding but still highly limited base of theoretical and empirical knowledge concerning this new development in public safety and homeland security.

Theoretical Framework

Empirical research must be guided by a valid theoretical framework. Theory is needed to specify predictor variables and generate testable hypotheses. As this study sought to determine which predictor variables can explain the appearance and growth of a new technology within and across numerous law enforcement agencies in several states, the theoretical framework developed by Rogers (1962, 2003) known as diffusion of innovations theory was utilized.

Diffusion of innovations theory (Rogers, 1962, 2003) was employed over the last four decades to explain and predict the adoption and utilization of new technologies, programs, and practices across multiple disciplines and in a wide range of settings. By 1995, over 5,200 diffusion studies were conducted involving rural sociology, education, public health, marketing, technology, and communication. Specifically, diffusion research has studied the process of adoption of information technology (Fichman, 1992), the spread of total quality management

across 2,700 U.S. hospitals (Westphal, Gulati, & Shortell, 1997), the utilization of new medical units and services by nursing homes (Castle, 2001), the rise of electronic banking technologies (Lee, 2001), the emergence of teleworking (Perez, Martinez, & De Luis, 2003), the employment of distance learning (Ndahi, 1999), and the increased usage of e-government services by citizens (Dimitrova and Chen, 2006).

Diffusion theory is being increasingly employed to guide empirical research into the adoption of new technologies and policy interventions within public safety (Mullen, 1996; Weiss, 1997; Chamard, 2004; Skogan & Hartnett, 2005; Weisburd and Lum, 2005; Buenafe, Brown, & Bass, 2004). Klinger (2003) praised criminologists who have only recently discovered this framework that "...should help us cultivate a deeper understanding of justice system structures and operations" (p. 466). New innovations in the form of technologies and policing strategies such as Compstat, crime analysis and mapping, and information sharing have been studied through this theoretical framework

The inquiry, which initiated the development, validation, revision, and widespread employment of diffusion theory, was fairly simple in nature. Rogers (1962, 2003) was intrigued as to why some good innovations with clear benefits are adopted while others were not.

Diffusion theory defines an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" and states that diffusion is "the process by which an innovation is communicated through certain channels over time among members of a social system (p. 11, 2003)." Diffusion is viewed as a "universal process of social change" that produces consequences based upon rejection or adoption of the innovation (p. xvi, 2003). It involves a "social process" through interpersonal communication and "social modeling" in which those who have adopted an innovation can influence others "to follow their lead" (p. 35,

2003). This study utilized diffusion of innovations theory to examine five innovation attributes and one organizational characteristic that could serve as influential predictors of adoption and utilization and incorporated three more antecedents from the current body of research into information-sharing networks in public safety.

Research Questions and Hypotheses

Utilizing and building upon the theoretical framework of diffusion of innovations, this study seeks to answer two research questions: what were the predictors of adoption of information-sharing networks by local law enforcement agencies in three study states and what were the predictors of utilization of information-sharing networks by local law enforcement in three study states? For purposes of this study, information-sharing networks are computer networks that allow a police agency to electronically share its agency records with local, state, or federal law enforcement and also access records held by their agencies.

To address these research questions, this study tested sixteen hypotheses concerning the predictors of adoption and utilization of information-sharing networks involving local law enforcement agencies. The first eight hypotheses concerned the adoption decision and the next eight hypotheses concern utilization. Within each group of eight hypotheses, the first three hypotheses concerned organizational characteristics followed by five hypotheses centered on the attributes of the innovation.

Research Question One: Adoption

H1 - Police organizations that have higher levels of inter-organizational trust were more likely to become adopters of information-sharing networks.

H2 - Police organizations that believe they will retain a higher degree of autonomy within an information-sharing network were more likely to become adopters of information-sharing technologies.

H3 - Police organizations characterized by higher levels of commitment by agency leadership to information-sharing initiatives were more likely to become adopters of information-sharing networks.

H4 - Police organizations that perceive a relative advantage to information sharing were more likely to become adopters of information-sharing networks.

H5 - Police organizations that perceive a lower degree of complexity associated with information-sharing technology were more likely to become adopters of information-sharing networks.

H6 - Police organizations that perceive a higher degree of compatibility associated with information sharing were more likely to become adopters of information-sharing networks.

H7 - Police organizations that experience a higher degree of observability associated with information sharing were more likely to become adopters of information-sharing networks.

H8 - Police organizations that perceive a higher degree of trialability associated with information sharing were more likely to become adopters of information-sharing networks.

Research Question Two: Utilization

H9 - Police organizations that have higher levels of inter-organizational trust were more likely to experience higher levels of utilization of information-sharing networks.

H10 - Police organizations that believe they will retain a higher degree of autonomy within an information-sharing network were more likely to experience higher levels of utilization of information-sharing networks.

H11 - Police organizations characterized by higher levels of commitment by agency leadership to information-sharing initiatives were more likely to experience higher levels of utilization of information-sharing networks.

H12 - Police organizations that perceive a relative advantage to information sharing were more likely to experience higher levels of utilization of information-sharing networks.

H13 - Police organizations that perceive a lower degree of complexity associated with information-sharing technology were more likely to experience higher levels of utilization of information-sharing networks.

H14 - Police organizations that perceive a higher degree of compatibility associated with information sharing were more likely to experience higher levels of utilization of information-sharing networks.

H15 - Police organizations that experience a higher degree of observability associated with information sharing were more likely to experience higher levels of utilization of information-sharing networks.

H16 - Police organizations that perceive a higher degree of trialability associated with information sharing were more likely to experience higher levels of utilization of information-sharing networks.

Theoretical and Empirical Contributions Made by this Study

This study provided several significant contributions to the emerging field of research into information-sharing networks within public safety. This study brings diffusion of innovations theory that has demonstrated its effectiveness in guiding research into a large and diverse spectrum of innovations within a wide range of settings for over four decades to the challenge of enhancing current knowledge of this study topic. With the exception of one previous single study, information-sharing researchers have largely overlooked one of social science's best-known and well-developed theories in their investigations. Moreover, this study built upon this framework by incorporating three additional independent variables, which have been identified by prior empirical research. This integrated theoretical approach confirmed the validity of previous research and yield new and significant findings to guide future inquiries. This investigation should also shed light on the question as to whether adoption and utilization share the same set of predictors or represent divergent processes influenced by distinct antecedents. Having employed both quantitative and qualitative methods of investigation, this study should broaden the scope of existing knowledge with its ability to cross-validate predictor variables and locate new avenues for future investigation. Lastly, the vast majority of existing studies have confined themselves to a locality, intra-state region, or within a single state. This study expanded information-sharing research involving law enforcement into a multi-state

setting which could produce new findings or enhance support for certain predictor variables and provided a foundation for future nationwide investigations.

Summary of Study Methodology

All predictor variables were operationalized through the use of survey research items designed to obtain data from law enforcement executives concerning levels of inter-organizational trust, retention of agency autonomy, cosmopolitanism, commitment by agency leadership, relative advantage, complexity, compatibility, observability, and trialability and their relationship with adoption and utilization of information-sharing networks. For example, law enforcement executives were asked to gauge the innovation attribute of complexity by answering a Likert type seven item scale question such as whether they agree or disagree and if so, how strongly with a statement intended to measure a key study construct such as complexity like “The network is relatively easy to understand”. Rogers (1962, 2003) recommended the development of specific survey instrument items to test and measure independent and dependent variables associated with the innovation diffusion for each individual study rather than reliance upon previous study questionnaires.

Anticipated Findings

Through the use of diffusion of innovations theory, this study tested sixteen hypotheses concerning the predictors of adoption and utilization of information-sharing networks within public safety. Having integrated diffusion of innovations theory with three other predictors specified in prior studies, it was expected that adopters and users of information-sharing networks will be law enforcement organizations that exhibit higher levels of inter-organizational

trust, a higher degree of retained autonomy, a higher level of commitment by agency leadership, and a higher degree of cosmopolitanism and perceived relative advantage, a lower level of complexity, a high degree of compatibility, a higher degree of observability, and a higher degree of trialability as being associated with this innovation. Validation or disconfirmation of these predictor variables serves to enhance theoretical and empirical understanding of the diffusion of information sharing within public safety, structure future research, and inform policymakers about theoretically informed and empirically established strategies to increase adoption and utilization of this innovation.

CHAPTER TWO: LITERATURE REVIEW

The theoretical and empirical search to locate the predictor variables, which could explain adoption and usage of information-sharing networks by law enforcement, has yielded a growing but still very limited body of research. However, although they have specified inducements and barriers by different names, inquiries within this small body of studies of this emerging research topic have tended to be relatively congruent in their findings. Taken as a whole, the existing studies within this literature review have mostly identified, described or are related to the predictor variables specified by the diffusion of innovations theoretical framework. However, previous investigators have largely neglected the utility of this theory to enhance understanding of the emergence of this innovation within this organizational setting.

Theoretical Research

Technology Acceptance Model and Task Technology Fit Theory

Research into the adoption and utilization of information-sharing networks by local law enforcement has largely been structured by two theories or consisted of atheoretical case studies. The relatively small body of existing studies has often been directed by two theories: the Technology Acceptance Model (Davis, 1989) and the Task Technology Fit Theory (Goodhue, 1995). The technology acceptance model (TAM) theory, developed by Davis (1989), attempts to explain and predict how users come to accept and use a technology. The two primary factors were *perceived usefulness*, defined by Davis as "the degree to which a person believes that using a particular system would enhance his or her job performance" and *perceived ease-of-use*,

defined as "the degree to which a person believes that using a particular system would be free from effort" (p. 319). Goodhue's theory of task technology fit (TTF) suggested that information technology will produce enhanced performance by system users only when the functionality of the system directly supports the tasks that they are required to perform (Goodhue, 1995; Zaworski, 2004). The four propositions that flow from Goodhue's task technology fit theory are: "(1) characteristics of information systems/services will affect the user evaluation of TTF, (2) task characteristic will influence user evaluation of TTF, (3) individual skills and abilities will affect user evaluation and, (4) the interaction between task and technology will influence the user evaluation" (Goodhue, 1995; Zaworski, 2004). Empirical research into this topic by Zaworski (2004) maintained that task technology fit theory is a valuable framework to guide investigations into law enforcement information-sharing systems.

As with any theory, both possess inherent explanatory powers and limitations. These two theories restricted their focus to officer level perceptions concerning only two constructs: the ease of use and perceived efficacy of this emerging technology. These two constructs are logically subsumed within two of the innovation attribute constructs of complexity and relative advantage within diffusion of innovations theory. Both theories have not accounted for other potentially influential innovation attributes as well as the role of several organizational characteristics. Both theories also attributed organizational level adoption decisions to user perceptions at the officer level. For example, it is likely that even a new technology such as information sharing which is viewed by line officers as easy to use and useful towards their job performance may not result in adoption by police organizations that lacked leadership, feared loss of agency autonomy, perceived incompatibility with agency culture or objectives, worried about the implementation of major organizational changes, and operated in an environment

characterized by low levels of inter-organizational trust. A theory that can identify and count for the full range of predictor variables at the organizational level would yield much greater explanatory power.

Diffusion of Innovations Theory

Over the last four decades, diffusion of innovations theory (Rogers, 1962, 2003) has been employed to explain and predict the adoption and utilization of new technologies, programs, and practices across multiple disciplines and in a wide range of settings. Over 5,200 diffusion studies had been conducted involving rural sociology, education, public health, marketing, technology, and communication by 1995. This theory has examined a wide range of innovations within a broad spectrum of organizational settings. Diffusion research has studied the process of adoption of information technology (Fichman, 1992), the spread of total quality management across 2,700 U.S. hospitals (Westphal, Gulati, & Shortell, 1997), the utilization of new medical units and services by nursing homes (Castle, 2001), the rise of electronic banking technologies (Lee, 2001), the emergence of teleworking (Perez, Martinez, & De Luis, 2003), the employment of distance learning (Ndahi, 1999), and the increased usage of e-government services by citizens (Dimitrova and Chen, 2006).

In more recent years, diffusion theory has been discovered by the criminal justice research community. It has structured the study of the adoption of new technologies and policy interventions within public safety (Mullen, 1996; Weiss, 1997; Chamard, 2004; Skogan & Hartnett, 2005; Weisburd and Lum, 2005; Buenafe, Brown, & Bass, 2004). Klinger (2003) commended criminologists who are now increasingly utilizing this framework which "...should help us cultivate a deeper understanding of justice system structures and operations" (p. 466).

New innovations in the form of technologies and policing strategies such as Compstat, crime analysis and mapping, and information sharing have been explored through this theoretical framework

In initiating his work and development of this theory, Rogers (1962, 2003) began with the question as to why some valuable innovations with tangible benefits are adopted while others were not. Diffusion theory has defined an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” and states that diffusion is “the process by which an innovation is communicated through certain channels over time among members of a social system (p. 11, 2003).” Diffusion operated as a “universal process of social change” that produces consequences based upon rejection or adoption of the innovation (p. xvi, 2003). It should be understood as a “social process” involving interpersonal communication and “social modeling” in which those who have adopted an innovation can influence others “to follow their lead” (p. 35, 2003).

Starting in 1962, Rogers has reformulated this theory five times (1962, 1971, 1983, 1995, and 2003). Through these revisions, Rogers (1962, 2003) has clarified the four main elements in the diffusion process and supplemented them with additional constructs. The four main elements were the innovation, the role of communication channels, time, and a social system.

The element of innovation concerned the attributes of the innovation and the characteristics of several categories of potential adopters Rogers (1962, 2003). The attributes of an innovation and the characteristics of the group of potential adopters influenced the decision to embrace or reject the new technology or practice. Rogers asserted that 49% to 87% of the differences in rates of adoption could be accounted for by five attributes that strongly correlate with the innovation-decision: relative advantage, compatibility, complexity, observability, and

trialability. Relative advantage referred to the degree that an innovation is perceived to be superior to the technology or practice that it displaces. It constituted an improvement in terms of lower cost, greater effectiveness and efficiency, or enhanced social or professional status. Relative advantage of an innovation and its rate of adoption are positively related. Compatibility involves the degree to which an innovation is perceived to match the needs, beliefs, and practices of an individual or organization. Innovations that are seen as being compatible have been more likely to be adopted. Complexity centered on the perception of the relative degree of difficulty that is required for the adoption and use of an innovation. Innovations that are viewed as more complex and difficult to employ are less likely to be adopted. Trialability involves the opportunity for individuals or organizations to experiment with an innovation in a limited way. If an innovation has not required immediate adoption by the entire organization but can be tested through a pilot program, it was more likely to be adopted. Trialability reduced the cost of failure and has allowed for the transfer of success. Early adopters tended to function as de facto pilot programs for later adopters. Observability referred to the degree that outcomes associated with an innovation could be viewed by others. Innovations that are more observable tended to be more quickly adopted.

Rogers has identified five types of adopters: innovators, early adopters, early majority, late majority, and laggards, and places them on a continuum of innovation acceptance (Bueanafe, Brown, & Bass, 2004). These categories of adopters are presented within Figure 1.

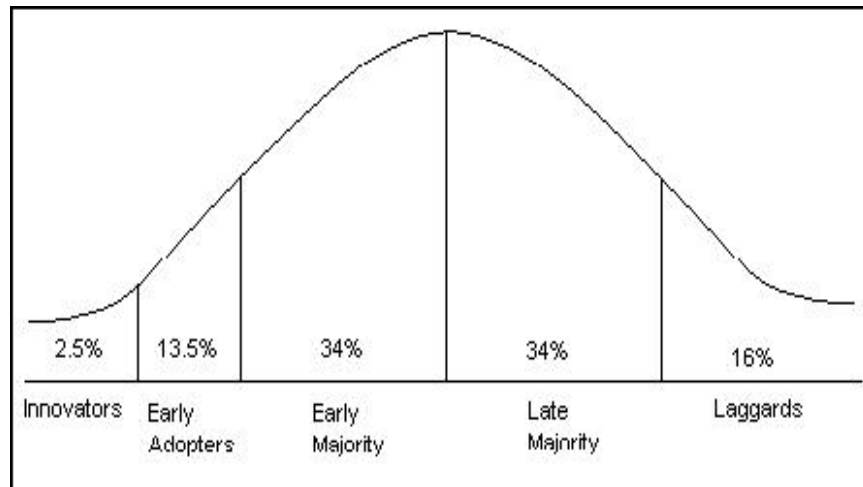


Figure 1: Diffusion of Innovations Model. From *Buenafe, Brown & Bass, 2004, adapted from Rogers, 1995.*

From this continuum, Rogers (1962,2003) theorized that earlier adopters are those that will seek out and actively engage and promote innovation acceptance while late adopters and laggards will be slow to accept, or might even reject, the innovation (Buenafe, Brown, and Bass, 2004). These categories of adopters varied on important characteristics. Innovators are described as “venturesome” and are responsible for “importing” the innovation into a specific social system. Early adopters were often opinion leaders who command “respect” within the social system and whose endorsement of the innovation will matter to later adopters. Early majority adopters were more “deliberate” in their decision-making and exercised caution in adoption of an innovation. Late majority adopters held back until it is clear that the level of uncertainty associated with an innovation has largely been eliminated. While late majority adopters could be viewed as “skeptical,” laggards could be defined as “suspicious.” They are highly retrospective

in their decision-making and may see their decision to postpone or withhold adoption of an innovation as rational given their perception of risk.

Moreover, earlier adopters also differed from later adopters in other meaningful ways Rogers (1962, 2003). Earlier adopters tended to be better educated, enjoyed higher social status, occupied positions in organizations of greater size and resources, consumed higher levels of information from mass media communications, and were more cosmopolite than their later adopting counterparts. An individual or organization that is more cosmopolite is one that seeks and receives higher levels of exposure and exchange with individuals and organizations outside of their specific social system. Cosmopolites traveled more and interacted and communicated with individuals and organizations outside of their social system providing them with the opportunity to return to their social system with new innovations. Based upon conflicting and inconclusive research, age has not been confirmed as a variable that strongly correlates with being an earlier adopter.

The role of communication channels was a second operative element in the diffusion dynamic. Rogers (1962, 2003) defined the communication channel as “the means by which messages get from one individual to another” and emphasized two types of communication processes: mass media and interpersonal. While mass media communication may have created awareness, interpersonal communication by trusted peers tended to influence the actual adoption decision.

Rogers (1962, 2003) also theorized that the element of time is a salient variable in the adoption process. The innovation-decision period, according to Rogers, was the duration of time that is needed for the adoption process to occur. The rate of adoption follows an “S-shaped curve of diffusion” which began to elevate slowly through a relatively small group of innovators and

early adopters dramatically rising with the addition of early and late majority adopters and then leveled off with the increasing slow spread among laggards. The “take off” segment of the S-shaped curve was most influential to the diffusion of the innovation and occurred between 10 and 20% adoption which Rogers termed “the heart of the diffusion process” (p. 274, 2003).

The social system comprised the fourth major element of diffusion theory (Rogers, 1962, 2003). The social system was defined by the presence and activity of related individuals, groups, or organizations who share a common goal. The “social glue” of a Rogerian social system was the commonality of purpose. Law enforcement within a specific agency, region, or state could be defined as a social system within the diffusion framework. Within a social system, Rogers hypothesized that opinion leaders who frequently affect the attitudes of others operated to accelerate or decelerate the innovation-adoption process. A Sheriff or Police Chief might function as an opinion leader who persuaded individuals within the organization to adopt a new technology or also influenced peers who head other police agencies within their region or state to do likewise. Between social systems, change agents transferred and facilitated knowledge, awareness, and acceptance of new practices and technologies. Rogers characterized a change agent as a technical expert who might travel between organizations carrying new ideas and best practices.

As Rogers revised the diffusion framework over four decades, two additional constructs were added: types of innovation decisions and consequences of innovation decisions (1962, 2003). Innovation decisions might be categorized as optional, collective, or authority oriented. Optional decisions to adopt or reject can be made by individuals within an organization irrespective of the choices of others to embrace or resist the innovation. Collective decisions reflected organizational consensus while authority-driven decisions tend to be imposed by a

small group over the entire organization on the basis of their power or expertise. Rogers conceptualized the consequences of the innovation decision as desirable or undesirable, direct versus indirect, and anticipated versus unanticipated. Consequences that are desirable, direct, and anticipated tended to confirm or reinforce the innovation decision.

Criticism of Diffusion of Innovations Theory

Rogers recognized diffusion theory has also been met with five potential objections: a pro-innovation bias by researchers, the issue of individual blame, the possible problem of recall, confirmation of causality, and the question of generalizability (1962, 2003). A pro-innovation bias caused researchers to overlook or fail to study cases of rejection, discontinuance, or slow diffusion (1962, 2003). It was reduced or avoided by not automatically selecting innovations which have rapidly diffused and studying innovations which are still within a diffusion process rather than reliance on post hoc research into those that already did diffuse according to the model. The phenomenon of individual blame within diffusion studies centers on the assignment of fault to the potential individual adopters for not performing consistent with the framework. Rogers described it as “ignoring the shoe in order to blame the person’s foot” (p. 119, 2003). To decrease the potential for this form of bias, diffusion researchers could focus on organizations as the unit of analysis, maintain an open mind perspective, and examine the influence of those communicating about the innovation and not just those receiving the information. Recall bias arose when respondents provide inaccurate or incomplete information based on their memories of prior events related to the innovation adoption decision. Rogers noted that the dominant data collection method in several decades of diffusion research is the cross-sectional survey of single informants that could contribute to recall bias. Querying respondents who were present leading

up to and during the adoption decision as opposed to informants who were not direct participants and cross-validating the information from their responses with other data collection methods such as case studies, analysis of archival records, or repeated interviews represented two means of limiting recall effects. Researchers needed to also be aware of their ability to confirm causality in the absence of longitudinal studies and field experiments. If employing a cross-sectional survey, Rogers recommended the selection of an innovation that diffused rapidly and was highly salient to adopters to reduce recall bias, pre-testing of survey instruments to improve the validity of the data, and the use of independent records, which registered the actual time of adoption. Lastly, in terms of generalizability, Rogers noted the concern that diffusion theory may not be as readily replicable in developing nations, which faced greater social and economic disparities that could influence innovation adoption. Studies in developing nations must be sensitive to these realities in their choice of innovation, research designs, and data collection methods.

Other critics of diffusion theory have sought to identify other possible limitations within this framework. deLeon (1984) posited that innovation adoption is highly case specific and situational not easily lending itself to a universal or overarching framework. Walker (2006) emphasized that diffusion research often queries individuals but attributes their response concerning innovation decisions to the organizational level. Carter and Belanger (2005) suggested that diffusion research would benefit from the inclusion of predictor variables from other theories. Ollila and Lyytinen (2003) recommended diffusion of innovations theory in the study of technology adoption but suggested that different predictors within the theory may matter more at different points in time in the process. Fitzgerald, Ferlie, and Hawkins (2003) indicated that diffusion theory assumes a linear progression in the adoption process that may or may not be present in the cases of all innovations.

This study utilized diffusion of innovations theory to examine five innovation attributes which could serve as influential predictors of adoption and utilization and incorporated three more antecedents from the current body of research into information-sharing networks in public safety. The variables of relative advantage, compatibility, complexity, observability, and trialability specified by Rogers as leading to adoption and usage were cited and supported by existing theoretical and empirical research into innovations within law enforcement (Skogan & Hartnett, 2005; Buenafe, Brown, & Bass, 2004; Weisburd et al, 2003; Klinger, 2003; Moore, 2003; Weiss, 1997; Lingamneni, 1979; Chamard, 2004; Mullen, 1996). Supplementing these five attributes of innovations that contribute to diffusion, Rogers also identifies an organizational characteristic of earlier adopters—a high level of cosmopolitanism—as being conducive to adoption and utilization of new technologies and practices. Rogers defined the predictor variable of cosmopolitanism as “the degree to which the organization is oriented outside its social system” (p. 290). Cosmopolite organizations have higher levels of communication and interaction with organizations outside their social system enabling them to become better informed and import innovations back into their social system. Earlier adopters tended to have a more cosmopolitan outlook with a greater awareness of information about innovations in policing from other agencies and the criminal justice research community (Weisburd and Lum, 2005).

Empirical Research

Role of Organizational Characteristics

Studies that specify and test additional predictor variables can build upon existing theoretical frameworks. Three more predictor variables relating to organizational characteristics have been identified by empirical research into information-sharing systems adopted by law enforcement that can be integrated within the diffusion of innovations theoretical framework. These predictor variables are commitment by agency leadership, trust, and retention of agency autonomy within the network (Bureau of Justice Assistance, 2005; Sullivan and Mathews, 2003; Scholl, 2005; Skogan & Hartnett, 2005; Reynolds et al, 2006; GAO, 2004; Chau, Atabakhsh, Zeng, & Chen, 2001; Scholl, 2005; Gil-Garcia, Scheider, Pardo, & Cresswell, 2005; Raghu, Ramesh, and Whinston, 2003; Roper and Sullivan, 2003; Harris and Webster, 2003; GAO, 2004; Scholl, 2005; NGA, 2002). These three variables were also consistent with the Rogerian construct of compatibility but for purposes of this study, they were examined as new variables and separate hypotheses. Compatibility represented an innovation attribute while leadership, trust, and autonomy comprised organizational characteristics.

Agency leadership has been identified by existing research as a key predictor variable (Bureau of Justice Assistance, 2005; Sullivan and Mathews, 2003; Scholl, 2005; Skogan & Hartnett, 2005). Rogers also emphasized the role of leadership as a key variable in his discussion of “opinion leaders” and “change agents” (1962, 2003). However, Rogers (1962, 2003) conceptualized leadership in the form of “opinion leaders” who influence adoption decisions by their peers within a specific social system and “change agents” who are issue experts who come from outside the social system to promote the innovation. This study defined leadership in terms

of the level of commitment by each agency's leadership to information sharing. Leadership was conceptualized as an intra-agency variable relating to the individual agency adoption decision that differs from the cross-agency variable of "opinion leadership" articulated by Rogers relating to the diffusion of the innovation across agencies. A higher level of commitment by agency leadership to information sharing was expected to be positively related to an adoption decision and increased levels of utilization.

Trust is also cited as a variable that could strongly influence the adoption of information-sharing systems (Reynolds et al, 2006; GAO, 2004; Chau, Atabakhsh, Zeng, &Chen, 2001; Scholl, 2005). Trust referred to the level of confidence that an agency has in other agencies as it contemplates joining them in an information-sharing network. An agency who perceived that it can rely upon other agencies to maintain information security and work together productively will be characterized as having a higher level of trust. A higher level of inter-organizational trust was anticipated to positively related to the adoption decision and greater levels of utilization.

Agency autonomy was found within existing research to be determinative of the innovation decision (Gil-Garcia, Scheider, Pardo, & Cresswell, 2005; Raghu, Ramesh, and Whinston, 2003; Roper and Sullivan, 2003; Harris and Webster, 2003; GAO, 2004; Scholl, 2005; NGA, 2002; Reynolds et al, 2006). Prior studies have identified a major concern of law enforcement agencies as having to relinquish control over their records, policies, or decision-making by participating in an information-sharing network (Reynolds et al, 2006; Gil-Garcia, 2005). Agencies who perceived that they have retained a high level of autonomy were more likely to adopt this innovation and actively share their information. If these three predictor variables which constitute organizational characteristics were found to have a statistically significant relationship with the outcome variables of adoption and utilization, the Rogers'

diffusion of innovations framework as applied to the study of information sharing in public safety can be strengthened with their integration.

A fourth variable which Rogers identifies as being another organizational characteristic of earlier adopters was a high level of cosmopolitanism which was validated by Weiss (1997) as being critical to the diffusion among American police agencies of several communications technologies and investigative techniques. Cosmopolite police organizations fulfilled two diffusion functions: first, they were introduced to and obtained new innovations from increased contact outside their specific social system; and two, they shared and spread new technologies and practices through their higher levels of communication and interactions with other law enforcement agencies (Weiss, 1997). Likewise, Weisburd and Lum (2005) confirmed the effect of cosmopolitanism in their study of diffusion of crime mapping among one hundred twenty-five local law enforcement agencies. Earlier adopters tended to have a more cosmopolitan outlook with a greater awareness of information about innovations in policing from other agencies outside their immediate social system and also accessing them from the criminal justice research community (Weisburd and Lum, 2005).

Role of Innovation Attributes

Rogers (1962, 2003) specified several variables concerning the attributes of an innovation that influenced its rate of adoption and use: relative advantage, complexity, compatibility, observability, and trialability. These antecedents that led to adoption and usage have been cited and supported by existing theoretical and empirical research into information-sharing networks within law enforcement. In a recent study of 122 local law enforcement agencies participating within an information-sharing network in the greater Chicago metropolitan area, Skogan and

Hartnett (2005) found evidence for the influence of several diffusion of innovations theoretical antecedents such as observability, relative advantage, compatibility, and trialability. Relative advantage and complexity were identified as influential predictor variables in similar diffusion studies (Dunworth, 2000; Bureau of Justice Assistance, 2005; Chau et al, 2003; Weisburd and Lum, 2005). Relative advantage and complexity were also validated as predictor variables concerning the adoption and employment of a new Internet portal for crime analysts to disseminate and retrieve investigative information (Buenafe et al, 2004). Relative advantage, observability, and compatibility were confirmed by Weisburd et al (2003) as influential antecedents in the rapid diffusion of the new Compstat program in their nationwide survey of 1,100 large and small local law enforcement agencies. Moore (2003) credited compatibility with the crime-fighting mission and the traditional use of command structure to impose accountability for leading to the widespread adoption of the Compstat policing strategy throughout the 1990s.

Research Identifying Both Organizational Characteristics and Innovation Attributes

In their study of six public safety information-sharing systems in various regions of the United States, Gil-Garcia et al (2005) identified several variables that can function as barriers to the implementation of information integration across agencies: turf and resistance to change, environmental and institutional complexity, organizational diversity and goal conflicts, and IT incompatibility. Moreover, Pardo et al (p.6, 2004) hypothesized that risk, resource constraints, conflict, and strong institutional influences such as a bureaucracy's desire to retain its individual organizational autonomy against the demands of other entities may undercut even "...the most highly visible and politically popular integration efforts." Entrenched agency level information

technology systems which were anchored in the status quo and defied change, the challenge of continuously coordinating policies and operations between distinct agencies, the inability to sufficiently comprehend salient technological issues, the constraining need for privacy and system security, unresolved and prominent differences in data collection and storage between agencies, and a dearth of competent IT personnel to successfully integrate agencies within an information-sharing network are cited by Dunworth (2000) as the impediments to successful information sharing.

Gil-Garcia et al (2005) found a series of variables which contribute to the adoption of information-sharing networks in public safety such as the maintenance of individual agency authority and discretion, the institution and operation of a governance structure, the building and maintenance of long term strategic alliances, a solid understanding of individual agency operational procedures by all parties, access to necessary financial resources, and a sufficient level of support from elected officials. Obsolete or incompatible computer systems, and a lack of consensus or the inability to synchronize rules, definitions, and standards for information sharing can function as significant barriers (Bureau of Justice Assistance, 2005).

Conversely, strong commitment by agency leadership which encouraged high levels of participation by users, widespread and effective training of the maximum number of potential network users, creation of a cybernetic feedback loop which enables users to give input and continuously make constructive changes to the network, and delineation of valid performance measures at program initiation constituted predictor variables associated with successful information-sharing initiatives (Bureau of Justice Assistance, 2005). Effective planning, cultural change within organizations, strategic decisions in allocation and management of human capital, and the creation and maintenance of inter-organizational trust were identified by the Government

Accounting Office as variables that are most conducive to information sharing in public safety (2004). Executive level leadership, a governance structure that engages all relevant stakeholders, dedicated and long term funding, and the presence of a high level of trust between organizations helped explain cases where information sharing is accepted and implemented (Sullivan and Mathews, 2003).

Consistent with the Technology Acceptance Model, Chau et al (2001) found that perceived usefulness to an individual officer functioned as a strong inducement for employing information-sharing technologies. Police officers highly valued improved task performance efficiency and their perception of this benefit being obtained through information sharing is an influential predictor of technology usage (Chau et al, 2001).

User involvement in system design and the ability to retain agency independence are strongly associated with the usage of information-sharing systems (Gil-Garcia et al, 2005). Agency control of their data, low cost, a system of self-government for participating agencies, a high degree of continuous user involvement in design and implementation, universal system compatibility with any jurisdiction's form of records management, and an open source and non-proprietary solution are all identified as predictors that influence agency engagement in information sharing (Reynolds et al, 2006).

Consensus on who should participate, how shared resources will be allocated, what type of information will be integrated, and maintenance of system security was essential to establishing information-sharing networks among agencies (Jones, 2005). When consensus was high on these indicators, information sharing was likely to proceed and when it was low, it was more likely to not develop (Jones, 2005). Information-sharing systems which imposed high participation costs on users, did not relate directly to their daily tasks, and were being proposed

in an inter-organizational environment characterized by low levels of trust were unlikely to succeed (Chau et al, 2001).

Drawing upon stakeholder analysis, Scholl (2005) found that several predictor variables influenced the level of inter-organizational cooperation needed for information sharing: the organizational culture of the agency towards the issue facilitates or inhibits it, the degree of personal ties and peer relationships across organizations within a proposed network, and if the leadership style of those promoting the initiative fosters cooperation or confrontation. Scholl (2005) noted that the ability to impose information sharing upon relatively sovereign organizations is highly constrained. “Enlightened self interest” as opposed to top down mandates is more likely to spark and sustain information sharing among organizations (Scholl, 2005). Benefactors must be prevalent and benefits need to be specific to encourage information sharing (Scholl, 2005). Having emphasized that trust precedes technology, Scholl (2005) maintained that technical solutions alone cannot create collaboration but rather it was the social process of inter-organizational collaboration that is antecedent to the acceptance of new technology.

Resource constraints can inhibit information-sharing initiatives within law enforcement. “Stovepipe funding” was identified as a predictor variable that can impede efforts aimed at information sharing (National Governors Association, 2002). Stovepipe funding described the typical governmental budgetary regime where resources are individually allocated by agency and resources were not usually dedicated towards innovations designed for multi-agency utilization. Within this financing structure, agencies experienced and rationally responded to a specific set of incentives and disincentives. Agencies were reluctant to expend limited agency resources on programs that benefit multiple agencies outside of their own and were more likely to refuse to devote scarce resources to multi-agency initiatives (NGA, 2002).

How this Study Addresses Theoretical and Empirical Gaps within the Current Literature

Research that can accurately locate and confirm the theoretical and empirical determinants involved with the decision to adopt and continuously employ the innovation of information sharing is still highly limited within the context of public safety.

First, this study employed a theory that has proven valuable in predicting the adoption and utilization of new technologies across a wide range of fields for four decades but has received little application to the challenge of understanding the emergence of information-sharing networks within law enforcement. The relatively small body of existing studies has often concentrated on the individual user as the unit of analysis guided by two theories: the Technology Acceptance Model (Davis, 1989) and the Task Technology Fit Theory (Goodhue, 1995). Both are highly useful theoretical frameworks for explaining officer level adoption and usage behavior but are constrained in their ability to explain the role of a number of predictor variables that potentially influence organizational decisions to adopt and employ information-sharing networks. A theory such as diffusion of innovations, which encompasses a much larger number of potentially important independent variables than TAM or TTF would likely have much greater predictive power concerning changes in organizational behavior. However, at present, only one study has been conducted employing diffusion of innovations theory to explain the growth of information sharing among local law enforcement agencies (Skogan & Hartnett, 2005). This single study confirmed the ability of diffusion of innovations theory to explain and predict higher rates of adoption and usage of information sharing by local law enforcement within one metropolitan area but further studies are clearly required to validate this theoretical framework for this specific innovation (information integration) within this organizational setting

(law enforcement) in broader environment (multi-state). As it is the first research to introduce diffusion of innovations theory to this study topic, Skogan and Hartnett (2005) can be appropriately viewed as a “starting point” rather than the final word. This study built upon their work by employing diffusion of innovations theory, incorporating three new independent variables to this framework, adding qualitative methods to gather more data, and broadening the investigation from a single locality to a three state setting.

Secondly, this study advanced theoretical knowledge with an integrated approach that tests hypotheses concerning both innovation attributes and organizational characteristics. Many traditional diffusion studies focused on only five innovation attributes: relative advantage, complexity, observability, compatibility, and trialability (Rogers, 1962, 2003). Other studies have noted the role of organizational characteristics such as trust and autonomy (Gil Garcia et al, 2005; Reynolds et al, 2006). However, there is an obvious paucity of studies that have analyzed within a single predictive model how both innovation attributes and organizational characteristics influence the level of information sharing in public safety. The literature review confirmed that many previous studies tended to focus on either innovation characteristics or organizational features but not examine both potential predictors at the same time within the same setting. An integrated model offers the opportunity to obtain a more complete picture. This study contributed to existing research by examining three more predictor variables beyond the traditional diffusion of innovations framework represented by the organizational characteristics of trust, leadership, and autonomy. If validated, these three predictor variables could be integrated into the diffusion of innovations framework to enhance theoretical understanding of the expansion of information sharing within public safety and guide future research (are these antecedents operative for other innovations or are they unique to this innovation?).

Thirdly, having utilized a broader framework such as diffusion of innovations and then building upon it with three new predictor variables, this study accounted for many of the predictor variables identified within the current body of literature. For example, the current literature has isolated several predictors of non-adoption such as complexity, IT incompatibility, a lack of user involvement in system design, insufficient levels of consensus among agencies, and the inability of individuals to connect the innovation to improved performance (Gil Garcia et al, 2005; Jones, 2005; BJA, 2005; Reynolds et al, 2006). While they may be expressed by different variable names, many of the predictors identified by the literature review are represented by or related to the set of nine innovation attributes and organizational characteristics and four control variables specified by this study (Sullivan and Matthews, 2003; Gil Garcia et al, 2005; Bureau of Justice Assistance, 2005; and Reynolds et al, 2006). To include more than these combined thirteen variables as separate constructs might have been redundant and could have unnecessarily increased the likelihood of multicollinearity. To test all variables mentioned within the existing literature as discrete variables and distinct hypotheses could have rendered this research design unmanageable and unfeasible. Over-fitting of the regression model needs to be avoided (Pallant, 2005). There is always a tension in research between what we would ideally investigate and what we can realistically test and examine within a single study. This research broadened the theoretical structure of information-sharing research to convict or release many of the likely suspects without becoming a runaway investigation that attempts to catch everyone who could ever be responsible and ends up empty-handed and frustrated.

Fourthly, if Skogan and Hartnett (2005) are correct in their initial finding that adoption and utilization may likely be distinct processes driven by different sets of predictor variables, then this study is needed to help validate or disconfirm this important conclusion. This study

identified which specific variables representing innovation attributes, organizational characteristics, and other control variables function as antecedents for both processes. For example, certain predictors may exert significant influence towards adoption but may have little impact on the level of utilization. Any finding that certain variables contribute differentially towards adoption and utilization or that predictors for both outcomes are highly dissimilar will aid in establishing that they represent theoretically and empirically unique processes is important to future research. Likewise, findings that show that adoption and utilization actually share several of the same important predictors would also be highly beneficial to current knowledge and future inquiries.

A fifth contribution made by this study was the employment of both quantitative and qualitative research methods which performed a cross-validation function in hypotheses testing, enhanced the depth of data collected enabling “the numbers to speak” through actual interviews with law enforcement executives, and increased the probability of identifying new predictor variables for future investigation. Lastly, diffusion studies concerning information sharing by law enforcement have almost all been solely concentrated within a single locality or a single region within a state or statewide in scope but limited to one state. This study employed a multi-state setting which should improve generalizability and help confirm whether the theoretical and empirical antecedents for information sharing remain invariant across multiple states in different regions of the United States. While still short of an actual nationwide investigation, this study expanded current research into a multi-state setting that represented an advance, which can only enhance our theoretical and empirical understanding of the subject.

Predictive Models of Adoption and Utilization

Based on six variables specified by diffusion of innovations theory and three variables identified by prior empirical research, two models were developed for examination within this study. At this stage in information-sharing research within the context of law enforcement, it has not been confirmed by multiple investigations that the variables that precede adoption are distinct from those that are the antecedents to utilization. In fact, only a single diffusion study of information sharing by local law enforcement has suggested that different variables within this theoretical framework may operate to individually influence each outcome (Skogan and Hartnett, 2005). Only after it has been validated by multiple studies should investigators be prepared to conclude that different independent variables are responsible for adoption versus utilization and proceed with examination of diverse models for each process. For purposes of this inquiry and grounded in our current theoretical and empirical understanding, we have assumed that the same set of variables affected both adoption and utilization. The initial study models were revised to reflect study findings. This study tested predictive models consisting of the same set of theoretically and empirically specified variables that helped determine which variables account for adoption and utilization. This research aided in the identification of whether the variables that led to adoption and utilization converged and diverged.

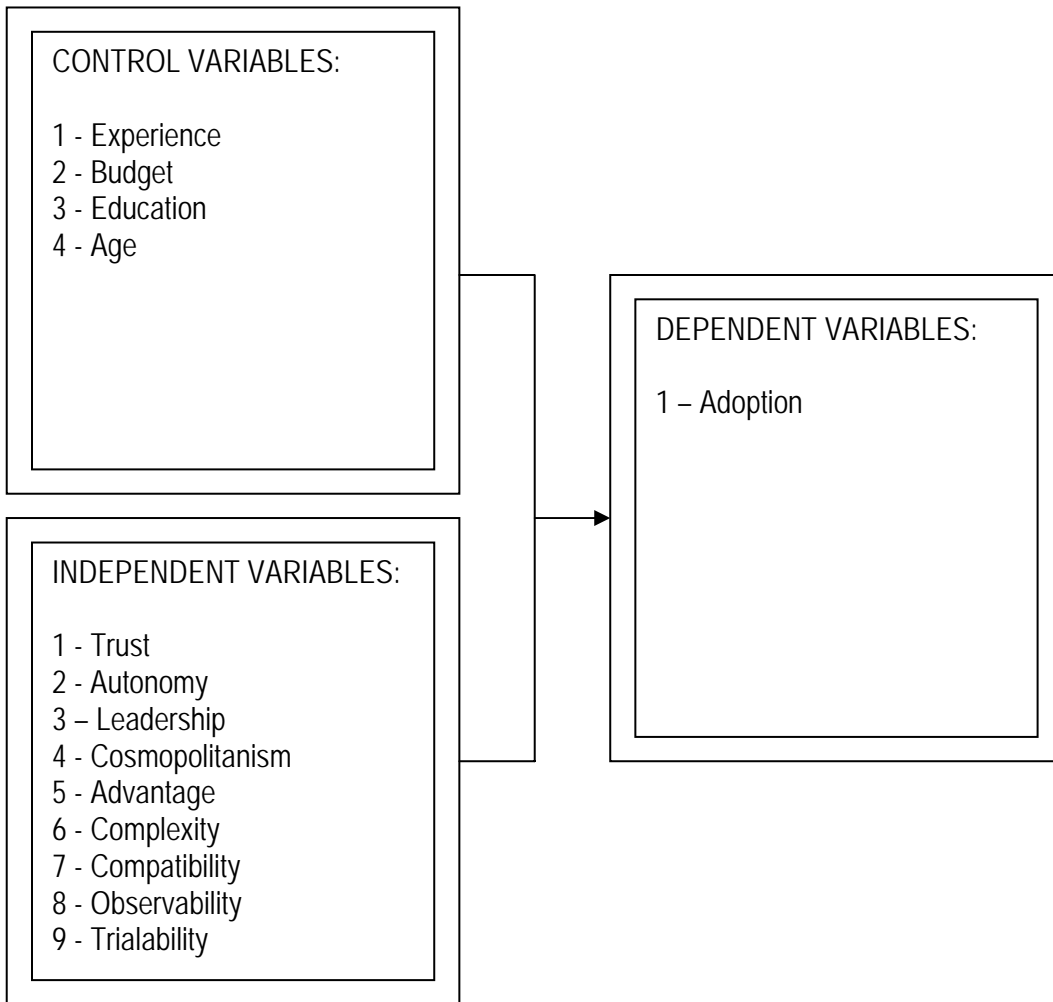


Figure 2: Proposed Model for Predictors of Adoption of Information-sharing Networks by Local Law Enforcement Agencies

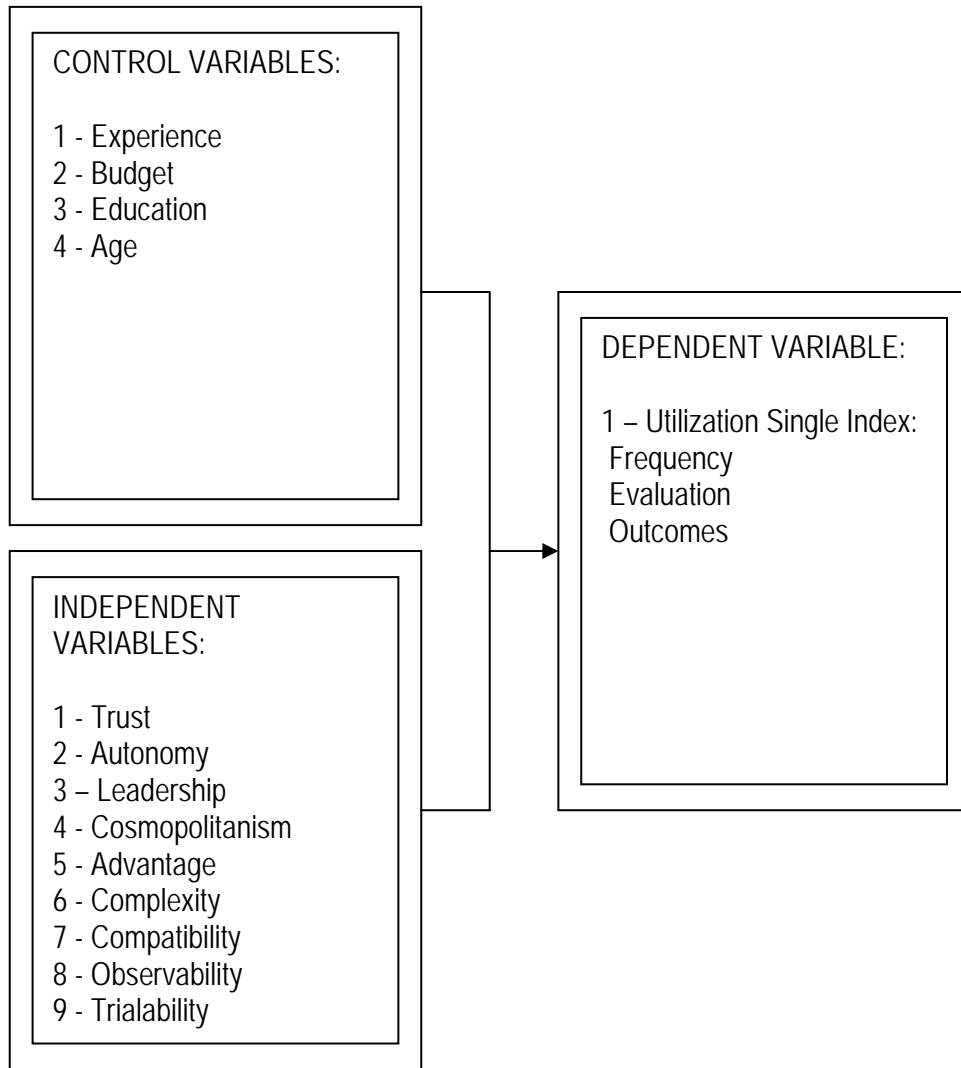


Figure 3: Proposed Model for Predictors of Utilization of Information-sharing Networks by Local Law Enforcement Agencies

CHAPTER THREE: METHODOLOGY

This study employed a non-experimental research design to explore cross sectional data. Quantitative and qualitative research methods and analysis were utilized. The unit of analysis was the local law enforcement organization.

The three states of Georgia, New York, and California were selected for study. These three states offered several advantage and opportunities. First, the states represented three major and different regions of the United States such as the South, Northeast, and West, which could enhance study generalizability. The states had an almost equal number of municipal police departments and county sheriff's offices so no one state would dominate or distort study findings. Each state possessed an impressive degree of internal diversity with local agencies significantly ranging in size, character of the jurisdiction served by the department, and rate of innovation diffusion.

For the quantitative study of information sharing, the mode of data collection was survey research. For the qualitative study, twenty targeted telephone interviews with representatives from each of the three study states were conducted to obtain an additional layer of more rich and in-depth data that may serve to enhance understanding of the quantitative findings and potentially identify new avenues for future research. Additionally, qualitative data was captured through the inclusion of two open-ended items within the survey instrument providing the opportunity for law enforcement executives to share their expertise and experience unconstrained by pre-determined response categories and in their own words. This study incorporated several valuable methodological recommendations from Rogers (1962, 2003) to reduce potential biases and enhance internal and external validity: an innovation still within the diffusion process was

examined, the organization was selected as the unit of analysis, the survey instrument was pre-tested, and additional data collection using targeted telephone interviews offered opportunities for cross-validation.

Unit of Analysis

A large body of social science research examining organizational behavior has been conducted by surveying an individual respondent from the entity who represents or “speaks” for the organization (Dillman, 2000). When the unit of analysis is at the organizational level, surveys in diffusion studies have queried the leaders of private, public, or non-profit sector entities to better understand the impact of the predictor variables upon organizational behavior concerning the adoption and employment of an innovation (Rogers, 1962, 2003; Bradford and Florin, 2003; Goodman, Fichman, Lerch, and Snyder, 1995; Moore and Benbasat, 1991; Poppo and Zenger, 1998; Chamard, 2004; Weiss, 1997; Weisburd and Lum, 2005).

However, as with any method of data collection, there are possible limitations that must be acknowledged and addressed. Rogers (1962, 2003) has made the observation that diffusion research may rely too heavily upon interviews with organization executives to study organizational innovativeness but also maintains that “much useful knowledge” can be acquired through this study method (p. 407).

The nature of the innovation-decision was important to how the diffusion study was conceptualized and implemented. If an innovation-decision was characterized as an “authority innovation-decision” whereby a CEO strongly influences the adoption outcome for the organization, then a research design that surveyed chief executives to learn about organizational innovativeness was sound (Rogers, p. 403, 1962, 2003). Based on prior diffusion studies of law

enforcement organizations and the hierarchical and paramilitary character of these agencies, a survey of Sheriffs and Police Chiefs as representatives of the organizations concerning this “authority innovation-decision” was justified (Chamard, 2004; Weiss, 1997, Weisburd and Lum, 2005; Dillman, 2000).

Key factors to determine the identity of the organizational representative were whether he or she possesses the “authority, capacity, and motive” to respond (Dillman, p. 339, 2000). Of all potential organizational representatives, the Police Chief or Sheriff or their designated senior administrator was most likely to have the authority, capacity, and motive to respond. As the sole or most influential decision-maker in the police organization, the Police Chief or Sheriff possessed the requisite authority to participate. Their capacity to respond was facilitated by their career experience and ability to access organizational knowledge. The average length of professional law experience for survey respondents was 25.6 years. Given the extensive professional experience of respondents, agency executives were in a position to contribute significant knowledge and insight into this issue acquired during long and successful careers. Agency executives were also in a position to tap the institutional knowledge of the organization if adoption occurred prior to the start of their tenure assuming they had not already been briefed on this significant aspect of agency operations. Qualitative research within this study revealed a high degree of interest in the topic among chief executives.

Rogers (1962, 2003) noted that a potential methodological concern inherent to the many diffusion studies that interviewed executives to identify the reasons for changes in organizational behavior is that not all executives were able to fully provide all information concerning the innovation decision. One fairly common potential methodological issue was that the executive responding to the survey may not be the same executive who was present at the adoption of the

innovation. Potential remedies to this issue include: deletion of surveys completed by Sheriffs or Chiefs who did not hold their current position during agency adoption of the information-sharing network, comparison of responses by those who were in office during agency adoption versus those respondents who did not head the agency at the time, or acknowledgement of this potential limitation and acceptance of the data obtained.

As noted, one option was to discard all surveys completed by respondents whose predecessors actually made the adoption decision for the agency on the automatic assumption that the current chief executive would not have access to that institutional knowledge or their responses would dramatically differ from previous agency heads. 73.4% of respondents were not the chief executive at the time of adoption, which would have removed most study data from analysis. This was not an unexpected finding and it likely represented the reality for almost all information-sharing studies that have been or will be implemented in this country. The average tenure of Police Chiefs in most cities in America is less than five years and most Sheriffs can be replaced every four years through popular election. Unless adoption has occurred in the last year or two, most studies that survey law enforcement leaders to learn more about organizational adoption will have to accept this inherent limitation to researching this topic.

A comparative analysis was undertaken between the 286 chief executives who were not in their current position at the time of agency adoption and the 98 police administrators who occupied office at the time of organizational adoption. This analysis found that the predictor variables accurately accounted for 75% of the adoption decisions among those who had not been the chief executive at the time of adoption. This finding was highly consistent with the overall study finding that 66% of the adoption decisions were made by the entire sample of both chief executives whose tenure overlapped with the adoption decision and those whose did not could be

predicted by these study variables. However, this high degree of congruence could have been influenced by the fact that seven out of ten survey respondents were not the chief executive at the time of adoption. Following a recommendation by Rogers (1962, 2003), the qualitative investigation enabled chief executives to discuss in-depth how the adoption process actually unfolded in their agency and their experiences tended to strongly align with the responses of police administrators not present at the time of adoption in selection of predictor variables.

Most importantly, this study asked all respondents regardless of agency adoption status or whether their tenure as chief executive coincided with adoption to provide their level of agreement with a list of reasons which may or may not influence their decision to adopt or not adopt an information-sharing network. The actual survey questions are designed to answer the research question of which predictors can account for adoption and utilization of information-sharing networks by local law enforcement organizations. The research question and survey items did not seek to answer or definitively measure whether the Palo Alto Police Department had specifically adhered to these predictors in their adoption decision but whether these predictors influenced police organizational decision-making and utilization of this innovation. Some chief executives likely drew upon the specific experience of their current police organization while others may have simply responded to whether these predictor variables would affect any adoption decision or level of utilization by a police organization that they led. This was an important distinction which further justified the conduct of survey research involving chief executives regardless of whether they oversaw their current agency's adoption or not. It should be noted that among all adopters, all chief executives were obviously able to discuss utilization.

Based on the foregoing reasons, this study chose to accept data from all respondents. Future research can determine how great a threat this issue truly poses by continuing to compare responses from all categories of agency heads to determine if their responses significantly vary as a result of this single characteristic. This methodological question did not start with this diffusion study nor does this study seek to resolve it. In this study, meaningful data was generated which facilitated effective analysis that comported well with the theoretical and empirical findings of similar studies. The experience of this study suggested that while it may be ideal to ask the agency head who presided during adoption, the inability to do so does not defeat valid inquiries into this topic.

Secondly, an additional question involved in survey research for diffusion studies is whether a single or multiple informants for each organization should be queried. The use of multiple informants could reduce the level of recall bias to which one informant could be more susceptible but it also adds complexity and cost to the study (Hughes and Preski, 1996).

Moreover, respondents are potentially vulnerable to position bias where their functional role within the organization may limit their ability to report information concerning the full range of organizational level variables that influenced the adoption decision (Hughes and Preski, 1996). For example, involving an information technology manager as another informant in this study could yield additional data on IT related questions but by virtue of their organizational role, they may be limited or unable to accurately respond to questions concerning all nine predictor variables.

While multiple informants could produce more comprehensive data, it could create a major methodological problem stemming from disagreements between multiple informants from

within the same organization (Teo and King, 1997). Sound selection of a competent single informant represented a better approach (Teo and King, 1997).

The preferred option of diffusion studies involving the adoption of information technology by organizations was the employment of the single informant method (Bradford and Florin, 2003; Goodman, Fichman, Lerch, and Snyder, 1995; Moore and Benbasat, 1991; Poppo and Zenger, 1998). This study utilized the single informant method for organizational level survey research. For organizational level research, diffusion studies indicated that the chief executive was most likely to be aware of or understand more of the variables influencing the adoption decision.

Study Variables

As presented in Table 1, the initial independent variables for this study were the levels or degrees of inter-organizational trust, retention of agency autonomy, commitment of agency leadership, cosmopolitanism, relative advantage, complexity, compatibility, observability, and trialability. Adoption and utilization of the innovation of an information-sharing network by a local law enforcement agency represented the two dependent variables for this investigation and are found in Table 2. Adoption and utilization are being examined as two separate dependent variables as they appear to represent distinct constructs. Adoption does not guarantee utilization and it is unclear at this stage in diffusion investigations of information-sharing networks in local law enforcement how adoption and utilization diverge and converge in the identity and influence of their antecedents. Study findings aided in determining the similarity and dissimilarity of the adoption and utilization processes within this setting.

On both theoretical and empirical grounds, these two constructs are best measured and examined as two separate dependent variables. The dependent variable of adoption was dichotomous in nature (0-1). The measurement of this variable was highly consistent with the theoretical framework and the large extant body of diffusion investigations. The dependent variable of utilization was represented by a single additive index (3-16) based upon the combined scores on three different measures: frequency of use, positive user evaluations, and positive outcomes. Frequency of use was cited as a measure of utilization in multiple diffusion studies (Skogan & Hartnett, 2005; Dimitrova, 2006; Rogers, 2003; Buenafe et al 2004). Positive user evaluations and positive outcomes were cited as indicators of utilization in a second set of diffusion studies (Dimitrova, 2006; Buenafe et al, 2004; Chau, 2001). Positive user evaluations and improved outcomes have been documented as valid performance measures associated with information sharing in law enforcement (Bureau of Justice Assistance Center for Program Evaluation, 2006). Moreover, higher levels of utilization seem to correlate with and express themselves in more positive evaluations and outcomes (Bureau of Justice Assistance Center for Program Evaluation, 2006). Law enforcement executives would seem less likely to utilize an information-sharing system that they did not perceive as being a positive experience for their agency and did not translate into improved outcomes for their officers and detectives on the job (i.e. solving crimes, identifying suspects). The single additive index for the dependent variable of utilization was constructed through the employment of survey items, which are theoretically informed and almost identically scaled. These items and index displayed a significant degree of measurement validity and reliability. The single additive index also afforded the ability to measure different dimensions of the same construct. The independent variables under study are presented within Table 1 and the dependent variables are located within Table 2.

Table 1: Definitions of Study Variables for Independent Variables

| Variable | Description | Type | Values | Units |
|-----------------|---|-------------|---------------|--------------|
| TRUST | Level of interorganizational trust between local law enforcement agencies (Q12, Q13, Q19) | Ordinal | 1-7 | N/A |
| AUTONOMY | Degree of retention of individual agency autonomy with information-sharing network (Q9, Q10, Q11) | Ordinal | 1-7 | N/A |
| LEADERSHIP | Level of commitment by agency leadership to information sharing (Q14) | Ordinal | 1-7 | N/A |
| COSMOPOLITANISM | Degree which the organization is oriented outside its social system (Q20, Q22) | Ordinal | 1-7 | N/A |
| ADVANTAGE | Improved performance over the status quo (Q6, Q7, Q8, Q21) | Ordinal | 1-7 | N/A |
| COMPLEXITY | Degree of difficulty of understanding or employing information sharing (Q16, Q23) | Ordinal | 1-7 | N/A |
| COMPATIBILITY | Degree of consistency between organizational needs and beliefs and the innovation of information sharing (Q17, Q24) | Ordinal | 1-7 | N/A |
| OBSERVABILITY | Degree to which others can observe the outcomes linked to information sharing (Q15, Q26) | Ordinal | 1-7 | N/A |
| TRIALABILITY | Ability to experiment with information sharing in a limited way (Q18, Q25) | Ordinal | 1-7 | N/A |

Table 2: Definitions of Study Variables for Dependent Variables

| Variable | Description | Type | Values | Units |
|-----------------|---|-------------|-----------------------|--------------|
| ADOPTION | Adoption of information sharing (Q1) | Dichotomous | 0-1 0=No, 1=Yes | N/A |
| UTILIZATION | Single additive index combining three weighted measures of utilization: 1) frequency of use (1-6), 2) positive user evaluations (1-5), and 3) positive outcomes (1-5) (Q27, Q28, Q29) | Ordinal | 3-16 | N/A |

To control for the effects of other agency and individual characteristics and enhance internal validity, several control variables were incorporated into the analysis and are presented within Table 3. A control variable reflecting a key organizational characteristic that varied greatly such as agency budget and control variables to minimize the effects of differences between individual survey respondents such as years of law enforcement experience, educational level, and age were employed. These control variables tracked closely with several organizational and individual characteristics specified by Rogers (1962, 2003) as influential to the innovation decision. Rogers maintained that earlier adopters tend to be better educated and work in organizations that are larger in size and possess greater resources (1962, 2003). The study regressed the dependent variables against the control variables to calculate the Adjusted R-Square, which explained the percentage of variation in the dependent variables, accounted for by the influence of the control variables

Table 3: Definitions of Study Variables for Control Variables

| Variable | Description | Type | Values | Units |
|-----------------|---|-------------|---------------|-----------------|
| EXPERIENCE | Years of law enforcement experience | Scale | 0-60 | Years |
| BUDGET | Annual budget of the local law enforcement agency (Q33) | Interval | Total \$ | Dollars |
| EDUCATION | Level of formal education obtained Q34) | Interval | 1-5 | Degree attained |
| AGE | Age of the survey respondent Q35) | Interval | Age in years | Years |

Quantitative Research and Analysis

Data Collection

Rogers (1962, 2003) emphasized the primacy of survey research as a means of data collection in diffusion studies. For adopters and non-adopters, the survey asked them to assess the exact same set of variables and respond whether these antecedents would influence their agency decision to adopt an information-sharing network.

A mixed method of survey implementation was selected to offer respondents opportunities to participate through either a more traditional self-administered mail survey or via a Web-based survey instrument. Dillman (2000) has indicated that mixed mode surveys can enhance respondent participation, decrease the potential for non-response and coverage errors, and serve a complimentary capability function where each employed method serves to help indemnify against the limitations of others that are utilized. Approximately one-third of survey participants responded through the Web version (108 or 28%) while the other two-thirds communicated their information via the traditional mail survey.

However, Dillman (2000) has counseled that possible differences in modes must be minimized to synchronize the survey stimuli for respondents to the greatest extent possible. Adhering to Dillman's "unimode construction" protocol for mixed methods surveys, the mail and Web versions of the survey instrument were very highly similar in visual appearance, identical in format, and self-administered in implementation preventing possible interviewer influences. Both pre-testing respondents and actual respondents did not report any difficulty in understanding or completing either version and expressed similarly high levels of satisfaction with each survey experience.

While the self-administered mail survey lacked an available in person or telephone interviewer to immediately answer survey-related issues for respondents, it has continued to be a highly effective and widely used survey research method (Dillman, 2000). A Web-based survey also has potential advantages and limitations. The benefits of Web surveys are reduced cost, speed, automation, and use of graphical opportunities such as visually attractive images and icons. Like mail questionnaires, Web surveys face the possible drawbacks of poor construction, inept question design, potential corruption by entertainment features, and unrepresentative sampling. By design, the Web-based survey within this research successfully avoided those possible vulnerabilities.

Social Exchange Theory

Dillman (2000) has utilized social exchange as the theoretical foundation for the conduct of survey research. Social exchange theory has posited that human beings act on a motivation that their actions will be rewarded with anticipated benefits from others. Fundamentally, social exchange theory has rested on a premise that humans are social beings whose motivations, actions, and interactions can be guided by non-economic influences such as personalizing a letter or expressing gratitude. When respondents viewed survey participation as a social exchange, they can sense that their expectations for long-term benefits could be satisfied (i.e. completing this survey will help you and your agency by improving understanding and approaches to information sharing for local law enforcement).

Social exchange theory has operated on three elements: rewards, costs, and trust. To align actual survey research with social exchange theory elements, rewards should be increased, costs reduced, and trust built for respondents. Rewards are anticipated gains from an activity, costs are

expected expenses or burdens associated with participation, and trust is the belief that rewards will exceed costs in the long term. Rewards and costs are much more social than material. A survey which has increased a sense of reward by looking important and interesting, reduced cost or respondent burden by appearing easy to do, and established trust by offering potential value on a socially desirable objective for the respondent would be consistent with this theoretical framework (Dillman, 2000).

Rewards are increased by expressing positive recognition of the respondent (i.e. personalizing the letter), communicating gratitude, seeking counsel as human beings like to be asked for their help, affirming support of shared group values, infusing questionnaires with a high level of interest for the respondent, offering peer validation by letting respondents know that others have participated in this survey, and as the study draws to a close, informing respondents that this may be one of their last chances to make their voice heard and enjoy influence (Dillman, 2000).

Costs are reduced by not communicating to the respondent as a subordinate, working to prevent embarrassment such as starting a survey with a highly complex and technical question that may make respondents feel dumb, decreasing inconvenience such as enclosing a postage paid return envelope, making questionnaires relatively short in length and duration and able to be completed with little difficulty, reducing requests for information which is deemed personal such as annual income and if unavoidable, then accompanying the request with a clear and credible explanation and promise of confidentiality (Dillman, 2000).

Trust is enhanced by clearly communicating survey sponsorship involving a legitimate authority such as a university, ensuring that the respondent views the task as important through the use of a professional presentation, inclusion of a personalized and signed cover letter, and

employment of follow-up mailings so people trust that they are giving their participation to a project that is valuable. A request to complete the survey from a credible sponsor on their personal letterhead will also contribute to higher levels of respondent trust (Dillman, 2000).

Dillman (2000) strongly suggested a systematic approach that built on the interplay of the three elements of social exchange theory. The principles of his systematic approach included: recognition that a single survey feature may be related to more than one element of social exchange, a realization that people may also be concerned about the costs of not responding, repetition eventually dilutes effectiveness, an understanding that using any tactic to the extreme could repel respondents such as dramatically shortening a survey to reduce cost might also convince some respondents that the survey carries little significance eroding their trust and willingness to participate, late respondents may differ from early responders which argues for altering follow-up communications such as the exact language in successive letters, perceptions of costs and rewards can vary by survey population and individual respondent which should factor into the content of survey-related communications, and that actions in response to social exchange elements should be viewed corporately rather than individually and independent of one another (Dillman, 2000). Each feature of the survey contained the potential to increase or decrease one or more of the three elements of social exchange. A single element (reward, cost, trust) might be strengthened at the expense of another facilitator of social exchange (Dillman, 2000).

Dillman (2000) advised that the visual aspects of a survey are integral to the elements of social exchange. Colors, layout, navigational guides, symbols, and brightness all can influence and interact to increase rewards, reduce costs, and enhance trust (Dillman, 2000). For example, a

visually unattractive or navigationally confusing survey may decrease feelings of reward and trust and impose perceived cost to the respondent.

Every stage of the survey from pre-notice postcard to replacement survey must adhere to social exchange theory (Dillman, 2000). As a continual process of social exchange, rewards were increased, costs were reduced, and trust was confirmed at every step within successful survey implementation (Dillman, 2000). An effective implementation of the Tailored Design Method (TDM) involved linking elements of social exchange with the knowledge of the specific survey population, survey sponsor, and survey content. Different survey populations, sponsors, and instrument content contributed to potential opportunities and obstacles in increasing rewards, decreasing costs, and establishing trust.

Significant empirical evidence has accumulated in support of survey research guided by social exchange theory. Seeking to improve response rates based on their understanding of social exchange theory, Dillman, Sinclair, and Clark (1993) mailed 7,500 surveys to “High Response Areas” and 7,500 surveys to “Low Response Areas” based on their respective response rates to the 1990 census. As predicted by social exchange theory, Dillman et al (1993) found that making questionnaires more respondent-friendly and shortening their length, which would increase rewards and decrease costs, had the combined effect of increasing response rates by 8-10%. Moreover, escalating costs to respondents by asking for their social security numbers negatively affected response rates (Dillman et al, 1993).

Social exchange theory permeated all aspects of survey design and implementation within this research. Pre-testing of the survey instrument confirmed the efficacy of social exchange theory in its application to survey design and implementation. Pre-testing respondents noted that the reasonable survey length and eight to ten minute duration for completion reduced

their costs of participation. Unambiguous and easily understood questions decreased their perceived costs associated with responding to the survey. The inclusion of a “don’t know/can’t say” response category for all questions that they might not be able to answer was also viewed as a reduction in cost. Survey features such as a cover letter that informed them that their advice as a law enforcement executive was needed and quickly identified that the issues were important and interesting increased their sense of reward. Moreover, unsolicited favorable comments by actual respondents added to their returned surveys concerning their interest in the topic and the ease of completion served as further evidence of the value of survey research that is informed by social exchange theory.

Sampling Methodology

Local law enforcement organizations in three states were under study. The survey population consisted of the three hundred and eighty eight Sheriff’s Offices (county) and Police Departments (city) in the state of California, the four hundred and four Sheriff’s Offices (county) and Police Departments (city) in the state of Georgia, and the four hundred and seven Sheriff’s Offices (county) and Police departments (city) in the state of New York. Most diffusion studies of public safety information-sharing technologies have occurred within a single county or single state. Having selected three states from three different regions of the United States, this study sought to identify and validate predictor variables within a multi-state setting enhancing study generalizability.

Each of these states has almost the exact same number of local law enforcement agencies under study, which reduces the likelihood that study conclusions would largely reflect a single dominant state. Each of these states also has significant internal diversity and had an attractive

heterogeneity of diffusion between adopters and non-adopters of information-sharing networks.

Lastly, although study results would only be truly generalizable to these three states, if study conclusions validate a number of predictor variables within a multi-state setting, it would suggest that these predictors might potentially remain invariant and effective across many states.

The mailing list of Sheriffs and Police Chiefs in the State of New York was obtained from the Office of Justice Statistics and Performance within the New York State Division of Criminal Justice Services in February 2007. The mailing list of Sheriffs and Police Chiefs in the State of Georgia was provided by the Office of Public Affairs and Constituent Services within the State of Georgia Emergency Management Agency in February 2007. The mailing list of Sheriffs and Police Chiefs in the State of California was secured through the Office of Crime Studies within the State of California Department of Justice in February 2007. In addition, all three states' mailing lists were also validated as accurate and comprehensive by cross-checking them against a master list of all Sheriff's Offices and Police Departments for each of these three states provided by the Programs Support Section of the Criminal Justice Information Services Division within the Federal Bureau of Investigation which annually collects state mandated crime data for the Uniform Crime Report from all local and state law enforcement agencies in these three states. List accuracy was validated by the fact that only two agencies within the master mailing list were identified as having any issues during the survey implementation process. The City of Pinehurst, Georgia recently decided to discontinue offering policing services and disbanded its police department in October 2006. The Police Department of the Town of Southold, New York recently changed Police Chiefs and corrected correspondence was subsequently sent to the new Police Chief.

All 1,199 Sheriffs and Police Chiefs in all three states were mailed the survey and received five communications during the course of the study in accordance with the Dillman protocol (Dillman, 2000). Of the study population of 1,199 chief executives of local law enforcement agencies, a sample of 384 respondents was obtained. Police agencies for school districts or special districts such as a port authority were not included as study states varied significantly on the presence and number of these police organizations and they represent a small percentage of law enforcement organizations. By providing all county and city law enforcement agencies within each state with an equal opportunity to participate in this research, a valid and representative sample of the state's study population was obtained which is suitable for statistical analysis.

Power Analysis

A priori and post hoc power analyses were conducted to determine and confirm sample size based upon achieving a power level of .90 and a confidence level of .05. To address the first research question and test the first eight hypotheses through logistic regression analysis, the PASS 2005 Power Analysis and Sample Size Software was utilized to identify a necessary sample size of 97 observations to achieve 90% power at a .05 significance level to detect odds-ratios of 2.5 in independent variables if all independent variables explain 50% of the variation in the binary dependent variable of adoption. To address the second research question and test the second set of eight hypotheses through multiple regression analysis, a widely available statistical software program at <http://www.dainelsoper.com/statcalc/calc01.aspx> was employed to identify a needed sample size of 30 observations to achieve 90% power at a .05 significance level to detect an effect size of one if all independent variables explain 50% of the variation in the

dependent variable of utilization. Moreover, to confirm the minimum sample size needed for multiple regression analysis, PASS 2005 Power Analysis and Sample Size Software was also engaged which calculated that a minimum number of 22 observations were mandatory to attain 90% power at a .05 significance level to capture a large effect size if all independent variables are responsible for 50% of the variation in the dependent variable of utilization. The disparity between sample sizes is attributed to the need for a much larger sample size to conduct multiple logistic regression analysis.

Following the completion of data collection, post hoc power analysis was instituted to confirm the sufficiency of the sample size of the data collected for logistic and multiple regression analyses. Post hoc power analysis for logistic regression validated that the 384 cases obtained were effective at achieving a 90% power at a .05 significance level to confirm an odds-ratio of .5 if all independent variables are responsible for 15% variation in the dependent variable of adoption (N = 102 required). To confirm an odds-ratio of 1.5 if all independent variables are responsible for 15% variation in the dependent variable of adoption, then a sample size of 300 was needed which was also satisfied by this study's sample size. These odds-ratios were selected as inputs for the power analysis as they represented lowest to the highest odds-ratios revealed by the logistic regression analysis for the hypothesized relationships under study. Once again, requisite sample sizes increased when logistic regression was employed which explained why the sample size might need to reach as high as 300 to detect the highest odds-ratio of 1.5 if all independent variables were responsible for 15% variation in the dependent variable of adoption. Post hoc power analysis for multiple regression verified that 384 cases were conducive to attaining 90% power at a .05 significance level to if all independent variables are responsible for 10% and all control variables could account for 5% of the variation in the dependent variable of

utilization (N = 178 required). All post hoc power analyses were conducted through the employment of PASS 2005 Power Analysis and Sample Size Software. The final sample of 384 cases obtained through data collection and available to address both research questions through logistic regression and multiple regression analysis easily conformed to the expectations of the a priori power analysis and was confirmed as sufficient by the post hoc power analysis.

Survey Instrument and Implementation

A mixed-method survey research program, which utilized both mailed and Web-based survey instruments, was implemented involving a total study population of 1,199 local law enforcement executives in three states. All 1,199 Sheriffs and Police Chiefs in all three states were mailed the survey and received five communications during the course of the study in compliance with the Dillman protocol (Dillman, 2000). Of the study population of 1,199 chief executives of local law enforcement agencies, a sample of 384 respondents was secured. The survey instrument along with the cover letter sent to the study population is included in Appendix A.

Survey implementation strictly adhered to the Dillman five-contact protocol involving a pre-survey letter, a survey package, a thank you/reminder postcard, a replacement survey package, and a final reminder postcard (2000). Identical or similar correspondence content and language was utilized from validated Dillman five contact survey communications (Dillman, 2000). The survey was mailed directly to the chief executive (Sheriff or Police Chief) of each agency who was asked to complete it. Analysis of the results from survey question five, which asks for the specific job title of the respondent, confirms that in 73.2% of the surveys returned, it was the Sheriff or Police Chief who is reporting that he or she completed it. The law enforcement

executive had the option of completing the mailed version of the survey and returning it in a postage paid return envelope or completing an on-line survey by entering a provided link to the Web-based survey and logging in with his or her individualized access code.

A 32% response rate was achieved through meticulous compliance with the well-established five-contact Dillman survey research implementation protocol. While this response rate corresponded with the anticipated 30-35% response rate discussed and anticipated in the prospectus defense, there may have been additional means to enhance it, which could be explored as methods for future investigations into this research topic. While important, response rate is secondary to obtaining the number of observations sufficient for valid statistical analysis. As confirmed by the post hoc power analysis, 384 observations represented more than the number of cases needed for logistic regression and required for multiple regression.

Each state was almost equally represented in survey participation with 112 surveys completed by law enforcement executives in Georgia representing a response rate of 27.7%, 123 surveys completed by law enforcement executives in California representing a response rate of 31.7%, and 134 of surveys completed by law enforcement executives in New York representing a response rate of 32.9%. Fifteen surveys were returned anonymously with the survey cover sheet containing the agency code missing. Overall survey results do not appear to be skewed by over-representation of respondents from a single state.

The survey instrument contained 35 items whose measurement and reliability validity was tested through multiple confirmatory means such as theoretical guidance, an extensive literature review, peer review by the dissertation committee, pre-testing, factor analysis, and calculation of Cronbach's Alpha. These 35 items captured information on the independent, dependent, and control variables. Survey questions measured attitudes, knowledge, and

experiences concerning adoption and utilization of information-sharing networks. The items sought to measure levels of nine independent variables and their degree of influence on two dependent variables that have been specified by Rogers' theory of the diffusion of innovations and the literature review: inter-organizational trust, degree of retention of agency autonomy, commitment by agency leadership, cosmopolitanism, relative advantage, complexity, compatibility, observability, and trialability. The items also measured several dimensions of the dependent variable of utilization such as frequency of use, positive user evaluations, and positive outcomes.

Having followed the recommendation of Rogers (1962, 2003) to develop and implement a survey instrument that is specific to each diffusion study, an instrument was generated, pre-tested, revised, and validated. As a starting point, this study analyzed several survey items employed by Skogan and Hartnett (2005) in their research into the adoption and usage of information-sharing systems by one hundred and twenty-two Chicago area police departments. Permission had been obtained to utilize the Skogan and Hartnett (2005) survey instrument. Items within the Skogan and Hartnett survey instrument specifically measure the independent variables of observability, relative advantage, and compatibility. These items were useful in the development of this study's survey items to measure those constructs.

Survey items for all independent, dependent, and control variables were developed and measurement validity and reliability for all items were verified through multiple means of confirmatory analysis. Strongly grounding measurement items in the theoretical framework guiding this study, employing peer review and pre-testing to validate and revise survey items, and utilizing established methods of statistical analysis facilitated the confirmation of measurement validity and reliability for almost all survey items.

Face validity refers to whether the operationalization of a study construct appears to be credible and defensible (Gliner and Morgan, 2000). Content validity involves checking the operationalization of the variable against the relevant content domain. Both forms of measurement validity can be confirmed by consultation with subject matter experts and experienced researchers and practitioners, which occurred through this study's peer review and pre-testing processes. Both peer review by the dissertation committee and pre-testing by sixteen law enforcement executives enabled the researcher to validate survey items and identify questions for revision to confirm face and content validity for all survey items.

Construct validity is the most comprehensive standard and involves "measuring the whole construct and nothing but the construct" (Gliner and Morgan, 2000). It needs to be grounded in theory. This study optimized the opportunity to confirm construct validity by employing multiple survey items to measure almost every individual variable, examining theoretically informed variables that have proven to be capable of definition and operationalization, and maintaining fidelity with research methods from both the body of diffusion studies and prior investigations of information sharing in law enforcement. Construct validity involves both convergent validity which is the degree to which concepts that should be related theoretically are interrelated in reality and divergent/discriminate validity which represents the degree to which concepts that should not be related theoretically are, in fact, not related in reality. Construct validity can be established through factor analysis which verifies that concepts which should be theoretically related are also empirically related (Dimotrova, 2006; Gliner and Morgan, 2000). This study employed factor analysis to confirm construct validity for the survey items measuring study variables.

Factor Analysis to Confirm Measurement Validity

Factor analysis confirmed that a survey item or items were actually measuring the latent variable for which they are intended to measure. This technique revealed construct validity, which is the optimal form of measurement validity. Construct validity ensured that a single latent variable was being effectively measured by one or more survey items designed for that purpose.

Initially, there were nine latent constructs within this study. These latent constructs were indicated by eight independent variables and one dependent variable. The independent variable of leadership constituted an observable variable directly measured by the single survey item in Q14 so it was not appropriate or necessary to include it within the factor analysis. The dependent variable of adoption represented an observable variable directly measured by the survey item in Q1, which also made it unsuitable and unessential to incorporate it within factor analysis.

Factor extraction was achieved by principal component analysis coupled with the varimax rotational technique, which identified total eigenvalues and the total variance explained as presented in Table 4 (Pallant, 2005). Eigenvalues should exceed one for survey items to establish measurement validity for one or more survey items utilized to measure a single latent variable. Total variance explained refers to the percentage of the latent construct that one or more survey items can actually measure with higher percentages contributing to greater measurement validity (Pallant, 2005). Factor analysis was conducted with the SPSS Software 15.0 for Windows statistical software package with measurement validity results presented below in Table 4 for each of the nine latent constructs within the study.

Table 4: Factor Analysis for Measurement Validity of Latent Variables

| Variable | Description | Total Eigenvalues | Total Variance Explained |
|-----------------|---|--------------------------|---------------------------------|
| TRUST | Level of interorganizational trust between local law enforcement agencies (Q12, Q13) | 1.735 | 86.7% |
| AUTONOMY | Degree of retention of individual agency autonomy with information-sharing network (Q9, Q10, Q11) | 2.346 | 78.2% |
| COSMOPOLITANISM | Degree which the organization is oriented outside its social system (Q20, Q22) | 1.419 | 70.9% |
| ADVANTAGE | Improved performance over the status quo (Q6, Q7, Q8, Q21) | 2.962 | 74% |
| COMPLEXITY | Degree of difficulty of understanding or employing information sharing (Q16, Q23) | 1.734 | 86.6% |
| COMPATIBILITY | Degree of consistency between organizational needs and beliefs and the innovation of information sharing (Q17, Q24) | 1.654 | 82.7% |
| OBSERVABILITY | Degree to which others can observe the outcomes linked to information sharing (Q15, Q26) | 1.443 | 72.1% |
| TRIALABILITY | Ability to experiment with information sharing in a limited way (Q18, Q25) | 1.539 | 76.9% |
| UTILIZATION | Single additive index combining three weighted measures of utilization: 1) frequency of use (1-6), 2) positive user evaluations (1-5), and 3) positive outcomes (1-5) (Q27, Q28, Q29) | 2.925 | 97.4% |

Factor analysis confirmed the measurement validity of all latent variables within this study. Principal component analysis revealed that all nine variables were each measuring a single latent construct. The Bartlett's Test of Sphericity found statistically significant values for all

variables confirming that this principal component analysis was suitable to establish measurement validity. In addition, the principal component analysis for each variable demonstrated that survey items loaded appropriately for each variable under study (above .4).

A primary purpose of factor analysis was data reduction (Pallant, 2005). Survey items that have not demonstrated measurement validity can be excluded from further analysis. In the initial principal component analysis, the three survey items intended to measure the latent construct of trust obtained an eigenvalue of 1.888 and accounted for 62.9% of the variance in trust. However, a secondary principal component analysis of two of the three items measuring trust (Q12 and Q13) revealed that they could explain 86.7% of the variance in trust while retaining an eigenvalue of 1.735. Total variance explained increased by 23.8% with the exclusion of Q19 from measurement of the variable of trust. This finding is buttressed by the results of this principal component analysis, which found that while Q19 achieved an acceptable level, it did not load especially highly on the component of trust as Q12 and Q13 did. In other words, Q19 was making little or no contribution to enhancing measurement validity concerning trust. This finding indicated that querying survey respondents in Q 19 about whether “A fellow Sheriff or Chief in your area asked your agency to join the information-sharing network” was not effectively measuring the latent construct of trust. Coupled with the results of the reliability analysis, the decision was made to delete the survey item Q19 and its accompanying datum from the measurement of trust and regression analysis.

All Eigenvalues exceeded one for the survey items and variables intended to measure each latent construct. 70.9% to 97.4% of the latent variables within the study were shown to be measured by the designated survey items. Survey items were aggregated into the single variables, which they measured for regression analysis.

Cronbach's Alpha to Confirm Measurement Reliability

The reliability of the survey instrument involves the ability of measurement items to yield consistent results. Reliability was established through the use of a measure of internal consistency reliability that is appropriate for multiple-choice questions. Cronbach's Alpha calculated all possible correlations between items based on all potential split halves of the same test and produced a reliability estimate between 0 and 1 (Pallant, 2005).

A Cronbach's Alpha of .7 for the items within a survey instrument should validate their measurement reliability (Pallant, 2005). It is possible for a survey item to still be permitted for inclusion within a study with a Cronbach's Alpha as low as .6 (Taylor R., Reeves B., Mears R., Keast J., Binns S., Ewings P., and Khan, K., 2001; Garson, 2007). Reliability analysis was conducted with the SPSS Software 15.0 for Windows statistical software package to calculate Cronbach's Alpha for one or more survey items measuring each of the nine latent variables within the study. Measurement reliability results are presented in Table 5 for each of the nine latent constructs within the study.

Table 5: Measurement Reliability Analysis of Latent Variables

| Variable | Description | Cronbach's Alpha |
|-----------------|---|-------------------------|
| TRUST | Level of interorganizational trust between local law enforcement agencies (Q12, Q13) | .84 |
| AUTONOMY | Degree of retention of individual agency autonomy with information-sharing network (Q9, Q10, Q11) | .85 |
| COSMOPOLITANISM | Degree which the organization is oriented outside its social system (Q20, Q22) | .58 |
| ADVANTAGE | Improved performance over the status quo (Q6, Q7, Q8, Q21) | .88 |
| COMPLEXITY | Degree of difficulty of understanding or employing information sharing (Q16, Q23) | .84 |
| COMPATIBILITY | Degree of consistency between organizational needs and beliefs and the innovation of information sharing (Q17, Q24) | .79 |
| OBSERVABILITY | Degree to which others can observe the outcomes linked to information sharing (Q15, Q26) | .61 |
| TRIALABILITY | Ability to experiment with information sharing in a limited way (Q18, Q25) | .69 |
| UTILIZATION | Single additive index combining three weighted measures of utilization: 1) frequency of use (1-6), 2) positive user evaluations (1-5), and 3) positive outcomes (1-5) (Q27, Q28, Q29) | .98 |

Based on attaining a Cronbach's Alpha of .7 or higher, the initial reliability analysis confirmed measurement reliability for six latent study variables. Based on obtaining a Cronbach's Alpha of .6 or higher, reliability analysis corroborated measurement validity for two latent variables within the study.

Exclusion of Survey Item and Variable of Cosmopolitanism from Further Study

Reliability analysis facilitated two major methodological decisions within this study. First, Q19 was deleted from the measurement of the variable of trust. When Q19 was included, the Cronbach's Alpha was .65. When Q19 was excluded, the Cronbach's Alpha rose to a much stronger .84. Moreover, the corrected item-total correlation for Q19 fell below the recommended minimum value of .3 (Pallant, 2005). Based on this finding, Q19, which attempted to consistently measure trust by questioning survey respondents about the influence of other Sheriffs or Chiefs asking them to adopt a network, was not a reliable measurement of trust. This survey item would need to be excluded based on its negative effect on measurement validity and measurement reliability. The variable of trust was re-constituted by combining Q12 and Q13 into a single variable for regression analysis. Secondly, the items intended to measure cosmopolitanism generated a Cronbach's Alpha of .58, which falls below the minimum standard of .6. Upon further scrutiny, the corrected item-total correlations for both items seeking to measure cosmopolitanism were a rather weak .41. This low value is likely explained by the conclusion that individual items within the scale measuring cosmopolitanism may be measuring a different construct than the entire scale. A measurement that is valid but not reliable cannot produce data appropriate for statistical analysis (Pallant, 2005). This reliability analysis provided the evidentiary basis for the decision to exclude the variable of cosmopolitanism from further study. While theoretically specified, cosmopolitanism was not reliably measured by the survey and could not be included in the regression analyses. The initial hypothesis concerning cosmopolitanism was deleted from the study.

Final reliability analysis results validated six variables as having a Cronbach's Alpha above .7, one variable just missing the .7 standard with a .69, and one variable above the

minimum cut-off point of .6. Data for these eight independent variables were examined through logistic and multiple regression analysis. With the exclusion of cosmopolitanism, hypotheses tested were reduced from an original eighteen to a final sixteen.

Survey Pre-Testing

Two forms of pre-testing were conducted to prepare this survey instrument (Dillman, 2000). First, peer review by my dissertation committee yielded a number of valuable recommendations concerning question design, question order, and survey format, which were all implemented, with the approval of the committee. Secondly, the researcher conducted retrospective cognitive interviewing of sixteen law enforcement executives who completed the draft survey in December 2006. These law enforcement professionals represented several Sheriff's Offices and Police Departments from Northeast Florida with experience in public safety ranging from ten to 25 years. There were varying degrees of adoption and usage of information-sharing networks among pre-testing respondents. This pre-testing group appeared to be representative of the survey population.

Pre-testing yielded several valuable findings concerning the survey instrument: there was a high level of interest in this topic which provided sufficient motivation to complete the survey, the cover letter was found to be effective in communicating the purposes and potential benefits of the research and what was being requested of the respondents, the original sequence of Q4 and Q5 was reversed as a result of respondent feedback, Q12 was amended to delete the words "by you" as a result of respondent feedback, respondents appreciated having the two open ended questions to elaborate on prior responses or to identify other issues such as the need for funding, and survey questions were well understood by respondents. Pre-testing also found that

respondents liked that they were able to successfully complete the survey within a ten minute time period. Extending survey length and demanding longer durations for participation could have had adverse consequences on response rates and data collection.

Overall, pre-testing participants felt that the entire survey package was highly consistent with the three main objectives of the Dillman protocol based upon Social Exchange Theory: enhanced rewards for responding, limited perceived costs for participating, and greater trust in valued outcomes being obtained from participation in this survey (2000).

Pre-testing did not identify any potential sources of non-response or measurement error. The pre-testing process enabled the researcher to refine the survey instrument prior to final administration. Approval by the University of Central Florida Institutional Review Board of the survey research questionnaire and five contact series of survey communications to potential respondents as well as the targeted telephone interview script was obtained in February 2007. The correspondence that confirmed the approval of the University of Central Florida Institutional Review Board is included in Appendix B.

Data Entry and Coding

A data coding protocol was developed to facilitate data entry and analysis. For questions six through twenty-six, the seven-item Likert scale of response categories from strongly disagree to strongly agree was coded 1 to 7. For questions six through twenty-nine, the response category of “Don’t Know/Can’t Say” was initially coded 98 and cases of missing data were originally coded 99. For purposes of statistical analysis through SPSS, both were re-coded as the mean. For questions twenty-seven to twenty-nine whose responses comprise the single additive index for

the dependent variable of utilization, response categories such as “Highly Frequently” and “Highly Positive” were coded as 6 while “Never” and “Highly Negative” were coded as 1.

Missing Data

Imputation of the mean was selected as the most appropriate strategy for addressing missing data for continuous variables measured by a Likert scale. Both responses such as “Don’t Know/Can’t Say” and non-responses were treated as missing data employing imputation of the mean.

Analysis of the Data

The study utilized multiple logistic regression and multiple regression analyses of the data obtained from survey research to identify and validate statistically significant relationships between the control and dependent variables and the independent and dependent variables. Multiple logistic regression is employed to analyze relationships between several independent predictor or independent variables and a single outcome or dependent variable that is dichotomous in nature (Pallant, 2005). In addressing the first research question and analyzing the data associated with the first eight hypotheses, multiple logistic regression is appropriate, as the dependent variable of adoption is dichotomous in nature (0-1). This form of analysis can help determine the likelihood or probability of variation in the outcome variables as explained by the predictor variables. It can improve understanding of the influence of covariate control variables. Unlike multiple regression analysis, logistic regression does not assume a linear relationship between independent and dependent variables, does not need normally distributed variables, and does not assume homoscedasticity (Pallant, 2005).

With multiple logistic regression, a change in the dependent variable that can be accounted for by the independent variable can be detected and expressed as an odds-ratio. An odds-ratio of less than one is interpreted as the independent variables contributing to a lower likelihood of variation in the dependent variable while an odds-ratio in excess of one would describe a relationship where the predictor variables increase the probability of a change in the outcome variable. If the relationship between an independent variable and adoption was statistically significant and positive, then the probability for adoption of information sharing increased. For example, if the relationship between relative advantage and adoption was positive and statistically significant, then the odds of adoption increased all other variables held constant. If the relationship between complexity and adoption was negative and statistically significant, then the odds of adoption decreased all other variables held constant. The Wald statistic was employed to confirm whether the coefficients associated with each independent variable are statistically significant.

If the Wald statistic confirmed significance, then the independent variable should be kept within the multiple logistic regression model as predictive of adoption. If not, then that independent variable can be removed from the model. Multiple logistic regression models were constructed for the relationships between control variables and the dependent variable and the relationships between independent variables and the dependent variable. This analysis regressed the dependent variable of adoption against all control variables to calculate the Adjusted R-Square, which represents the percentage of variation in the outcome variable accounted for by the control variables. As a second stage, the study regressed the dependent variable of adoption against all control variables and independent variables and calculated the new Adjusted R-Square to determine the percentage of variation now explained by the model with the addition of the

independent variables. This second stage of analysis generated the Adjusted R-Square Change reflecting the effect of the inclusion of the independent variables within the logistic regression model

Multiple regression was most appropriate for addressing the second research question and analyzing the data associated with the eight hypotheses concerning utilization that needed to be tested. This form of analysis can illuminate the specific relationship between several predictor or independent variables and a dependent variable that is ordinal or interval in nature (Pallant, 2005). Three measures of the dependent variable of utilization such as frequency, evaluations, and outcomes were combined to construct a single additive index for utilization (3-16). Specification of independent variables was important as the inclusion of statistically insignificant predictors or the exclusion of statistically significant predictors can affect the regression model. Moreover, researchers should avoid “overfitting” the regression model with the inclusion of additional irrelevant variables that creates “noise” rather than meaning (Pallant, 2005).

The Adjusted R-Square, also known as the coefficient of multiple determination, was generated to determine the percentage of variance in the dependent variable that is uniquely or jointly explained by the independent variables (Pallant, 2005). For example, an Adjusted R-Square of .28 means that 28% of the variation in utilization of information-sharing networks by law enforcement organizations in this study can be explained by the eight-predictor variables assuming that all are statistically significant and included within the model. An F-test confirmed the significance of an Adjusted R-Square. Coefficients associated with each independent variable are tested for statistical significance using t-tests. Unstandardized coefficients represented the amount of change in the dependent variable when the independent variable changes by one unit with all other variables held constant. Standardized coefficients enabled the study to rank the

relative importance of each predictor variable. For instance, a standardized coefficient of .542 for relative advantage and .132 for trialability would inform the study that relative advantage is a much more significant influence upon utilization than is trialability. A regression model is adjudicated on the basis of the three benchmarks of the Adjusted R-Square, the significance of the regression coefficients, and the absolute values of the regression coefficients.

Five assumptions are required for multiple regression: 1) the expected value of the error is zero meaning linearity, 2) the residuals have a constant variance 3) the residuals are normally distributed 4) the residuals are independent and 5) the explanatory variables are not highly related to each other (Pallant, 2005). The residual is the error produced by the difference between the observed Y and the predicted Y. The first assumption of linearity or zero residual can be tested by examining a residual plot and verifying there is no pattern. The second assumption of constant variance can be tested by examining a residual plot and verifying that the residuals appear random. The third assumption of normality can be tested with a histogram and looking for a normal bell shaped curve. The fourth assumption of independence can be tested with a Durbin-Watson test for first order autocorrelation and if $d = 2$, there is no autocorrelation and independence is confirmed. The fifth assumption of a lack of multicollinearity can be tested by regressing each independent and control variable against all other independent and control variables and computing the Variance-inflation factor (VIF). A high VIF means high multicollinearity. If the VIF is more than ten, a multicollinearity problem is present and the variable(s) that shows a high VIF may need to be removed from the model (Netter, Wasserman, & Kutner, 1985). If multicollinearity is not present, then the fifth assumption for regression is satisfied.

This study regressed the dependent variable of utilization against all control variables to calculate the Adjusted R-Square that represents the percentage of variation in the outcome variable accounted for by the control variables. As a second stage, the study regressed the dependent variable of utilization against all control variables and independent variables and calculated the new Adjusted R-Square to determine the percentage of variation now explained by the model with the addition of the independent variables. This second stage of analysis produced the Adjusted R-Square Change, which illuminated the effect of the inclusion of the independent variables within the regression model.

Qualitative Research and Analysis

Overview: Objectives, Advantages, and Limitations

Qualitative inquiries occur within natural settings and utilize interviews, observational data, verbal narratives, and documentary review to enhance understanding of attitudes, behaviors, and socially constructed phenomena (Miller and Salkind, 2002). Qualitative investigations enable researchers to tap and better comprehend “experiential knowledge” and probe the “subjective understanding” of respondents concerning the decisions and dynamics within a specific context at a defined point in time (Dudwick, Kuehnast, Nyhan Jones, and Woodcock, 2006; Roberts & Wilson, 2002). This mode of social scientific inquiry is conducive to examining attitudes, beliefs, and experiences influencing actions taken or avoided by respondents (Roberts & Wilson, 2002). A primary objective of qualitative research is to locate “meaningful patterns or themes” as well as find any unexpected departures from those common roadways across the map of collected and analyzed data (Frechtling & Westat, 1997). Ultimately,

qualitative data and analysis should help yield meaningful answers to specific questions under study (Frechtling & Westat, 1997).

Qualitative research possesses the capability to uncover or locate “novel insights” (Miller and Salkind, 2002). Direct quotes from interviewees obtained through qualitative research may function to illuminate findings produced by the quantitative research within a specific study (Miller and Salkind, 2002). In effect, it can enable the numbers “to speak” through words found through qualitative investigatory methods. Qualitative research methods such as open-ended questions within interviews may enable researchers to hear directly from respondents unencumbered by fewer pre-determined parameters (Dudwick et al, 2006). While qualitative data is not conducive to statistical analysis, it can help cross-validate or triangulate statistically confirmed findings from quantitative research within the same study. A mixed methods study that utilizes both quantitative and qualitative methods optimizes the opportunity for complimentary capabilities where each method compensates for the limitations of the other while adding its own strengths to the investigation (Dudiwck et al, 2006).

Data Collection

This study supplemented the quantitative findings with qualitative research involving targeted telephone interviews of twenty law enforcement executives in all three states. This method facilitated in-depth interviews that yielded an additional layer of more rich data and further informed this study by capturing the actual words and reported behaviors of study subjects. Through these interviews, the researcher more intensively examined topics from the quantitative findings and explored new variables that may have been missed by the survey instrument. Qualitative research through this method served to further confirm and better

understand conclusions from the quantitative study as well as it potentially identified new avenues for future investigation.

As a qualitative method of data collection, these interviews were not capable of being subject to statistical analysis nor would they be generalizable to non-study subjects (Miller and Salkind, 2002). A chief advantage of having conducted in depth individual interviews in addition to survey research was the possibility for the researcher to cross-validate quantitative with qualitative findings. Interview instrument design and implementation incorporated elements of Social Exchange Theory to decrease costs, increase rewards, and affirm trust with respondents (Dillman, 2000).

Fowler and Mangione (1990) specify protocols for the conduct of standardized survey interviewing to reduce interviewer effects, decrease measurement error, and facilitate analysis of the data. This study adopted all elements of the Fowler and Mangione methodology and adhered to all recommended procedures by employing a structured interview, using non-directive probing techniques to elicit responses without introducing bias, registering responses verbatim for open-ended items, and involving an academically trained and experienced interviewer. The targeted telephone interview instrument is included in Appendix C.

Sampling Methodology

All 384 respondents from the quantitative research component of this study were sent a letter of appreciation for their time and participation and offering the opportunity to be contacted for a follow-up phone interview. This method afforded all respondents an equal opportunity to be included within the qualitative inquiry and ensured a sufficient number of interviews by state through this recruitment device. Respondents who expressed interest in sharing further

experiences and information with the researcher were then contacted to schedule the telephone interview. Twenty telephone interviews with law enforcement executives in the three study states were obtained. Eight agency leaders from California, nine executives from New York, and three senior administrators from Georgia participated. 70% of the interviewees were Police Chiefs, one serves as Sheriff, and five held agency leadership positions such as Undersheriff or Major. There was significant internal diversity within the interviewee population with annual agency budgets ranging in size from \$750,000 to \$374,000,000.

Interview Instrument

A standardized interview instrument with non-directive probing prompts was developed to structure the interview to obtain data. A standardized instrument also aided in the avoidance of measurement error and potential interviewer effects. The instrument probed respondents to provide incentives and impediments that might facilitate or inhibit their agency towards or away from adopting or utilizing information-sharing networks. Interviewees were also afforded the opportunity to identify issues missed by the researcher either within the mail or Web-based survey or this targeted telephone interview. Participants were assured of confidentiality and the interview instrument was approved by the Institutional Review Board of the University of Central Florida prior to data collection. Questions in the interview instrument paralleled the items on the survey instrument whose validity and reliability had been established. However, the qualitative inquiry enabled respondents to provide a greater level of information and explanation and capture more detailed data concerning the antecedents to adoption and utilization. This method also provided interviewees with the ability to express more lengthy responses in their own words as opposed to simply agreeing or disagreeing with a pre-determined statement. The

interview also enabled respondents to identify variables which may have been missed or insufficiently inquired about in the mail or Web survey and contribute additional experiences and knowledge of the subject with a closing “is there anything which you would like to add that we have not discussed?” type question.

A potential limitation of the instrument is the combination of querying interviewees about both dependent variables within the same question. It must be acknowledged that they may have responded differently had adoption and utilization been separated into different questions. This limitation should qualify any findings associated with the qualitative investigation. Social science research, like so many human enterprises, involves trade-offs that are deemed to be acceptable. It was recognized that it would not be possible to definitively disentangle results to a question that combined adoption and utilization but increasing telephone survey length to separately address these dependent variables for busy chief executives who had already completed a 35 item mail or Web survey for the same researcher on the same topic was not determined to be the ideal choice. Chief executives were asked for their participation based on the promise that the telephone interview would not exceed ten minutes unless they wished it do so and pre-testing of the mail and Web survey instrument found that busy police executives were not especially tolerant of dedicating more than ten minutes of their time to survey participation and completion. To have extended the telephone survey to add more open-ended questions could have risked violating two of the three elements of Social Exchange Theory: trust and cost. By impinging on trust and adding cost, survey participation and data collection could have been compromised.

Data Entry and Coding

Statements by each respondent were recorded on a standardized interview instrument that was then coded at the paragraph and sentence levels. Information received from respondents during interviews could be indexed into one of four coding categories based upon a coding protocol employed by Akbulut (2003) in an information-sharing investigation involving local law enforcement executives: 1) included as corresponding to one of the theoretically informed study variables under investigation (i.e. relative advantage or trust) 2) distinctly identified as an emerging theme not identified by the theoretical framework guiding this study 3) placed into multiple locations or 4) deemed as unrelated to the present inquiry. This coding protocol was also supplemented by the researcher's recognition of the frequency, intensity, specificity, and duration associated with statements made by interviewees concerning specific variables (Frechtling & Westat, 1997).

Analysis of the Data

Techniques recommended by qualitative researchers to obtain meaning and uncover relationships based upon textual or linguistic data include data reduction, data display, and conclusion drawing (Miles and Huberman, 1994). Data reduction is facilitated by summarizing and coding data, data display involves visually mapping the data via matrices, flow charts, and typologies to foster analysis and illustrate relationships, and conclusion drawing occurs when patterns, relationships, and linkages are established (Miles and Huberman, 1994; Akbulut, 2003). Pope, Ziebland, and Mays (2000) describe the data coding and data display processes as one of "constant comparison" where the researcher is continually evaluating and re-assessing into where each portion of data fits in terms of analytical categories and how the data may be inter-

related. Likewise, Dudwick et al (2006) define the data analysis process as “iterative” in employing repetitive and refining reviews of the data to achieve the goal of identifying patterns or themes within the data. It is a process guided more by general postulates than being bound by inflexible technical assumptions and regulations that accompany quantitative analysis (Dudwick et al, 2006). However, it should generate findings based upon a systematic and rigorous approach by a skilled and disciplined researcher (Frechtling & Westat, 1997).

A total of 20 targeted telephone interviews were completed with at least five law enforcement administrators from each of the three study states. Their content was analyzed and coded to the specified protocol, which facilitated the process of data reduction, variable confirmation, identification of new or emerging variables, and conclusion drawing.

Additional Qualitative Data Collected

This study also incorporated a second and useful opportunity to capture qualitative data from survey participants. Each of the 384 completed surveys also contained two open ended questions (Q30 and Q31) which separately queried respondents to answer in their own words what would be the “single most important reason” and the “single largest obstacle” to your agency joining and using an information-sharing network. 85% of survey respondents responded to the first open ended question (Q30) asking them to identify the “single most important reason” to adopt and utilize and 81% provided information concerning the second open-ended question (Q31), which concentrated on the respondent identifying the “single largest obstacle” to acquiring and employing information-sharing networks.

A limitation to these open-ended questions mirrored the constraint inherent within the targeted telephone interviews. These open-ended survey items asked about both adoption and

utilization (i.e. “join and use”) within the same question. This methodological choice opened up the possibility that respondents may have provided different data had they been queried about adoption and utilization separately. In the absence of a finding that both processes are indistinguishable in the identities of the variables that predict them, this limitation must be recognized and findings based on data from these questions should be qualified by it. This research assumed that risk to add the value and data captured by open ended questions without violating the “cost principle” of Social Exchange Theory by increasing survey length and ultimately, losing participants and reducing sample size. Pre-testing had demonstrated that ten minutes was the appropriate and accepted duration for survey participants. Increasing the number of open-ended questions to test each variable separately could better clarify survey findings at the cost of survey participation. Respondents might have also experienced the feeling of an added cost as they may have viewed several open-ended questions separating adoption and utilization as redundant, unnecessary, and disrespectful of their time constraints. Ultimately, future research should continue to explore on which predictors that adoption and utilization converge and diverge within the context of information sharing in local law enforcement.

The open-ended questions attracted a very high level of participation and yielded meaningful data to compliment the quantitative investigation and the other qualitative method of data collection. The open ended questions yielded another valuable reservoir of qualitative data which cross-validated quantitative results, enhanced hypothesis testing, identified new variables for future investigation, built upon the base of qualitative research obtained through the targeted telephone interviews, and strengthened the overall validity of study findings. Frequencies were calculated for each response to each open ended question and the exact same four category coding protocol employed for the data collected through targeted telephone interviews was

observed. The data and frequencies obtained from the open-ended survey questions are found in Appendix D.

CHAPTER FOUR: FINDINGS

Confirming Causality

Determination of causal relationships is a highly challenging and complex enterprise (Wan, 2002). Causality can defy or evade attempts to quickly or easily establish its presence. A theoretical framework is integral to the illumination of causal relationships between independent and dependent variables. According to Wan (2002), to construct a foundation for the determination of causality, the relationships between independent and dependent variables should demonstrate or must possess:

- co-variance in a positive or negative direction
- adherence to a temporal sequence (x before y)
- a prominent association
- verifiability of the cause-and-effect relationships
- a theoretical basis
- substantive, not simply statistical, meaning
- predictability
- the ability to be replicated
- a strong probability of exclusion of other explanations
- plausibility/coherence—correlates with existing knowledge
- a convincing degree of specificity

In terms of causality, this research is exploratory in nature as opposed to confirmatory.

This study focused on identifying and exploring the existence of potential predictive links between a number of independent variables and two dependent variables along with the roles of four control variables. This study does not aspire to establish causality as much as contribute to a possibly useful roadmap for this terrain of extremely limited research into information sharing by local law enforcement organizations to help guide future investigations that will be better positioned to address and confirm causality.

Anticipated Findings

Based upon the eight variables specified by the integrated theoretical framework available for analysis, it was anticipated that adopters and users of information-sharing networks would be law enforcement organizations which exhibited higher levels of inter-organizational trust, a higher degree of retained autonomy, and a higher level of commitment by agency leadership, and perceived relative advantage, a lower level of complexity, a higher degree of compatibility, a higher degree of observability, and a higher degree of trialability as being associated with this innovation. Validation or disconfirmation of these predictor variables would enhance existing theoretical and empirical understanding of the diffusion of information sharing within public safety, guide future research, and inform policymakers and police administrators about theoretically informed and empirically established strategies to increase adoption and utilization of this innovation.

Quantitative Analysis

Descriptive statistical analysis, logistic regression analysis, and multiple regression analysis were conducted to reveal meaningful data, test study hypotheses, construct predictive models, and identify new potential avenues for future investigation.

Descriptive Statistical Analysis

Means, standard deviations, and the range were calculated for all survey items and study variables. The results are presented in Table 6.

Table 6: Descriptive Statistics

| | Range | Minimum | Maximum | M | SD |
|--|-----------------|----------|-----------------|-----------------|-------------------|
| Adoption of info sharing | 1.000 | .000 | 1.000 | .51042 | .500544 |
| UTILIZEREGRESS | 15.81 | .00 | 15.81 | 7.1201 | 6.99278 |
| Length of time using system | 400 | 0 | 400 | 40.14 | 76.381 |
| CEO at time of adoption | 2 | 0 | 2 | .26 | .445 |
| Years of professional law enforcement experience | 50 | 0 | 50 | 25.68 | 7.723 |
| Annual dollar amount of agency budget | \$3,199,935,000 | \$65,000 | \$3,200,000,000 | \$23,609,765.15 | \$167,824,562.004 |
| Level of formal education | 4 | 1 | 5 | 2.73 | 1.097 |
| Age of survey respondent | 47 | 26 | 73 | 49.56 | 7.322 |
| TRUSTREGRESS | 11.17 | 1.86 | 13.03 | 10.7519 | 2.15416 |
| AUTONOMYREGRESS | 15.91 | 2.65 | 18.56 | 15.4729 | 3.13702 |
| COSMOREGRESS | 10.10 | 1.68 | 11.79 | 8.0827 | 2.03054 |
| ADVANREGRESS | 20.60 | 3.43 | 24.03 | 21.0481 | 3.71689 |
| COMPLEXREGRESS | 11.17 | 1.86 | 13.03 | 10.4751 | 1.95048 |
| COMPATREGRESS | 10.91 | 1.82 | 12.73 | 10.8340 | 2.07762 |
| OBSERVEREGRESS | 10.20 | 1.70 | 11.90 | 8.8264 | 1.85601 |
| TRIALREGRESS | 10.52 | 1.75 | 12.28 | 8.8202 | 2.24661 |
| Valid N (listwise) | | | | | |

Discussion of Descriptive Statistical Findings

A total of 384 chief executives of local law enforcement agencies in three states participated in this survey research. 188 local law enforcement agencies or 49% had not adopted any information-sharing network. 196 local law enforcement agencies or 51% had adopted the innovation of an information integration network. For adopters, the mean length of time for which the agency had employed the network was 40.1 months. Adopting agencies reported utilization of 167 different types of information-sharing networks across the three study states. Several agencies did report employing common systems. 98 local law enforcement agency chief executives reported being the decision-maker at the time of the adoption of the information-sharing network by the agency.

63.8% of the survey respondents were Police Chiefs, 9.4% were Sheriffs, and 26.8% were senior law enforcement executives designated by the Sheriff or Police Chief to complete the survey. This was not unexpected as each county in the United States almost always has a single Sheriff while also having multiple municipalities each with a Police Chief. Examples of the titles of those senior law enforcement executives who were not the Sheriff or Police Chief but still demonstrated a high degree of familiarity with agency experience and policies involving information sharing included Assistant Chief of Police, Major, Captain, and Undersheriff. The mean of years of professional law enforcement experience for survey respondents was 25.6 years. The mean of level of education for survey respondents was 2.73, which corresponded with between an associate of arts degree (two years of college coded as a 2) and a bachelor's degree (four years of college coded as a 3) which translates into the fairly safe and not all unexpected finding that the majority of respondents had some college education. The mean age of survey respondents was 49.5 years. The mean agency budget was \$23,609,765.

Quantitative Findings

Research Question One: Predictors of Adoption

What were the predictors of adoption of information-sharing networks by local law enforcement agencies in the three study states?

Hypothesis Testing

To facilitate hypotheses testing, a logistic regression model was constructed to identify and validate statistically significant relationships between each independent variable and the dependent variable of adoption. Results upon which hypotheses 1-8 are tested are found in Table 16, which displays the statistical significance, regression coefficient, and odds ratio for each control and independent variable within the logistic regression model.

Hypothesis One

Police organizations that have higher levels of inter-organizational trust were more likely to become adopters of information-sharing networks.

Quantitative Findings

The hypothesis specifying the independent variable of trust as a predictor of adoption was not supported as influential to the agency adoption decision. Trust did not have a statistically significant relationship with adoption. It should be noted that trust only missed the .05 threshold for statistical significance by a relatively small margin ($p = .055$).

Qualitative Findings

Trust found a noticeable level of support within the qualitative research. It emerged as a major and recurring theme within the targeted telephone interviews. Trust was identified by several respondents within the open-ended questions but was not a prominent topic. Both modes may have uncovered other potential dimensions of trust not specifically measured by this study.

Cited and reinforced by several law enforcement executives in these interviews, one agency leader summarized its contribution towards information sharing in having “high level of trust in their county environment” among all agencies. One agency leader specified the “need to build trust” as an antecedent to participation within information-sharing networks while another described it being able to have “partnerships” with other agencies. Over one-third of the interviewees specifically emphasized that trust must precede information sharing. Moreover, several trust-related issues such as overcoming politics and individual egos between organizations and avoiding turf protection in an environment, which demanded a high level of inter-organizational trust to facilitate information sharing, were repeatedly emphasized by interviewees.

As a single stand-alone term, trust received only a few mentions in the open-ended survey questions such as the chief executive who discussed the challenge of “trust issues in the beginning” of an information-sharing network and the senior administrator who cited the need for “achieving multi-lateral trust.” A number of potentially trust-related issues which executives articulated in the form of variables such as “politics,” “egos,” and “turf battles” were raised by respondents. Moreover, several agency leaders cited the need for “cooperation” between agencies, which also may be associated with trust. Lastly, this study concentrated on measuring

trust between organizations but another aspect of trust emerged in the qualitative research in the form of being able to trust the data accessed and exchanged between agencies.

While this study did not explore all possible dimensions of trust and left potential aspects such as turf protection and data integrity unmeasured, this qualitative research identified trust as being meaningfully linked to agency adoption and utilization. The telephone interviews produced almost all of the qualitative evidence for this relationship. Future studies might build upon these findings by developing and implementing other valid measures of the construct of trust to capture the several different and meaningful ways in which police executives appear to be expressing the same general theme.

Hypothesis Two

Police organizations that believe they will retain a higher degree of autonomy within an information-sharing network were more likely to become adopters of information-sharing technologies.

Quantitative Findings

This hypothesis was not supported study findings. Autonomy did not have a statistically significant relationship with adoption ($p = .636$). This disconfirmatory finding suggested that chief executives of local law enforcement agencies are either not highly concerned about or do not actually fear the loss of agency autonomy in joining an information-sharing network. At a minimum, this finding failed to identify this issue as a major incentive or obstacle to the adoption decision.

Qualitative Findings

This hypothesis did not obtain any substantial support within the qualitative data that was collected and analyzed. Only one executive referenced this concept during the twenty targeted telephone interviews and only a few survey respondents cited it as influential to their decision-making. It was possible that the several comments related to “turf protection” from both modes of qualitative data collection were an expression or measurement of a dimension of autonomy but only future research can validate or disconfirm that possibility. The qualitative findings appeared to conform to the quantitative outcomes regarding the role of autonomy in adoption.

Hypothesis Three

Police organizations characterized by higher levels of commitment by agency leadership to information-sharing initiatives were more likely to become adopters of information-sharing networks.

Quantitative Findings

A high degree of leadership exhibited by the chief executive proved to be a highly influential predictor of agency adoption of information sharing. This hypothesis was supported by a statistically significant relationship between the variables ($p = .008$). Leadership was identified as positively influencing the adoption decision ($B = .343$) and increasing the probability of adoption by 1.4 times all other factors being equal. Leadership was revealed by logistic regression analysis to be the strongest positive predictor of adoption.

Qualitative Findings

Leadership was provided an observable degree of support as an important and positive predictor of information sharing among local law enforcement agencies. The targeted telephone interviews located a common pattern among executives concerning the significance of leadership. One executive recounted the specific experience of his county leading the initiative by paying for all city agencies to join and participate. Another police administrator noted that “giant steps” had been taken towards achieving full and seamless information sharing as a result of “leadership” while a fellow executive commented on the need for “committed leadership.” After several years of working to implement a countywide system of information sharing, one agency leader concluded that “leadership from all agencies” is required while another referenced the role of a “lead agency” that can help other agencies realize the value of information sharing. One agency head ruled out the effect of a new federal mandate on local law enforcement agencies to engage in information sharing instead emphasizing that there is no substitute for “local leaders coming together to make it happen.”

The open ended survey questions did not yield the direct use of the word “leadership” among respondents but it cannot be entirely excluded given the potential for new and unmeasured constructs such as “politics” and “turf battles” revealed by these survey items to be a dimension of leadership or a function of its exercise or lack thereof. Almost all qualitative support for the predictor of leadership arose from the targeted telephone interviews. Given the frequency, intensity, and specificity of comments relayed by law enforcement executives during the targeted telephone interviews, this qualitative data lends support to this hypothesis.

Hypothesis Four

Police organizations that perceive a relative advantage to information sharing were more likely become adopters of information-sharing networks.

Quantitative Findings

This hypothesis was not supported as predictive of adoption. Advantage lacked a statistically significant relationship with adoption ($p = .261$). While prior research has confirmed this variable as being conducive to adoption of information-sharing technology at the officer level, this study could not conclude the chief executive's inclination to adopt this innovation was guided by a belief in securing an advantage over the criminal element (Zaworski, 2004; Scott, 2006).

Qualitative Findings

Both modes of qualitative research within this study were strongly confirmatory in their findings concerning the role of relative advantage as an effective predictor of adoption.

Qualitative research contributes strong support for this hypothesis.

All 20 targeted telephone interviews with agency executives identified advantage as a primary predictor of adoption and utilization. All interviewees believed that their agencies would acquire an advantage through adoption of information sharing in preventing and solving crimes, accessing valuable investigative information, and increasing the efficiency of obtaining data and records from other agencies. One executive noted that the "police are bounded by jurisdictions while the criminals are not" so this innovation would improve their odds for success in addressing crime and terrorism. Several executives made the observation that advantage

increased their likelihood of adoption as information sharing enhanced their ability to target specific categories of criminals and offenses such as gangs and stolen property. A number of interviewees employed terms like “paramount,” dramatic,” and “a significant improvement” to describe the advantage associated with this innovation as being highly influential to their decision to adopt it. One agency affirmed advantage as so closely linked to adoption of this innovation that in the absence of information sharing, “the only winners are criminals.” Another agency leader summarized the impact of advantage upon adoption with the conclusion, “We are in the information business, and the more information, the better we do our jobs” while a fellow senior administrator described it as a case of “the more you know, the less you will miss.”

77.8% of survey respondents answering the open-ended question (N = 296) asking them to provide the “single most important reason” for adoption of this innovation cited relative advantage. These respondents discussed the advantage of this innovation in tapping needed investigative information, enhancing efficiency in accessing records from other agencies, and improving crime prevention and offender apprehension. One executive noted, “criminal activity does not stop at jurisdictional boundaries,” which was echoed by numerous respondents in describing why advantage precedes adoption of information-sharing networks. One agency leader emphatically asserted the role of advantage by declaring this innovation to be “the best tool I have seen or heard of in my law enforcement career” while another maintained it was the most effective crime solving technology since the development of DNA testing.

The divergent quantitative and qualitative findings concerning the role of relative advantage in adoption justify further inquiry. Relative advantage was not found to have a statistically significant relationship with adoption yet executives who were queried and interviewed consistently identified it as highly influential to their adoption decision. Future

research could aid in identification of theoretical and empirical explanations for these incongruent findings.

Hypothesis Five

Police organizations that perceive a lower degree of complexity associated with information-sharing technology were more likely to become adopters of information-sharing networks.

Quantitative Findings

This hypothesis was not supported. The independent variable of complexity did not demonstrate a statistically significant relationship with adoption ($p = .587$). This finding was somewhat contradictory to previous studies focused on user level of predictors of acceptance and utilization of information-sharing networks. Future inquiries should include additional research into why system complexity in terms of ease of use and understanding are less influential to agency adoption decisions made by chief executives but have been validated as prominent predictors of adoption and utilization by detectives and officers (Zaworski, 2004; Scott, 2006).

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced persuasive qualitative data in support of this hypothesis. Agency executives did not raise the issue of or discuss their ease of use or understanding of the information-sharing network within the targeted telephone interviews and only 1.3% of survey respondents referenced “complexity” as studied by this research to be a major consideration. However, it should be noted that within

the open ended survey responses, 3% of the agency executives mentioned “training” which could relate to complexity or like any other new practice or technology, they were simply recognizing the inevitable reality that some amount or form of training will need to occur.

Complexity, as theoretically conceived and empirically measured by this study did not yield significant conclusions about its role in adoption. However, it was possible that multiple references to IT and RMS issues made in both sets of the qualitative data might possibly reflect a different and unmeasured dimension of complexity that could be further examined with valid measurement tools in future research.

Hypothesis Six

Police organizations that perceive a higher degree of compatibility associated with information sharing were more likely to become adopters of information-sharing networks.

Quantitative Findings

This hypothesis was not supported. Compatibility did not possess a statistically significant relationship with adoption ($p = .240$). Compatibility with organizational objectives or culture is not influential for law enforcement executives making an adoption decision.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced any important qualitative data in support of this hypothesis. As studied within this research, the construct of compatibility failed to generate any significant interest, comments, or discussion from agency executives during the targeted telephone interviews. One interviewee remarked that

a “culture of keeping information secret” would be incompatible with effective information sharing. Only 1% of survey respondents cited it as accelerating or impeding their adoption decision. A single respondent to the open-ended questions referenced “organizational culture” which was a component of compatibility.

Hypothesis Seven

Police organizations that experience a higher degree of observability associated with information sharing were more likely to become adopters of information-sharing networks.

Quantitative Findings

This hypothesis was not supported by the statistical findings. Observability was not found to have a statistically significant relationship with adoption ($p = .703$). Greater opportunities to observe information-sharing networks by either seeing or hearing about them in the agency’s area did not enhance the probabilities for adoption of information sharing.

Theoretically, it is possible that the Rogers’ framework did not hold a high degree of explanatory power for this innovation within this organizational environment. On a practical level, local law enforcement executives may not have had opportunities to observe information sharing in their area if the innovation was limited or non-existent locally. It was possible that they may not have highly valued such an occasion as crucial to their adoption decision-making process. Future research needs to explore the role of this variable and its presence or absence as a determinant of the adoption decision.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced significant qualitative data in support of this hypothesis. However, a couple of law enforcement executives did make minor references to the presence of observability in their telephone interviews. One executive added a closing comment to his interview that new agencies may join if they see “success” and another made the same observation that “success sells.” However, most interviewees did not focus on or discuss this subject and no survey respondents identified observability as a primary or secondary consideration for agency adoption.

Hypothesis Eight

Police organizations that perceive a higher degree of trialability associated with information sharing were more likely to become adopters of information-sharing networks.

Quantitative Findings

Trialability was found to be a statistically significant variable affecting adoption ($p = .000$). However, the hypothesis as stated was not supported. Facilitating experimentation with this innovation did not contribute to increased odds of its adoption. Providing the opportunity for detectives and officers to experiment with the proposed information-sharing network before the agency was required to adopt the innovation actually represented a negative influence on the adoption decision ($B = -.310$). The agency that had an opportunity to trial test the innovation was .734 times less likely to adopt it. This was a curious finding that warrants future research. It could be indicated but must be verified that chief executives do not place great value in this practice in contemplating agency adoption of an information-sharing network.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced important qualitative data in support of this hypothesis. One executive made the comment in an interview that “no one wants to be the experiment” but this topic was not articulated or advanced by any other interviewees. One respondent to the open-ended questions offered that he would like to know “how it works elsewhere” before embracing it. Contrary to the quantitative findings, trialability never emerged as a meaningful theme in the qualitative research.

Predictive Models of Adoption

Logistic regression was conducted to identify and validate potential predictors of adoption and construct a model for the antecedents to the innovation adoption decision concerning information sharing by local law enforcement. Logistic regression does not demand the presence of the same set of assumptions that are required for multiple regression analysis. Linearity of the relationship between the independent variables and the dependent dichotomous variable, normality of distribution among study variables, and constant variance of residuals are not prerequisites for logistic regression (Pallant, 2005).

Two logistic regression models were constructed. The first predictive model consisted of only the control variables. The second model was comprised of the independent and control variables. This two stage process of model construction facilitated identification of the change in the Adjusted R Square influenced by the inclusion of the independent variables.

Predictive Model of Adoption—Control Variables Only

The control variables only model was validated by three statistical tests. The Omnibus Tests of Model Coefficients demonstrated a goodness of fit for the predictive model with a Chi-square of 29.353 with 4 degrees of freedom and a highly significant probability value of .000. The Omnibus Test of Model Coefficients is presented in Table 7. This test confirmed that the original model proposed by SPSS, which predicted no relationship between the set of independent and control variables in their ability to influence the adoption decision, was incorrect. Secondly, the Hosmer and Lemeshow Test reported a significance level of .463 that is supposed to exceed the recommended threshold level of .05, which also indicated the value of the study's predictive model (Pallant, 2005). The Hosmer and Lemeshow Test results are presented within Table 8.

Table 7: Goodness of Fit Statistics—Omnibus Tests of Model Coefficients, Control Variables Model

| Step | Chi-square | df | Sig. |
|---------|------------|----|------|
| 1 Model | 29.353 | 4 | .000 |

Table 8: Goodness of Fit Statistics—Hosmer and Lemeshow Test, Control Variables Model

| Step | Chi-square | df | Sig. |
|------|------------|----|------|
| 1 | 7.701 | 8 | .463 |

As displayed within Table 9, the Cox & Snell R-Square of .074 and Nagelkerke R-Square of .098 that function as statistics representing the Adjusted R-Squares within a logistic regression

model indicated that 7.4% to 9.8% of the adoption outcome can be accounted for by this predictive model.

Table 9: Adjusted Square Statistics—Control Variables Model

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|-------------------|----------------------|---------------------|
| 1 | 502.817(a) | .074 | .098 |

Logistic regression generates a classification rate that assigns a percentage to the number of cases within the study that can be accurately predicted by the model (Pallant, 2005). Table 10 revealed the model correctly classified 59.6% of the cases where adoption of information-sharing networks occurred. 40.4% of the cases where an agency adopted this innovation could not be explained by this predictive model.

Table 10: Classification Rate—Control Variables Model

| Step | Adoption of info sharing | Observed | Predicted | | Percentage Correct |
|------|--------------------------|--------------------|--|---|--------------------|
| | | | Adoption of info sharing NO ADOPTION | Adoption of info sharing YES ADOPTION | |
| 1 | sharing | NO ADOPTION | 102 | 86 | 54.3 |
| | | YES ADOPTION | 69 | 127 | 64.8 |
| | | Overall Percentage | | | 59.6 |

The control variable of budget did not generate a statistically significant relationship with agency adoption. The years of law enforcement experience, age, and educational level of the

chief executive were statistically significant predictors of agency adoption within this model. Experience held a statistically significant influence towards adoption ($p = .002$). As the law enforcement experience of the agency head increased so did the likelihood of agency adoption of an information-sharing network. This variable positively influenced the adoption decision ($B = .069$) slightly increasing the probability of this outcome by 1.071 times all factors held constant. Education maintained a statistically validated relationship to adoption ($p = .014$). The educational level of the agency leader contributed positively towards adoption ($B = .248$) increasing the odds of this occurrence by 1.282 times all other things remaining equal. Age was also statistically meaningful to agency adoption ($p = .032$). However, increasing age of the Sheriff or Police Chief operated in the opposite direction having a small negative effect on adoption ($B = -.049$) and slightly decreased the chances for adoption by a factor of .952. These results are presented within Table 11.

Table 11: Variables in the Equation—Control Variables Model

| | B | S.E. | Wald | Df | Sig. | Exp(B) | 95.0% C.I. for EXP(B) | |
|------------------|-------|------|-------|----|-------|--------|--------------------------|----------------|
| | | | | | | | Lower Bound | Upper Bound |
| Step 1(a) | | | | | | | | |
| LEOEXPERIENCEQ32 | .069 | .022 | 9.450 | 1 | .002* | 1.071 | 1.025 | 1.120 |
| BUDGETQ33 | .000 | .000 | 2.719 | 1 | .099 | 1.000 | 1.000 | 1.000 |
| EDUCATIONQ34 | .248 | .101 | 6.005 | 1 | .014* | 1.282 | 1.051 | 1.564 |
| AGEQ35 | -.049 | .023 | 4.572 | 1 | .032* | .952 | .910 | .996 |
| Constant | -.085 | .834 | .010 | 1 | .919 | .919 | | |

Note. * $p < .05$

Predictive Model of Adoption—Independent and Control Variables Integrated

Three tests involving logistic regression of the study's predictive model for adoption confirmed utility of the model which contained both the independent and control variables under study. The Omnibus Tests of Model Coefficients demonstrated a goodness of fit for the predictive model with a Chi-square of 82.860 with 12 degrees of freedom and a highly significant probability value of .000. These results are presented within Table 12. This test verified that the original model proposed by SPSS that predicted no relationship between the set of independent and control variables in their ability to influence the adoption decision was incorrect. Secondly, the Hosmer and Lemeshow Test reported a significance level of .678, which is far above the recommended threshold level of .05, which also indicates the value of the study's predictive model (Pallant, 2005). This statistical finding is found within Table 13.

Table 12: Goodness of Fit Statistics—Omnibus Tests of Model Coefficients, Integrated Model

| Step | | Chi-square | Df | Sig. |
|------|-------|------------|----|------|
| 1 | Model | 82.860 | 12 | .000 |

Table 13: Goodness of Fit Statistics—Hosmer and Lemeshow Test, Integrated Model

| Step | Chi-square | df | Sig. |
|------|------------|----|------|
| 1 | 5.727 | 8 | .678 |

As displayed in Table 14, the Cox and Snell R-Square of .194 and Nagelkerke R-Square of .259 that function as statistics representing the Adjusted R-Squares within a logistic regression

model suggested that between 19-25.9% of the adoption decision can be explained by this predictive model.

Table 14: Adjusted Square Statistics—Integrated Model

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|-------------------|----------------------|---------------------|
| 1 | 449.311(a) | .194 | .259 |

Logistic regression generated a classification rate that assigns a percentage to the number of cases within the study that can be accurately predicted by the model (Pallant, 2005). Table 15 revealed that the model correctly classified 66.7% of the cases where adoption of information-sharing networks occurred. 33.3% of the cases where an agency adopted this innovation could not be accounted for by this predictive model.

Table 15: Classification Rate—Integrated Model

| Step | Observed | Predicted | | Percentage Correct |
|------|--|---|--|--------------------|
| | | Adoption of info sharing NO ADOPTION | Adoption of info sharing YES ADOPTION | |
| 1 | Adoption of info sharing NO ADOPTION | 124 | 64 | 66.0 |
| | Adoption of info sharing YES ADOPTION | 64 | 132 | 67.3 |
| | Overall Percentage | | | 66.7 |

The predictive model of all independent and control variables was also analyzed through logistic regression to identify the contribution of specific predictor variables towards adoption (Pallant, 2005). Four of the twelve predictor variables proposed for inclusion within the model were found to have a statistically significant relationship ($p < .05$) with adoption of information-sharing networks by local law enforcement agencies. Two independent variables affected the adoption decision and two control variables were determined to influence the adoption decision. The statistically significant independent variables within the model were leadership ($p = .008$) and trialability ($p = .000$). Trialability was identified as a predictor variable by Rogers' diffusion of innovations theory and leadership was added to this framework based upon other empirical research into adoption of information-sharing networks by law enforcement. Leadership positively influenced agency adoption while trialability diverged from diffusion theory and possessed a negative relationship with the innovation adoption decision. The two control variables whose statistically significant relationship with adoption were confirmed consisted of the years of experience of the law enforcement executive ($p = .009$) and the age of the local law enforcement leader ($p = .035$).

Table 16: Variables in the Equation—Integrated Model

| | B | S.E. | Wald | Df | Sig. | Exp(B) | 95.0% C.I. for EXP(B) | |
|------------------|-------|-------|--------|----|-------|--------|--------------------------|----------------|
| | | | | | | | Lower Bound | Upper Bound |
| Step 1(a) | | | | | | | | |
| LEOEXPERIENCEQ32 | .065 | .025 | 6.807 | 1 | .009* | 1.068 | 1.016 | 1.121 |
| BUDGETQ33 | .000 | .000 | 2.748 | 1 | .097 | 1.000 | 1.000 | 1.000 |
| EDUCATIONQ34 | .202 | .111 | 3.321 | 1 | .068 | 1.224 | .985 | 1.522 |
| AGEQ35 | -.054 | .026 | 4.433 | 1 | .035* | .947 | .901 | .996 |
| TRUSTREGRESS | .165 | .086 | 3.683 | 1 | .055 | 1.179 | .996 | 1.396 |
| AUTONOMYREGRESS | .027 | .057 | .224 | 1 | .636 | 1.027 | .919 | 1.148 |
| ADVANREGRESS | -.061 | .054 | 1.266 | 1 | .261 | .941 | .846 | 1.046 |
| COMPLEXREGRESS | -.048 | .088 | .296 | 1 | .587 | .953 | .802 | 1.133 |
| COMPATREGRESS | .122 | .104 | 1.382 | 1 | .240 | 1.130 | .922 | 1.385 |
| OBSERVEREGRESS | -.029 | .076 | .145 | 1 | .703 | .971 | .837 | 1.127 |
| TRIALREGRESS | -.310 | .066 | 22.286 | 1 | .000* | .734 | .645 | .834 |
| LEADERQ14 | .343 | .129 | 7.099 | 1 | .008* | 1.409 | 1.095 | 1.813 |
| Constant | -.384 | 1.209 | .101 | 1 | .751 | .681 | | |

Note. * $p < .05$

As Table 16 revealed, leadership was identified as positively influencing the adoption decision ($B = .343$) and increasing the probability of adoption by 1.4 times all other factors being equal. Trialability in the form of enabling agency personnel to test drive the technology before the agency made a major commitment negatively affected agency adoption ($B = -.310$) reducing the probability by a factor of .734. Greater law enforcement experience made a small positive contribution to the adoption decision ($B = .065$) making it 1.068 more times likely that the agency would adopt. Lastly, increasing age of the chief executive negatively influenced adoption ($B = -.054$) making it less likely that this innovation would be embraced by a factor of .947.

In this model, logistic regression disconfirmed the roles of the independent variables of relative advantage, autonomy, observability, complexity, compatibility, and trialability in the adoption decision. Moreover, the control variables of the educational level of the chief executive and the agency budget were not validated as predictive of adoption.

Effect of Independent Variables—Change in Classification Rate and Adjusted R-Square

The change in the classification rate enabling the model to accurately predict adoption of information sharing from the control variables only model to the integrated model was a 7% increase. The change in the Adjusted R-Square from the control variables only model to the integrated model including independent variables was an increase of 12 to 16.1% in greater explanatory power. These findings are presented with Table 17.

Table 17: Change in Classification Rate and Adjusted R-Square

| Classification Rate Controls | Classification Rate Integrated | Change in Classification Rate | Adjusted R-Square Controls | Adjusted R-Square Integrated | Change in Adjusted R-Square |
|------------------------------|--------------------------------|-------------------------------|----------------------------|------------------------------|-----------------------------|
| 59.6% | 66.7% | 7% | 7.4-9.8% | 19.4%-25.9% | 12-16.1% |

Quantitative Findings

Research Question Two: Predictors of Utilization

What were the predictors of utilization of information-sharing networks by local law enforcement in the three study states?

Sample under Analysis

Only adopters are network users. Of the 384 respondents, 196 reported data on the measures of utilization. Data from these 196 respondents was analyzed through multiple regression. Post hoc power analysis for multiple regression verified that 196 cases were conducive to attaining 90% power at a .05 significance level to if all independent variables are responsible for 10% and all control variables could account for 5% of the variation in the dependent variable of utilization (N = 178 required). The sample size to conduct this analysis of the predictors of utilization was sufficient.

Hypothesis Testing

To facilitate hypotheses testing, a multiple regression model was constructed to identify and validate statistically significant relationships between each independent variable and the dependent variable of adoption. Results upon which Hypotheses 9-16 are tested are found in Table 20 on page 116 that displays the statistical significance, unstandardized regression coefficient, and standardized regression coefficient for each control and independent variable within the multiple regression model.

Hypothesis Nine

Police organizations that have higher levels of inter-organizational trust were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

This variable was not confirmed for any role in influencing the level of utilization ($p = .630$). The regression results indicated that police agencies that operated in an environment characterized by higher levels of trust between their organizations do not tend to have greater levels of utilization of information-sharing networks. A potential explanation is that it may not be as significant once the information-sharing network is established and operational between agencies who may already be assured of such a pre-condition to their participation. It should be noted that trust barely missed the cut-off point for statistical significance in influencing adoption ($p = .055$) so future studies may uncover a greater role than found by this research.

Qualitative Findings

Qualitative research tended to be supportive of this hypothesis. During the telephone interviews with agency executives, several interviewees reinforced the role of trust in both adoption and utilization. Over one-third of the interviewees specifically discussed trust as a pre-condition for information sharing. Interviewees emphasized the need to “build trust” and foster a climate of trust and cooperation to start and maintain information sharing.

The open-ended questions captured only a few instances of trust being specifically identified as a prominent predictor of utilization. Both modes of qualitative research did obtain data that may reflect other dimensions of trust untested by this study such as respondents referring to the challenges of “politics,” “egos,” “turf protection,” and acquiring cooperation and participation from all agencies. These may function as trust-related barriers that must be overcome to facilitate and maintain utilization.

The targeted telephone interviews provided sufficient frequency, intensity, and duration of discussion of trust to support its influence as a predictor of utilization. Overall, qualitative data secured support towards the hypothesis that trust functions as a meaningful predictor of utilization.

Hypothesis Ten

Police organizations that believe that they will retain a higher degree of autonomy within an information-sharing network were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

This hypothesis was not supported by this study. Autonomy held a statistically significant relationship with utilization ($p = .019$). However, the direction of this relationship was unexpected and contrary to the hypothesis. Increasing autonomy of individual law enforcement agencies within the network appeared to negatively influence the level of utilization ($B = -.210$). Methodological explanations such as collinearity and question wording were examined but did not offer evidence for this finding. This finding should serve as a basis for future research into how autonomy might specifically operate to adversely affect utilization of information-sharing networks.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced impressive qualitative data in support of this hypothesis. Autonomy did not emerge as a

significant theme during the targeted telephone interviews or within the open-ended questions. Only one executive referenced this concept during the 20 targeted telephone interviews who mentioned that some agencies might “fear a loss of autonomy” within a regional information-sharing network. Likewise, only a few survey respondents reported autonomy as affecting utilization with one mentioning the “independence of data maintenance while sharing information” and another citing “maintenance of their own agency records.”

It was possible that the several comments related to “turf protection” from both modes of qualitative data collection were an expression or measurement of a dimension of autonomy but only future research can validate or disconfirm that possibility. The qualitative findings appeared to not comport with the quantitative outcomes regarding the variable of autonomy and its effect on utilization.

Hypothesis Eleven

Police organizations characterized by higher levels of commitment by agency leadership to information-sharing initiatives were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

While leadership emerged as a prominent predictor of adoption, it did not significantly influence utilization ($p = .373$). Strong leadership on the issue of information sharing by an agency executive appeared to impact initial agency adoption of this innovation but not sustain or enhance utilization. It is possible that a high level of leadership by an agency executive can “kick

start” the adoption process but it is not required to maintain utilization that could be affected by other variables.

Qualitative Findings

Leadership remained influential as a predictor of adoption and utilization within the qualitative findings. Substantial support for this hypothesis was evidenced almost entirely from within the targeted telephone interviews. Over one-third of the interviewees discussed the role of leadership with several executives providing specific examples and experiences where leadership increased utilization. Police administrators discussed the “role of the CEO,” the need for “local leaders” to facilitate information sharing, and the antecedent of “leadership from all local agencies” to ensure a continuous and seamless system of multi-agency information sharing. The open-ended survey questions did not produce direct references to the word “leadership” among respondents. However, it cannot be ruled out as having been present within the attitudes and experiences of respondents who did repeatedly reference the need to overcome “politics” and “turf battles.” These variables which were uncovered by these open ended survey items may be shown in future research to be a direct or proxy measure of the presence or absence of leadership within the context of increasing utilization of information sharing within public safety. Overall, the hypothesis that leadership matters to utilization was corroborated by the qualitative data and findings.

Hypothesis Twelve

Police organizations that perceive a relative advantage to information sharing were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

This hypothesis was supported by study findings. Advantage had a statistically significant relationship with utilization ($p = .001$). Advantage positively influenced utilization ($B = .315$). This was an anticipated finding that is highly consistent with both the theoretical framework and prior empirical research. Clearly, the more that an agency perceives or experiences greater crime fighting capabilities associated with this innovation, the more it will be utilized.

Qualitative Findings

Qualitative research yielded impressive support for the proposition that when agencies perceive greater relative advantage linked to information sharing, their utilization of the innovation correspondingly increases. Moreover, although crime prevention and crime solving capabilities still dominated as the premier advantage, executives also certified that the other three measures of advantage within this study such as increased efficiency, improved access to investigative information, and identification of multi-jurisdictional offenders were highly relevant advantages warranting greater utilization.

100% of interviewees discussed advantage with significant specificity, frequency, duration, and intensity. After relating how high usage of information sharing would track mobile career criminals and “identify crime patterns,” one agency leader termed it a “no-brainer” while another senior administrator confirmed that his agency had “become dependent on information sharing” to combat crime.

Of those responding to the open-ended questions, almost 80% of agency executives discussed how the role of acquiring an advantage in enhancing public safety contributed to their utilization of information sharing. One executive noted that, “police agencies run on

information” while others noted that its increasing utilization was essential in an era where criminals have become more mobile, advanced, and organized. “Amazed that all agencies don’t have this” was how one agency leader described the contribution of advantage to utilization.

Hypothesis Thirteen

Police organizations that perceive a lower degree of complexity associated with information-sharing technology were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

This hypothesis was supported by the multiple regression analysis of the data. A statistically significant relationship between complexity and utilization was identified ($p = .035$). From the perspective of agency administrators, less complexity inherent to information-sharing technology produced higher levels of utilization of this innovation ($B = .291$). Like advantage, complexity has now been validated at both the administrative and officer level as an important predictor of utilization of information-sharing networks (Scott, 2006; Zaworski, 2004).

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced persuasive qualitative data in support of this hypothesis. As theoretically defined and empirically measured by ease of use and understanding, complexity did not emerge as a major theme in the data collected by both modes of qualitative research. It is possible that executives were expressing a form of complexity with multiple comments regarding “IT and RMS issues”

between agencies to establish interconnectivity that went unmeasured by this study but could be explored as a possible dimension of complexity in future research.

Hypothesis Fourteen

Police organizations that perceive a higher degree of compatibility associated with information sharing were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

Multiple regression analysis did not yield statistically significant support for this hypothesis ($p = .948$). Perception of greater compatibility with the objectives and organizational culture of the agency did not contribute to higher levels of utilization of information sharing.

The refinement of measurement tools could extract different data but given the levels of measurement and reliability validity present within this survey instrument for this construct, it is not the most likely avenue for future investigation. The lack of significant findings to support this hypothesis might be more attributable to theoretical or other empirical explanations.

Compatibility was not validated as a predictor for either adoption or utilization. It is possible that this Rogerian construct is not readily generalizable to local law enforcement agencies and the adoption and utilization of an innovation such as information sharing. At this point, only further research can prove instructive as to why and how this variable does or does not truly impact adoption and utilization of this innovation by these organizations.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced significant qualitative data in support of this hypothesis. As theoretically identified and empirically measured by this study, compatibility received almost no attention from interviewees or survey respondents in its relationship to utilization. One interviewee remarked that a “culture of keeping information secret” would be incompatible with effective information sharing and one survey respondent noted the “role of organizational culture” but scant evidence was offered in support of this hypothesis from qualitative research.

Hypothesis Fifteen

Police organizations that experience a higher degree of observability associated with information sharing were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

Although specified by Rogers in his theoretical framework, observability was not validated as a predictor of utilization. It did not achieve a statistically significant relationship with utilization within the multiple regression analysis ($p = .366$). Greater opportunities for observability of information-sharing networks did not facilitate more frequent employment or more positive evaluations of this technology.

While factor analysis attributed an ability to measure 72.1% of the construct of observability to the two survey items designed for that purpose, measurement reliability was acceptable but below the desired .7 for Cronbach’s Alpha. It is possible that improvement of

survey items designed to measure this construct could yield data that could point in other directions.

Observability was not validated for either adoption or utilization. Future research could explore whether agencies need only see the innovation for themselves to influence their decision to adopt and utilize as opposed to having to witness the innovation at other agencies in their area. Further research can help clarify if observability is truly non-operative in the context of local law enforcement and information sharing.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced convincing qualitative data in support of this hypothesis. A couple of interviewees did reference the value of agencies seeing success stemming from utilization of information sharing but it did not emerge as a dominant or recurring theme in the interviews as a whole. Responses to the open-ended questions concerning observability did not contain any evidence for the proposed relationship to utilization.

Hypothesis Sixteen

Police organizations that perceive a higher degree of trialability associated with information sharing were more likely to experience higher levels of utilization of information-sharing networks.

Quantitative Findings

Trialability did not emerge as statistically significant to utilization ($p = .421$). The opportunity to experiment with this innovation was meaningful to adoption but did not impact utilization. It is a logical potential explanation that if an agency has already acquired the information-sharing network, it negates the need to experiment or test drive the technology. However, this possible explanation would also leave unanswered the questions generated by the quantitative finding as to how increased trialability decreased the odds of adoption.

It would appear that chief executives do not consider experimentation with the network to be a primary factor in encouraging their adoption or utilization of information sharing. In fact, given the negative relationship with adoption, they may possibly view attempts to engage in experimentation as unnecessary or somehow counterproductive. Further research could illuminate this issue and clarify our understanding of why trialability is viewed as a negative aspect of the processes of adoption and does not influence utilization of information-sharing networks by local law enforcement executives.

Qualitative Findings

Neither the targeted telephone interviews nor the open-ended survey questions produced sufficient qualitative data that would support confirmation of this hypothesis. Almost no agency executives offered observations or experiences on the need for trialability to induce greater utilization. One interviewee and one survey respondent referenced experimentation with the innovation but they remained alone in their interest in the topic.

Predictive Model of Utilization

Multiple regression analysis was employed to identify and potentially validate several independent variables that contributed to variation in the dependent variable of utilization. It enabled the determination of the relative strength or importance of each independent variable in influencing utilization. Multiple regression also resulted in the construction of a predictive model. A multiple regression model should be evaluated on three performance measures: its Adjusted R-Square, the statistical significance of its regression coefficients (t test), and the absolute values of its un-standardized coefficients of regression (Beta) (Pallant, 2005).

The standard technique for multiple regression analysis was selected to identify the optimal predictive model given all potential models. Two predictive models were constructed through multiple regression analysis. One model consisted of only control variables. A second model was comprised of both independent and control variables. This two stage process of model construction facilitated identification of the change in the Adjusted R Square influenced by the inclusion of the independent variables.

All five major assumptions for the employment of multiple regression were satisfied for both models: 1) the expected value of the error was zero establishing linearity 2) constant variance of residuals was confirmed 3) normality of the residuals was validated with the use of a histogram 4) independence of residuals was verified by the Durbin-Watson statistic (equal to 2) and 5) a lack of multi-collinearity was confirmed by computation of the variance-inflation factor. A VIF over 10 would indicate a multi-collinearity problem and both models exhibited a VIF far below 10 for each variable.

A Predictive Model of Utilization—Control Variables Only

As illuminated by Table 18, none of the control variables were found to be statistically significant in their relationship to utilization. Apparently, the years of law enforcement experience, the educational level, or the age of the chief executive or the budget of the agency were not determinants of utilization. Consequently, as displayed within Table 19, the Adjusted R-Square for the multiple regression model of the control variables only offered less than a 1% explanatory power (.9). Therefore, 99% of the variation in the dependent variable of utilization could not be accounted for by the control variables. Interestingly, the control variables of law enforcement experience and age of the agency leader did influence adoption. More extensive experience favored adoption while increasing age undermined it. There is a logical scenario in which these control variables are operative for the adoption process and decision but would not likely impact levels and positive evaluations associated with utilization. The chief executive's personal characteristics may influence their initial decision-making concerning information sharing but not continue to affect agency utilization once that decision is made.

Table 18: Multiple Regression Coefficients—Control Variables Model

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95% Confidence Interval for B | | VIF |
|-------|--|-----------------------------|------------|---------------------------|-------|------|-------------------------------|-------------|-------|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | |
| 1 | (Constant) | 11.947 | 1.543 | | 7.744 | .000 | 8.904 | 14.990 | |
| | Years of professional law enforcement experience | .039 | .044 | .106 | .875 | .383 | -.049 | .126 | 2.861 |
| | Annual dollar amount of agency budget | 8.06E-010 | .000 | .070 | .976 | .330 | .000 | .000 | 1.024 |
| | Level of formal education | .275 | .186 | .106 | 1.479 | .141 | -.092 | .642 | 1.016 |
| | Age of survey respondent | -.005 | .045 | -.014 | -.112 | .911 | -.093 | .083 | 2.844 |

Table 19: Model Summary—Control Variables Model

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-----------------|----------|-------------------|----------------------------|---------------|
| | R Square Change | F Change | df1 | df2 | |
| 1 | .171(a) | .029 | .009 | 2.66538 | 2.043 |

A Predictive Model of Utilization—Independent and Control Variables Integrated

In the integrated predictive model, the control variables were also found to have no statistically validated impact on utilization. However, a different set of predictor variables emerged as influential antecedents to utilization compared to the model for adoption. Autonomy held a statistically significant relationship with utilization ($p = .019$). Advantage also

demonstrated a confirmed link to utilization ($p = .001$). Complexity also affected utilization in a statistically meaningful way ($p = .035$).

In an unanticipated direction of their relationship, autonomy negatively affected utilization ($B = -.210$). Advantage accelerated utilization ($B = .315$) and decreased complexity also positively contributed to greater utilization ($B = .291$). Among these predictor variables, autonomy demonstrated itself to be the most important influence on utilization while autonomy possessed the most negative impact on utilization. As to why increased individual agency autonomy within the network would depress utilization is not fully understood. Theoretically and empirically, enhanced autonomy should have increased utilization. Future research will be required to unravel this somewhat perplexing finding. Advantage and complexity performed according to theoretical and empirical expectations and improved utilization of information-sharing networks among local law enforcement agencies. The integrated model failed to confirm the influence of the independent variables of leadership, trust, compatibility, observability, and trialability as predictive of utilization. These findings are displayed within Table 20.

Table 20: Multiple Regression Coefficients—Integrated Model

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95% Confidence Interval for B | | VIF |
|---|-----------------------------|------------|---------------------------|-------|-------|-------------------------------|-------------|-------|
| | B | Std. Error | Beta | | | Lower Bound | Upper Bound | |
| (Constant) | 9.273 | 1.864 | | 4.975 | .000 | 5.595 | 12.951 | |
| Years of professional law enforcement experience | .065 | .044 | .178 | 1.487 | .139 | -.021 | .152 | 3.077 |
| Annual dollar amount of agency budget | 1.09E-009 | .000 | .096 | 1.352 | .178 | .000 | .000 | 1.074 |
| Level of formal education | .092 | .190 | .035 | .484 | .629 | -.282 | .466 | 1.151 |
| Age of survey respondent | -.041 | .044 | -.110 | -.938 | .349 | -.127 | .045 | 2.960 |
| High level of commitment by CEO to being in network | -.222 | .248 | -.095 | -.894 | .373 | -.712 | .268 | 2.443 |
| TRUSTREGRESS | -.067 | .139 | -.052 | -.482 | .630 | -.341 | .207 | 2.453 |
| AUTONOMYREGRESS | -.210 | .089 | -.238 | - | .019* | -.385 | -.035 | 2.168 |
| ADVANREGRESS | .315 | .091 | .394 | 3.447 | .001* | .135 | .496 | 2.806 |
| COMPLEXREGRESS | .291 | .137 | .220 | 2.121 | .035* | .020 | .562 | 2.306 |
| COMPATREGRESS | .013 | .192 | .009 | .066 | .948 | -.367 | .392 | 3.831 |
| OBSERVEREGRESS | -.100 | .110 | -.073 | -.905 | .366 | -.318 | .118 | 1.388 |
| TRIALREGRESS | .069 | .085 | .063 | .807 | .421 | -.099 | .237 | 1.297 |

Note. *p < .05

Table 21: Model Summary—Integrated Model

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-----------------|----------|-------------------|----------------------------|---------------|
| | R Square Change | F Change | df1 | df2 | |
| 1 | .383(a) | .147 | .091 | 2.55241 | 1.965 |

Effect of Independent Variable—Change in the Adjusted R-Square

The control variables only model generated a negligible Adjusted R-Square of .9 leaving 99.1% of the variation in utilization unexplained. As evidenced within Table 21, the integrated model of both control and independent variables demonstrated an Adjusted R-Square of 9.1%.

As illustrated within Table 22, the improvement in explanatory power that resulted from the inclusion of the independent variables within the predictive model is 9.2%.

Table 22: Change in Adjusted R-Square

| Adjusted R-Square - Controls | Adjusted R-Square - Integrated | Change in Adjusted R-Square |
|------------------------------|--------------------------------|-----------------------------|
| .9% | 9.1% | 9.2% |

Summary of Qualitative Analysis and Findings

Qualitative research was undertaken to compliment the quantitative methods to address research questions and help test hypotheses within this study. The multiple goals of the qualitative research were attained: cross-validation of quantitative outcomes, location of data and findings that may diverge from the quantitative research, and identification of new or emerging variables, which may not have been found by other study methods and will facilitate future investigation. Moreover, participants were afforded the opportunity to expand or elaborate on topics from their mail or Web survey responses. In sum, the overall validity of the entire study was enhanced through qualitative investigation techniques.

Qualitative research was organized and implemented through two modes of data collection. First, all 384 survey respondents were given the opportunity to answer two open ended questions within the quantitative instrument. This tool would enable them to reinforce or expand upon other responses in their own words and highlight issues that may have been missed or insufficiently inquired about in the closed-ended items within the survey. 85% of survey respondents responded to the first open-ended question concerning “the single most important”

reason for agency adoption and utilization and 81% of survey respondents answered the second open ended item involving the “single largest obstacle.” These two open ended questions generated meaningful data without increasing the burden of participation for respondents. Secondly, twenty targeted telephone interviews were conducted with law enforcement executives across all three study states. These interviews produced valuable data and fulfilled the functions of well-designed and executed qualitative research. Several interviewees expressed a high level of satisfaction with the content and conduct of the telephone interviews and all very much appreciated the opportunity to discuss the issue further in this format and setting.

A potentially significant limitation inherent to both modes of qualitative data collection involved querying respondents about adoption and utilization within the same question. While it generated data, this question design may have constrained the study’s ability to conclusively disentangle findings based on these responses. An interviewee or respondent may actually have been commenting exclusively or more decidedly on one outcome within the context of the combined question, which limits the opportunity to draw more precise conclusions. However, the qualitative investigation was intended to supplement the quantitative inquiry and this methodological choice was made to reduce survey length, decrease the burden on respondents, and enhance their willingness to participate. Quality research involves a constant cost benefit analysis and this methodological choice was deemed to yield more profit while accepting the expenditure associated with it.

Qualitative research made a number of vital contributions to this research. First, it cross validated the variable of leadership found in the quantitative research to be a prominent predictor of adoption. It also triangulated the influence of advantage as an important predictor of utilization. Secondly, it corroborated the disconfirmation of the variables of autonomy,

complexity, compatibility, and observability as significant predictors of adoption. It also confirmed the non-influence of compatibility and observability as significant antecedents to utilization. Thirdly, qualitative findings opened potentially new avenues for future inquiries by locating cost, data security, IT/RMS issues, politics, or “turf tending,” officer safety as a dimension of relative advantage, and the need for appropriate policies and procedures as new variables or emerging themes. Lastly, qualitative research within this study did not confirm the negative effect of trialability on adoption as the quantitative analysis had established. Qualitative research also did not validate trialability as having a significant effect on utilization, which is consistent with the quantitative findings. Lastly, trust emerged as an important predictor for both adoption and utilization.

Summary of Study Findings

Quantitative analysis of the study data employed logistic regression to identify and validate predictors of adoption and multiple regression to confirm predictors of utilization. The integrated logistic regression model validated the role of the independent variables of leadership and trialability as influencing agency adoption in both positive and negative ways. Strong leadership favored agency adoption while trialability decreased the probability of adoption. Logistic regression disconfirmed the roles of the independent variables of autonomy, advantage, observability, complexity, compatibility, and trialability in the adoption decision. The two control variables whose statistically significant relationship with adoption was confirmed by logistic regression were the years of experience of the law enforcement executive and his or her age. More extensive experience in law enforcement was more likely to induce adoption while advancing age was more likely to function as a barrier to it.

Multiple regression analysis determined that the three independent variables of autonomy, advantage, and complexity influenced agency utilization of information-sharing networks. The independent variables of trust, observability, complexity, compatibility, and leadership were not confirmed by multiple regression analysis to affect utilization of information-sharing networks by local law enforcement agencies. None of the control variables were validated by multiple regression analysis as having an effect on utilization.

The logistic regression model of both independent and control variables explained between 19.4-25.9% of the adoption decision and correctly classified 66.7% of the cases where adoption of information sharing by local law enforcement agencies occurred. In terms of increasing explanatory power for adoption, the independent variables enhance the predictive ability of the control variables by 12-16.1% as measured by the Cox and Snell Adjusted R-Square. The classification rate for accurately predicting cases of agency adoption increases by 7.1% when the independent variables are combined with the control variables.

The integrated model of independent and control variables explained 9.1% of the variation in the dependent variable of utilization. The independent variables contribute 9.2% more explanatory power when combined with the control variables in predicting agency utilization of information-sharing networks.

A key finding of this investigation into adoption and utilization was the accumulation of more evidence within a second diffusion study of information sharing by local law enforcement, which strongly indicated that different predictors individually motivate each process. While two control variables such as length of law enforcement experience and age of the chief executive influenced adoption, none of the control variables affected utilization. The theoretically specified predictor variable of trialability that discouraged adoption was irrelevant to utilization. The

empirically validated predictor variable of leadership that inspired adoption was not meaningful to utilization. Autonomy served to depress utilization but did not affect adoption. Advantage encouraged utilization but was not persuasive to adoption. Reduced complexity was conducive to utilization but failed to generate increased adoption. The quantitative findings revealed that adoption and utilization did not share any of the predictor variables as common influences. This finding opens the avenue for confirmatory inquiries that can establish the theoretically and empirically distinct identities of adoption and utilization within the context of information sharing by local law enforcement organizations.

Qualitative research was structured and implemented through twenty targeted telephone interviews with agency executives and with two open-ended questions within the survey instrument answered by 81% and 85% of the 384 respondents. Qualitative research cross-validated the findings obtained through quantitative analyses that leadership serves as an effective predictor of adoption and advantage enhances utilization. In support of the quantitative findings, it also disconfirmed the variables of autonomy, complexity, compatibility, and observability as significant predictors of adoption. Having triangulated other quantitative conclusions, the qualitative inquiry also excluded compatibility, observability, and trialability as prominent predictors of utilization. Qualitative findings set the stage for future research by locating cost, data security, IT/RMS issues, politics, or “turf tending,” officer safety as a dimension of relative advantage and the need for appropriate policies and procedures as potential new variables or emerging themes for further investigation. Outcomes of quantitative and qualitative research did diverge, as the independent variable of trialability was not found to be a persuasive predictor of adoption in data collected through targeted telephone interviews and open-ended survey questions. Qualitative research did not validate trialability as having a

significant effect on utilization, which comports with the quantitative investigation. Lastly, trust was identified by the qualitative inquiry as an influential predictor of both adoption and utilization.

Table 23: Summary of Study Findings—Adoption

| Variable | Quantitative Investigation | Qualitative Inquiry |
|----------------------------|----------------------------|---------------------|
| Law Enforcement Experience | Supported | N/A |
| Age | Not supported* | N/A |
| Budget | Not supported | N/A |
| Education | Not supported | N/A |
| Trust | Not supported | Supported |
| Autonomy | Not supported | Not supported |
| Leadership | Supported | Supported |
| Advantage | Not supported | Supported |
| Complexity | Not supported | Not supported |
| Compatibility | Not supported | Not supported |
| Observability | Not supported | Not supported |
| Trialability | Not supported* | Not supported |

Note. * denotes a statistically significant relationship but not as predicted by the specific hypothesis.

Table 24: Summary of Study Findings—Utilization

| Variable | Quantitative Investigation | Qualitative Inquiry |
|----------------------------|----------------------------|---------------------|
| Law Enforcement Experience | Not supported | N/A |
| Age | Not supported | N/A |
| Budget | Not supported | N/A |
| Education | Not supported | N/A |
| Trust | Not supported | Supported |
| Autonomy | Not supported* | Not supported |
| Leadership | Not supported | Supported |
| Advantage | Supported | Supported |
| Complexity | Supported | Not supported |
| Compatibility | Not supported | Not supported |
| Observability | Not supported | Not supported |
| Trialability | Not supported | Not supported |

Note. * denotes a statistically significant relationship but not as predicted by the specific hypothesis.

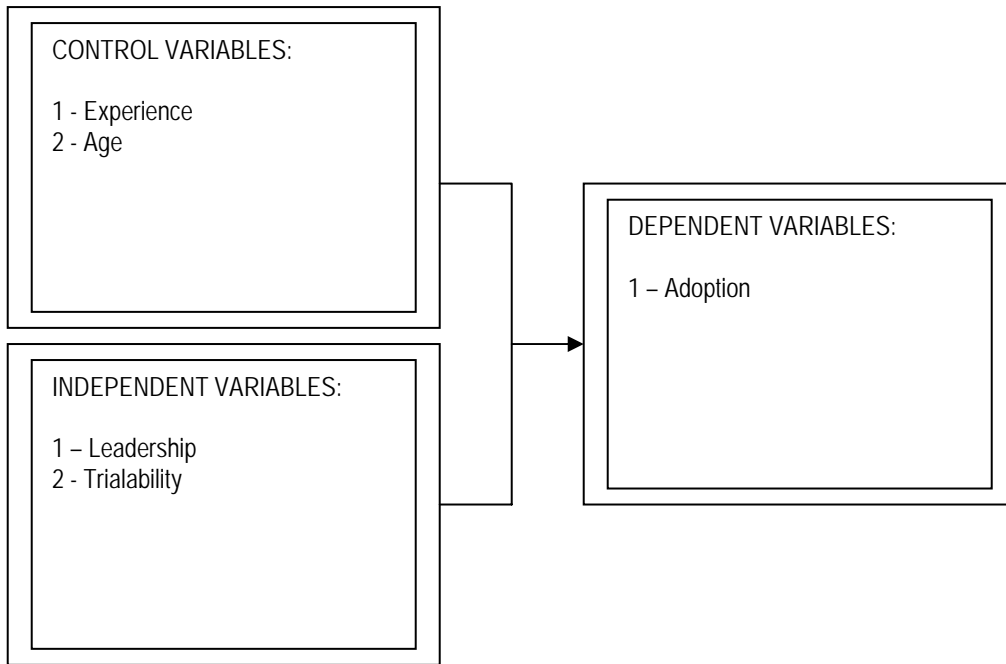


Figure 4: Revised Model—Predictors of Adoption of Information-sharing Networks by Local Law Enforcement Agencies

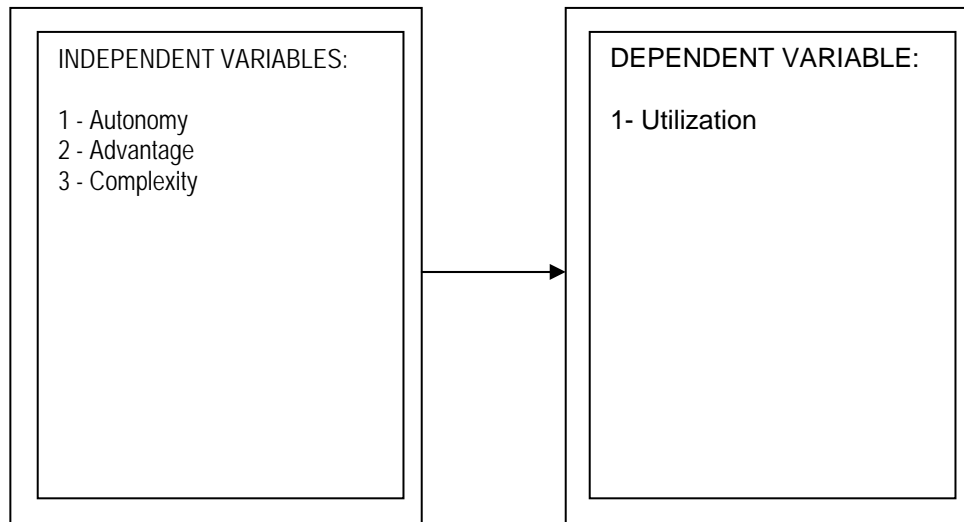


Figure 5: Revised Model—Predictors of Utilization of Information-sharing Networks by Local Law Enforcement Agencies

CHAPTER FIVE: CONCLUSIONS AND IMPLICATIONS

Discussion

Having employed both quantitative and qualitative research methods, this study addressed two research questions and tested sixteen hypotheses. Quantitative analyses affirmed the role of the theoretically informed antecedents of leadership and trialability in influencing the adoption process of information-sharing networks by local law enforcement in three states. Quantitative findings supported relative advantage, autonomy, and complexity as capable of affecting utilization of information-sharing networks by local police organizations.

Quantitative research within this study confirmed the explanatory influence of the control variables of increasing law enforcement experience and age of the chief executive towards agency adoption in both positive and negative directions. No control variables emerged as being influential for utilization.

Qualitative research made several salient contributions to this research. First, it cross-validated the quantitative finding that the independent variable of leadership is a significant and positive predictor of adoption. It also corroborated the quantitative conclusion that advantage positively contributes to utilization. In support of the quantitative findings, it also failed to validate the effects of the variables of autonomy, complexity, compatibility, and observability as significant predictors of adoption. Triangulating the quantitative conclusions, the qualitative inquiry also excluded compatibility, observability, and trialability as prominent predictors of utilization. Thirdly, qualitative findings identified cost, data security, IT/RMS issues, politics or “turf tending,” and the need for appropriate policies and procedures as new variables or

emerging themes for future investigation. Qualitative research within this study did not confirm the effect of trialability on adoption as the quantitative outcomes had established but did converge with quantitative findings that trialability did not affect utilization. Trust was confirmed by the qualitative inquiry as an important antecedent to adoption and utilization.

Unanticipated Findings

Based on the theoretical framework and prior empirical research, it was expected that relative advantage and trust would positively influence adoption. The quantitative findings yielded no support for those hypotheses but the qualitative research indicates that both may function as important antecedents to adoption. This divergent finding between the quantitative and qualitative investigations should be examined and reconciled if possible in future research.

Trialability and autonomy did not perform as theoretically predicted. Contrary to diffusion theory, trialability depressed adoption and autonomy undermined utilization. Future investigations need to identify why greater opportunities to experiment with this innovation would discourage adoption and why increased independence within the network would decrease utilization by local law enforcement agencies.

A third and curious finding was the lack of support for the influence of the control variable of agency budget on the adoption decision and utilization frequency and evaluations within the quantitative research given the overwhelming volume of comments made by chief executives in the open-ended questions on the survey and in the targeted telephone interviews concerning the role of cost in affecting agency involvement with information-sharing networks. Cost represented 33% of the responses to the open-ended question concerning the “single largest obstacle” to adoption and utilization in the study survey. Senior law enforcement administrators

frequently cited cost as a barrier to information sharing during the targeted telephone interviews. It is possible that agency heads see information sharing as new spending or an unfunded or unbudgeted cost in addition to current annual agency spending so the size of the existing agency budget does not factor as prominently into this process but new revenue sources such as federal or state grants would be influential in addressing cost concerns. Another potential explanation may be the reluctance by single agencies to expend their limited individual resources on what they perceive will be benefits accrued by other agencies within the network (NGA, 2002). Therefore, resources allocated towards a multi-agency information sharing initiative are not viewed as a function of the existing agency budget but definitely seen as a new cost. Only future research can unravel or reconcile this interesting relationship where the current agency budget is not a dominant “driver” but cost is still a primary consideration.

Implications for Future Research and Study Limitations

Numerous opportunities for future research were identified by this study. For variables confirmed by this research as having predictive power, it is incumbent on future research to explain or clarify exactly how several identified predictors specifically operate to influence adoption and utilization. For example, how do higher levels of law enforcement experience automatically translate into more receptivity to information-sharing networks and why does increasing age of the agency head seemingly impede the decision to adopt and if so, then why? Considering the reality that greater professional experience and increasing age are usually constant companions in the course of life, it is curious that they would produce conflicting influences on the same innovation. It could be that older chief executives are less familiar or

knowledgeable about information technology but this remains to be established by future research into this innovation.

Future investigations should also concentrate on further study of predictor variables which had been theoretically selected or previously empirically validated but were not confirmed by this study. The proposed predictors of autonomy, observability, complexity, and compatibility were not determined by either quantitative or qualitative inquiries within this study to be persuasive in agency adoption and this finding warrants additional research. Likewise, the hypothesized predictors of observability, compatibility, and trialability were not identified as influential antecedents of utilization. Continued inquiry into the role of these potential predictors could help better explain or reconcile divergent findings from prior empirical research in this field.

As indicated by the 2005 Skogan and Hartnett investigation that began the application of diffusion theory to examine information sharing in local law enforcement, different predictor variables may be individually responsible for the adoption and utilization processes. Impressive evidence emerged within this study in support of the Skogan and Hartnett proposition that adoption and utilization may involve separate processes motivated by different antecedents. This study found that adoption was influenced by the diffusion theory variable of trialability while utilization was impacted by diffusion predictors such as autonomy, advantage, and complexity. Enthusiastic leadership inspired adoption but played no role in utilization. Control variables such as increasing age of the chief executive negatively influence the likelihood of adoption while greater law enforcement experience of the agency head enhanced the probability that this innovation would be embraced. No control variables were determined to encourage or discourage utilization. Adoption and utilization appear dissimilar in their motivating influences.

These study findings offer stronger support to the idea that adoption and utilization represent readily distinguishable processes driven by divergent predictor variables and should open avenues for future inquiry to confirm this growing suspicion.

Inclusion of emerging variables such as those identified by the two open ended questions within the original survey and by targeted telephone interviews could also guide future empirical research into information sharing by local law enforcement. Cost, data security, creation of policies and procedures to govern information sharing, IT/RMS interface issues, and “turf battles” are a few examples of variables selected by survey respondents and telephone interviewees that were not specified for study in this research but deserve exploration in forthcoming work. The identification of these potential predictor variables was consistent with prior research that should further justify future examination (Gil-Garcia et al, 2005; Dunworth, 2000). Study variables such as trust seemingly touched upon potential issues such as data security or turf protection but those emerging variables were not specifically measured within this research. Specific survey items or other research methods need to be developed, validated, and deployed to capture data on these newly specified variables to determine their role in adoption and utilization. Inclusion of new variables within validated adoption and utilization models could enhance existing theoretical frameworks, improve empirical knowledge, guide future policymaking, and provide executive decision support.

Several limitations inherent to this research further set the stage for future investigation. This research was confined to a non-experimental design. If it is feasible, future investigations might seek to implement experimental or quasi-experimental research designs. This study was largely cross-sectional in design. However, it might have captured more than events and experiences at a single point in time by asking respondents to recall their retrospective decision-

making process for innovation adoption and for non-adopting agencies who were asked to prospectively consider what variables would facilitate or inhibit their adoption and utilization of information-sharing networks. Future research could employ a longitudinal research design that could produce more extensive and valuable data for analysis of the process of adoption or non-adoption as well as utilization or non-utilization by local law enforcement agencies. Longitudinal research might also aid in better establishing causal links between the predictor and outcome variables examined within this study. While this research concentrated on the predictors or causes of decisions to engage or not participate in information-sharing networks, prospective studies could more closely examine the full range of actual outcomes or consequences associated with information integration networks. For example, this study validated the hypothesis that the belief by agency leaders in a relative advantage associated with information sharing increased agency utilization of the innovation. A subsequent study could confirm whether improved outcomes (i.e. increased arrests, improved crime clearance rates) were actually obtained through utilization of information-sharing networks.

This research represented a single level investigation and a single informant approach to data collection. Future inquiries could expand to a multi-level analysis, which could assess the influence of predictor variables in operation at the individual, organizational, and environmental levels. Moreover, this study collected data from a single informant who served as the chief executive officer of the organization. Additional inquiries might capitalize on the use of multiple informants such as line officers and detectives, patrol and investigative supervisors, and agency IT personnel to explore the effects of antecedents that incentivize or impede information sharing within local law enforcement. For example, more active and regular network users such as patrol officers or detectives may be influenced by different variables or varying levels of antecedents in

making their adoption and utilization decision-making compared to the Sheriff or Police Chief. A potential limitation of the single informant approach encountered by this study was the high percentage of Police Chiefs who constituted the survey respondents compared to Sheriffs. It is possible that their responses would be similar or even highly congruent but future studies should seek to include more Sheriffs as survey respondents recognizing the reality that many if not all counties in America will have only one Sheriff but multiple Police Chiefs (i.e. maybe a dozen or more) so this may represent an insurmountable obstacle to data collection unless Sheriffs are surveyed separately in a “Sheriffs only” type study.

Local law enforcement agencies in three states were examined by this research. To enhance external validity of study findings, prospective inquiries could widen to involve many states or a national setting and could also collect data from state and federal law enforcement agencies. Do predictors of adoption and utilization remain invariant or deviate depending on whether the law enforcement agency is federal, state, or local in identity and character?

While survey research has been utilized as the dominant vehicle for data collection in diffusion studies, several limitations accompany the employment of this methodology. In general, four potential sources of error within survey research are sampling error, coverage error, measurement error, and non-response error. Moreover, survey research can capture attitudes, perceptions, beliefs, and opinions which may highly correlate with actions taken but it does not measure actual outcomes such as arrests made or stolen property recovered which are recorded in agency held records. It is always possible for a respondent to provide an answer to a survey instrument that may or may not be completely validated by official data or agency records held by their organization or other agencies. Future research aimed at exploring outcomes associated

with information sharing such as improved police performance may want to collect data from agency records as opposed to complete reliance on respondent recall.

This study relied upon multiple and logistic regression analyses to identify the variables which may facilitate or inhibit information sharing in local law enforcement. These statistical analytical methods can contribute to confirming casual relationships but rest on certain assumptions and possess specific limitations. Future research may want to engage data envelopment analysis to examine improved police organizational effectiveness and efficiency related to information sharing and structural equation modeling to incorporate measurement models of key constructs and better specify causal relationships between predictors and adoption and utilization.

A valuable line of future inquiry will be whether lessons learned from the validation of predictors within the context of information integration in law enforcement can be applied to the same research challenge within other fields such as health care, which is also grappling with the issue of information sharing. The integrated theoretical framework employed within this study may serve to identify and explain important antecedents for information-sharing networks in a diversity of disciplines and organizational settings.

Given the paucity of research into electronic information sharing by American law enforcement, this study advanced both theoretical and empirical understanding into this emerging organizational and public policy phenomenon and identified new avenues for future investigation. Nationwide, empirical research into the predictors of adoption and employment of information-sharing networks by local law enforcement in a multi-state setting represents a recent development. This is noteworthy as effective electronic information sharing by all levels of law enforcement has been identified as a critical national public policy priority by the 9/11

Commission, served as the subject of landmark legislation passed by Congress and signed into law by the President, and currently consumes an enormous amount of time, energy and financial resources as policymakers and police administrators seek to realize this goal. This research confirmed a high level of interest among law enforcement executives in this topic and the need to identify and validate evidence-based practices. Armed with the knowledge of the theoretically informed and empirically validated antecedents that facilitate or inhibit adoption and utilization of information integration networks by the nation's 18,000 local law enforcement agencies, policymakers and police administrators could optimize their approaches to information sharing and accelerate achievement of an urgent national objective.

APPENDIX A: COVER LETTER AND SURVEY INSTRUMENT

I am writing to ask for your help with a survey of local law enforcement leaders concerning information sharing. The purpose of this study is to better understand the reasons why police agencies might or might not join and utilize information-sharing networks. For definitional purposes, an information-sharing network enables your detectives and officers to access and exchange police records which are electronically stored by your agency and other law enforcement agencies (computer networks that allow you to share your agency records with local or state or federal law enforcement agencies and also access records held by their agencies).

Your answers can aid in improving approaches to addressing information sharing in law enforcement. Only by asking local law enforcement executives to provide their opinions can we truly gain a better understanding of what local law enforcement agencies want to see happen on the issue of information sharing.

The identities of participants and their agencies will remain completely confidential and will not be published. There are no known risks and participation is voluntary. You do not have to answer any questions that you do not wish to answer and you may discontinue participation at any time. The results of this survey will be made available to you upon request. There is no compensation paid to participants. You must be at least 18 years of age to participate. Your submission of a completed survey indicates your consent to participate in this study.

You may take this survey by completing enclosed written survey and returning it via the postage-paid return envelope that has been provided to you – OR – you can complete an on-line survey by clicking on the link <http://my.flagler.edu/jsaviak/survey.asp> and logging-in with a five-digit access code that is printed above. Your agency's firewall may prevent this link from working. If that is the case, you can copy and paste this link into your Internet access browser.

If you have any questions about this research, please contact me at (904) 819-6234 or via email at jsaviak@flagler.edu, or my supervisor, Dr. Lawrence Martin, at 407-823-5731. Questions or concerns about research participants' rights may be directed to the UCF IRB, Office of Research and Commercialization 12201 Research Parkway, Suite 501 Orlando, FL 32826-3246 Orlando, FL 32826-3246. The phone number is 407-823-2901.

Pre-testing of this survey indicates that it should take you 10 minutes to complete. Enclosed please find a postage paid envelope in which to return the survey. Thank you for your participation.

Sincerely,



**INFORMATION SHARING
SURVEY
of
Law Enforcement
Executives**

**Flagler College/University of Central Florida
2007**

**Please return your completed questionnaire
in the enclosed envelope to:**

**Joe Saviak
Assistant Professor
Public Administration Program
Flagler College
P.O. Box 1027
St. Augustine, FL 32085-1027**

**INFORMATION-SHARING SURVEY
of LAW ENFORCEMENT EXECUTIVES**

Q1. Presently, does your law enforcement agency utilize an electronic information-sharing network or networks that enable your detectives and officers to access and exchange police records with other law enforcement agencies? (Computer networks that allow you to share your agency records with local or state or federal law enforcement agencies and also access records held by their agencies.)

- Yes
- No (Please skip Q2 & Q3 & Q4 - **Go To Q5**)
- Don't Know

Q2. What is the name (s) of the information-sharing network or networks that your agency uses?

- 1. _____
- 2. _____
- 3. _____

Q3. How long has your agency been using an information-sharing network? Please state length of time in months.

____ months.

Q4. Were you the Sheriff or Police Chief at the time that this agency joined and began using an information-sharing network?

- Yes
- No
- Don't know

Q5. What is your specific job title?

- Sheriff
- Chief of Police
- Other (Please provide) _____

Here is a list of reasons that Police Departments or Sheriff's Offices might have for gaining access to and using an information-sharing network. For each reason that is mentioned, please indicate your level of agreement or disagreement as to whether this reason would

influence your agency's decision to join and use an information-sharing network. Even if your agency does not use an information-sharing network, please respond. To answer each question, please check the appropriate box.

| | Strongly Disagree | Moderately Disagree | Disagree | Neutral | Agree | Moderately Agree | Strongly Agree | Don't Know/ Can't Say |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Q6. It was believed that an information-sharing network would improve your agency's abilities to access investigation information. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q7. Your agency expected to save time in accessing information from other jurisdictions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q8. Access to an information-sharing network would improve your agency's ability to solve or prevent crimes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q9. Your agency did not have to give up control over your own records in order to be in the network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q10. Your agency retained a lot of its independence within the network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q11. Your agency did not have to make major changes in its policies and procedures to join the network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Disagree | Moderately Disagree | Disagree | Neutral | Agree | Moderately Agree | Strongly Agree | Don't Know / Can't Say |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Q12. There is a high level of trust among the agencies in the network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q13. The working relationship between your agency and other agencies in the network is a good one. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q14. There is a high level of commitment by your Sheriff or Chief to being in an information-sharing network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q15. Someone at your agency heard favorable things about information sharing from other agencies in your area. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q16. The network is relatively easy to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q17. Information sharing is consistent with the culture of your agency. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q18. Your agency was able to try the network first before making a major commitment to the network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q19. A fellow Sheriff or Chief in your area asked your agency to join the information-sharing network. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Disagree | Moderately Disagree | Disagree | Neutral | Agree | Moderately Agree | Strongly Agree | Don't Know / Can't Say |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Q20. Someone from your agency toured another law enforcement agency outside of your area and saw an information-sharing system firsthand. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q21. Your agency expected to identify offenders from different jurisdictions who might be committing crimes in your jurisdiction. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q22. Someone at your agency heard good things about information sharing at a national or statewide law enforcement conference or read a positive story about it in a law enforcement publication. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q23. The network is relatively easy to understand. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q24. Information sharing is a good match with your agency's needs and priorities. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q25. A few officers or detectives in your agency could test drive the network before your agency had to make a decision to join. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Q26. Someone at your agency saw that other agencies in your area were having success with information sharing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

The next three questions are related to the frequency, evaluations, and outcomes associated with information sharing by your agency. (If your agency does not utilize an information-sharing network, please skip Q27 & Q28 & Q29 – **Go to Q30**)

Q27. How would you describe the frequency with which your agency utilizes the information-sharing network?

- Highly frequently (more than 5 times a day)
- Pretty frequently (2 to 5 times a day)
- Somewhat frequently (once a day)
- Not frequent at all (2 or 3 times a week)
- Rarely (once a week)
- Never (never use the network)
- Don't Know/Can't Say

Q28. In terms of the feedback from detectives and officers in your agency regarding whether they like using the information-sharing network, would you describe their evaluations of it as:

- Highly positive
- Somewhat positive
- Neutral
- Somewhat negative
- Highly negative
- Don't Know/Can't Say

Q29. In terms of feedback from detectives and officers in your agency regarding whether they think that information sharing has improved their ability to do their job, would you describe their comments as:

- Highly positive
- Somewhat positive
- Neutral
- Somewhat negative
- Highly negative
- Don't Know/Can't Say

Q30. If you had to choose the single most important reason why your agency would join and use an information-sharing network, it would be:

Q31. If you had to choose the single largest obstacle to your agency joining and using an Information-sharing network, it would be:

For statistical purposes only, I need to ask you a few more questions.

Q32. How many years of professional law enforcement experience do you have?

_____ years

Q33. For this fiscal year, what is your total agency budget?

\$ _____

Q34. What is the highest level of formal education that you have obtained?

- High School
- Associates Degree
- Bachelors Degree
- Masters Degree
- Ph.D. or J.D.

Q35. Finally, your age would be:

_____ years old

**APPENDIX B: APPROVAL BY U.C.F. INSTITUTIONAL REVIEW
BOARD**



Office of Research & Commercialization

February 2, 2007

Joe Saviak
P.O. Box 1027
St. Augustine, FL 32085-1027

Dear Mr. Saviak:

The University of Central Florida's Institutional Review Board (IRB) received your protocol IRB #07-4143 entitled, "An Inquiry into the Predictors of Adoption and Utilization of Information Sharing Networks by Local Law Enforcement in Three States." The IRB Chair reviewed the study on 02/01/2007 and did not have any concerns with the proposed project. The Chair has indicated that under federal regulations (Category #4, research involving the collection of study of existing data, documents, records, pathological specimens or diagnostic specimens, if these sources are publicly available or if the information is recorded by an investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects) this research is **exempt** from further review by our IRB, so an approval is not applicable and a renewal within one year is not required.

Please accept our best wishes for the success of your endeavors. Should you have any questions, please do not hesitate to call me at 407-823-2901.

Cordially,

A handwritten signature in cursive script that reads "Joanne Muratori".

Joanne Muratori
(FWA00000351 Exp. 5/13/07, IRB00001138)

Copies: IRB File
Lawrence Martin, Ph.D.

JM:jt

APPENDIX C: TARGETED TELEPHONE INTERVIEW SCRIPT

Targeted Telephone Interview Script

Agency _____

Interviewee _____

Date & Time _____

Good morning/afternoon. My name is Joe Saviak. I am an Assistant Professor of Public Administration at Flagler College. Recently, you completed a survey that I sent you concerning research into why local law enforcement agencies may or may not join and use information-sharing networks. We very much appreciated your response. If I could, I wanted to take a few minutes to speak with you and follow-up on some of the issues that were in the survey.

First, I need to advise you of the rules governing this research and obtain your consent to participate in this interview. The identities of participants and their agencies will remain completely confidential and will not be published. There are no known risks and participation is voluntary. You do not have to answer any questions that you do not wish to answer and you may discontinue participation at any time. The results of this survey will be made available to you upon request.

Do I have your consent to participate in this telephone interview?

(IF YES, CONTINUE)

(IF NO, I certainly understand and appreciate your time. Have a good day).

I would like to ask you several questions concerning information sharing by local law enforcement.

Q1. If you had to choose the single most important reason why your agency would join and use an information-sharing network, it would be:

Tell me more about that.

And what would be the **second** most important reason why your agency would join and use an information-sharing network?

Q2. If you had to choose the single largest obstacle to your agency joining and using an information-sharing network, it would be:

Tell me more about that.

And what would be the **second** largest obstacle to your agency joining and using an information-sharing network?

Q3. Are there any issues involving why local law enforcement agencies might or might not join and use information-sharing networks that I missed in the survey or this phone interview that you would like to discuss? If so, please share your thoughts with me:

Tell me more about that.

I want to thank you for your participation. Only by asking local law enforcement executives to provide their opinions can we truly gain a better understanding of what local law enforcement agencies want to see happen on the issue of information sharing.

Thank you and have a good day.

APPENDIX D: OPEN-ENDED SURVEY RESPONSES

Open-ended responses to Question 30 (coded).

| | Coding | Existing Variable | New Variable | Multiple | Irrelevant | DNR | Freq Calc | Freq% |
|--------|--------|-------------------|--------------|----------|------------|-----|--------------|-------|
| ANON3 | 1 | Advantage | | | | | | |
| ANON1 | 1 | Advantage | | | | | | |
| ANON4 | 1 | Advantage | | | | | | |
| ANON5 | 1 | Advantage | | | | | | |
| ANON6 | 1 | Advantage | | | | | | |
| ANON7 | 1 | Advantage | | | | | | |
| ANON9 | 1 | Advantage | | | | | | |
| ANON10 | 1 | Advantage | | | | | | |
| ANON11 | 1 | Advantage | | | | | | |
| ANON12 | 1 | Advantage | | | | | | |
| ANON14 | 1 | Advantage | | | | | | |
| ANON15 | 1 | Advantage | | | | | | |
| CA001 | 1 | Advantage | | | | | | |
| CA004 | 1 | Advantage | | | | | | |
| CA005 | 1 | Advantage | | | | | | |
| CA008 | 1 | Advantage | | | | | | |
| CA011 | 1 | Advantage | | | | | | |
| CA017 | 1 | Advantage | | | | | | |
| CA020 | 1 | Advantage | | | | | | |
| CA021 | 1 | Advantage | | | | | | |
| CA028 | 1 | Advantage | | | | | | |
| CA029 | 1 | Advantage | | | | | | |
| CA034 | 1 | Advantage | | | | | | |
| CA036 | 1 | Advantage | | | | | | |
| CA037 | 1 | Advantage | | | | | | |
| CA039 | 1 | Advantage | | | | | | |
| CA041 | 1 | Advantage | | | | | | |
| CA042 | 1 | Advantage | | | | | | |
| CA043 | 1 | Advantage | | | | | | |
| CA044 | 1 | Advantage | | | | | | |
| CA049 | 1 | Advantage | | | | | | |
| CA051 | 1 | Advantage | | | | | | |
| CA053 | 1 | Advantage | | | | | | |
| CA058 | 1 | Advantage | | | | | | |
| CA059 | 1 | Advantage | | | | | | |
| CA060 | 1 | Advantage | | | | | | |
| CA065 | 1 | Advantage | | | | | | |
| CA066 | 1 | Advantage | | | | | | |
| CA074 | 1 | Advantage | | | | | | |
| CA078 | 1 | Advantage | | | | | | |
| CA080 | 1 | Advantage | | | | | | |
| CA082 | 1 | Advantage | | | | | | |
| CA090 | 1 | Advantage | | | | | | |

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| CA096 | 1 | Advantage |
| CA100 | 1 | Advantage |
| CA110 | 1 | Advantage |
| CA111 | 1 | Advantage |
| CA117 | 1 | Advantage |
| CA140 | 1 | Advantage |
| CA141 | 1 | Advantage |
| CA152 | 1 | Advantage |
| CA154 | 1 | Advantage |
| CA156 | 1 | Advantage |
| CA167 | 1 | Advantage |
| CA169 | 1 | Advantage |
| CA182 | 1 | Advantage |
| CA185 | 1 | Advantage |
| CA191 | 1 | Advantage |
| CA206 | 1 | Advantage |
| CA207 | 1 | Advantage |
| CA214 | 1 | Advantage |
| CA215 | 1 | Advantage |
| CA217 | 1 | Advantage |
| CA226 | 1 | Advantage |
| CA230 | 1 | Advantage |
| CA231 | 1 | Advantage |
| CA234 | 1 | Advantage |
| CA237 | 1 | Advantage |
| CA238 | 1 | Advantage |
| CA240 | 1 | Advantage |
| CA242 | 1 | Advantage |
| CA246 | 1 | Advantage |
| CA248 | 1 | Advantage |
| CA250 | 1 | Advantage |
| CA254 | 1 | Advantage |
| CA264 | 1 | Advantage |
| CA265 | 1 | Advantage |
| CA270 | 1 | Advantage |
| CA273 | 1 | Advantage |
| CA286 | 1 | Advantage |
| CA287 | 1 | Advantage |
| CA289 | 1 | Advantage |
| CA294 | 1 | Advantage |
| CA304 | 1 | Advantage |
| CA305 | 1 | Advantage |
| CA307 | 1 | Advantage |
| CA308 | 1 | Advantage |
| CA310 | 1 | Advantage |
| CA315 | 1 | Advantage |

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| CA316 | 1 | Advantage |
| CA319 | 1 | Advantage |
| CA328 | 1 | Advantage |
| CA332 | 1 | Advantage |
| CA334 | 1 | Advantage |
| CA337 | 1 | Advantage |
| CA341 | 1 | Advantage |
| CA344 | 1 | Advantage |
| CA349 | 1 | Advantage |
| CA350 | 1 | Advantage |
| CA362 | 1 | Advantage |
| CA367 | 1 | Advantage |
| CA379 | 1 | Advantage |
| CA386 | 1 | Advantage |
| CA388 | 1 | Advantage |
| GA001 | 1 | Advantage |
| GA002 | 1 | Advantage |
| GA003 | 1 | Advantage |
| GA004 | 1 | Advantage |
| GA013 | 1 | Advantage |
| GA015 | 1 | Advantage |
| GA017 | 1 | Advantage |
| GA019 | 1 | Advantage |
| GA021 | 1 | Advantage |
| GA024 | 1 | Advantage |
| GA036 | 1 | Advantage |
| GA040 | 1 | Advantage |
| GA042 | 1 | Advantage |
| GA054 | 1 | Advantage |
| GA058 | 1 | Advantage |
| GA063 | 1 | Advantage |
| GA064 | 1 | Advantage |
| GA065 | 1 | Advantage |
| GA069 | 1 | Advantage |
| GA079 | 1 | Advantage |
| GA080 | 1 | Advantage |
| GA082 | 1 | Advantage |
| GA083 | 1 | Advantage |
| GA086 | 1 | Advantage |
| GA089 | 1 | Advantage |
| GA092 | 1 | Advantage |
| GA100 | 1 | Advantage |
| GA105 | 1 | Advantage |
| GA109 | 1 | Advantage |
| GA124 | 1 | Advantage |
| GA130 | 1 | Advantage |

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| GA131 | 1 | Advantage |
| GA134 | 1 | Advantage |
| GA139 | 1 | Advantage |
| GA140 | 1 | Advantage |
| GA144 | 1 | Advantage |
| GA146 | 1 | Advantage |
| GA147 | 1 | Advantage |
| GA148 | 1 | Advantage |
| GA154 | 1 | Advantage |
| GA156 | 1 | Advantage |
| GA166 | 1 | Advantage |
| GA170 | 1 | Advantage |
| GA174 | 1 | Advantage |
| GA183 | 1 | Advantage |
| GA185 | 1 | Advantage |
| GA186 | 1 | Advantage |
| GA188 | 1 | Advantage |
| GA189 | 1 | Advantage |
| GA207 | 1 | Advantage |
| GA210 | 1 | Advantage |
| GA214 | 1 | Advantage |
| GA220 | 1 | Advantage |
| GA222 | 1 | Advantage |
| GA224 | 1 | Advantage |
| GA228 | 1 | Advantage |
| GA235 | 1 | Advantage |
| GA247 | 1 | Advantage |
| GA253 | 1 | Advantage |
| GA254 | 1 | Advantage |
| GA261 | 1 | Advantage |
| GA273 | 1 | Advantage |
| GA294 | 1 | Advantage |
| GA313 | 1 | Advantage |
| GA319 | 1 | Advantage |
| GA326 | 1 | Advantage |
| GA351 | 1 | Advantage |
| GA352 | 1 | Advantage |
| GA357 | 1 | Advantage |
| GA358 | 1 | Advantage |
| GA364 | 1 | Advantage |
| GA374 | 1 | Advantage |
| GA377 | 1 | Advantage |
| GA382 | 1 | Advantage |
| GA383 | 1 | Advantage |
| GA385 | 1 | Advantage |
| GA387 | 1 | Advantage |

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| GA388 | 1 | Advantage |
| GA396 | 1 | Advantage |
| GA400 | 1 | Advantage |
| GA403 | 1 | Advantage |
| NY003 | 1 | Advantage |
| NY008 | 1 | Advantage |
| NY011 | 1 | Advantage |
| NY021 | 1 | Advantage |
| NY023 | 1 | Advantage |
| NY024 | 1 | Advantage |
| NY028 | 1 | Advantage |
| NY031 | 1 | Advantage |
| NY032 | 1 | Advantage |
| NY041 | 1 | Advantage |
| NY048 | 1 | Advantage |
| NY053 | 1 | Advantage |
| NY056 | 1 | Advantage |
| NY061 | 1 | Advantage |
| NY064 | 1 | Advantage |
| NY065 | 1 | Advantage |
| NY066 | 1 | Advantage |
| NY074 | 1 | Advantage |
| NY078 | 1 | Advantage |
| NY086 | 1 | Advantage |
| NY087 | 1 | Advantage |
| NY091 | 1 | Advantage |
| NY095 | 1 | Advantage |
| NY098 | 1 | Advantage |
| NY099 | 1 | Advantage |
| NY101 | 1 | Advantage |
| NY104 | 1 | Advantage |
| NY109 | 1 | Advantage |
| NY110 | 1 | Advantage |
| NY112 | 1 | Advantage |
| NY119 | 1 | Advantage |
| NY122 | 1 | Advantage |
| NY126 | 1 | Advantage |
| NY128 | 1 | Advantage |
| NY129 | 1 | Advantage |
| NY135 | 1 | Advantage |
| NY137 | 1 | Advantage |
| NY139 | 1 | Advantage |
| NY149 | 1 | Advantage |
| NY151 | 1 | Advantage |
| NY159 | 1 | Advantage |
| NY161 | 1 | Advantage |

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| NY163 | 1 | Advantage |
| NY165 | 1 | Advantage |
| NY169 | 1 | Advantage |
| NY173 | 1 | Advantage |
| NY181 | 1 | Advantage |
| NY188 | 1 | Advantage |
| NY190 | 1 | Advantage |
| NY200 | 1 | Advantage |
| NY201 | 1 | Advantage |
| NY205 | 1 | Advantage |
| NY206 | 1 | Advantage |
| NY211 | 1 | Advantage |
| NY212 | 1 | Advantage |
| NY213 | 1 | Advantage |
| NY214 | 1 | Advantage |
| NY216 | 1 | Advantage |
| NY221 | 1 | Advantage |
| NY230 | 1 | Advantage |
| NY234 | 1 | Advantage |
| NY238 | 1 | Advantage |
| NY240 | 1 | Advantage |
| NY250 | 1 | Advantage |
| NY254 | 1 | Advantage |
| NY257 | 1 | Advantage |
| NY258 | 1 | Advantage |
| NY259 | 1 | Advantage |
| NY260 | 1 | Advantage |
| NY267 | 1 | Advantage |
| NY268 | 1 | Advantage |
| NY270 | 1 | Advantage |
| NY274 | 1 | Advantage |
| NY275 | 1 | Advantage |
| NY280 | 1 | Advantage |
| NY288 | 1 | Advantage |
| NY290 | 1 | Advantage |
| NY294 | 1 | Advantage |
| NY298 | 1 | Advantage |
| NY302 | 1 | Advantage |
| NY305 | 1 | Advantage |
| NY306 | 1 | Advantage |
| NY310 | 1 | Advantage |
| NY312 | 1 | Advantage |
| NY316 | 1 | Advantage |
| NY320 | 1 | Advantage |
| NY323 | 1 | Advantage |
| NY326 | 1 | Advantage |

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| NY329 | 1 | Advantage | | |
| NY331 | 1 | Advantage | | |
| NY332 | 1 | Advantage | | |
| NY339 | 1 | Advantage | | |
| NY343 | 1 | Advantage | | |
| NY354 | 1 | Advantage | | |
| NY357 | 1 | Advantage | | |
| NY361 | 1 | Advantage | | |
| NY362 | 1 | Advantage | | |
| NY363 | 1 | Advantage | | |
| NY364 | 1 | Advantage | | |
| NY369 | 1 | Advantage | | |
| NY370 | 1 | Advantage | | |
| NY378 | 1 | Advantage | | |
| NY383 | 1 | Advantage | | |
| NY384 | 1 | Advantage | | |
| NY388 | 1 | Advantage | | |
| NY390 | 1 | Advantage | | |
| NY391 | 1 | Advantage | | |
| NY392 | 1 | Advantage | | |
| NY399 | 1 | Advantage | | |
| | | | 296 / | |
| NY406 | 1 | Advantage | 383 | 77.28% |
| NY192 | 1 | Advantage | 1 / 383 | 0.26% |
| CA247 | 1 | Autonomy | 1 / 383 | 0.26% |
| CA306 | 1 | Leadership | 1 / 383 | 0.26% |
| GA328 | 1 | Trialability | 1 / 383 | 0.26% |
| CA178 | 1 | Trust | | |
| CA052 | 1 | Trust | | |
| CA351 | 1 | Trust | | |
| GA093 | 1 | Trust | | |
| GA129 | 1 | Trust | | |
| NY196 | 1 | Trust | 6 / 383 | 1.57% |
| CA153 | 2 | Cost | | |
| CA139 | 2 | Cost | | |
| ANON8 | 2 | Cost Effective | 3 / 383 | 0.78% |
| GA057 | 2 | Low-Cost | 1 / 383 | 0.26% |
| | | Make it | | |
| NY208 | 2 | mandatory | 1 / 383 | 0.26% |
| CA025 | 2 | Officer Safety | | |
| CA173 | 2 | Officer Safety | | |
| CA223 | 2 | Officer Safety | | |
| NY124 | 2 | Officer Safety | | |
| NY327 | 2 | Officer Safety | | |
| NY367 | 2 | Officer Safety | | |
| NY401 | 2 | Officer Safety | 7 / 383 | 1.83% |

| | | | | | |
|--------|---|--|----------------------------|---------|-------|
| GA018 | 2 | Quality & volume of data Single point of access countywide | | 1 / 383 | 0.26% |
| CA010 | 2 | | | 1 / 383 | 0.26% |
| GA051 | 3 | | Advantage & Trust | 1 / 383 | 0.26% |
| NY342 | 3 | | Advantage & Officer Safety | 1 / 383 | 0.26% |
| NY013 | 4 | | Keep up with trends | 1 / 383 | 0.26% |
| CA151 | 4 | | Pending | 1 / 383 | 0.26% |
| CA218 | 4 | | Standardization | 1 / 383 | 0.26% |
| NY012 | 4 | | Joint jurisdiction | 1 / 383 | 0.26% |
| ANON2 | 5 | | | DNR | |
| ANON13 | 5 | | | DNR | |
| CA009 | 5 | | | DNR | |
| CA018 | 5 | | | DNR | |
| CA031 | 5 | | | DNR | |
| CA040 | 5 | | | DNR | |
| CA174 | 5 | | | DNR | |
| CA193 | 5 | | | DNR | |
| CA194 | 5 | | | DNR | |
| CA241 | 5 | | | DNR | |
| CA244 | 5 | | | DNR | |
| CA256 | 5 | | | DNR | |
| CA258 | 5 | | | DNR | |
| CA313 | 5 | | | DNR | |
| CA314 | 5 | | | DNR | |
| CA340 | 5 | | | DNR | |
| CA359 | 5 | | | DNR | |
| CA369 | 5 | | | DNR | |
| CA381 | 5 | | | DNR | |
| GA023 | 5 | | | DNR | |
| GA032 | 5 | | | DNR | |
| GA055 | 5 | | | DNR | |
| GA075 | 5 | | | DNR | |
| GA076 | 5 | | | DNR | |
| GA098 | 5 | | | DNR | |
| GA106 | 5 | | | DNR | |
| GA108 | 5 | | | DNR | |
| GA119 | 5 | | | DNR | |
| GA133 | 5 | | | DNR | |
| GA151 | 5 | | | DNR | |
| GA164 | 5 | | | DNR | |

| | | | | |
|-------|---|-----|----------|--------|
| GA179 | 5 | DNR | | |
| GA190 | 5 | DNR | | |
| GA195 | 5 | DNR | | |
| GA223 | 5 | DNR | | |
| GA255 | 5 | DNR | | |
| GA279 | 5 | DNR | | |
| GA329 | 5 | DNR | | |
| GA350 | 5 | DNR | | |
| GA359 | 5 | DNR | | |
| GA362 | 5 | DNR | | |
| GA370 | 5 | DNR | | |
| GA393 | 5 | DNR | | |
| GA402 | 5 | DNR | | |
| NY007 | 5 | DNR | | |
| NY054 | 5 | DNR | | |
| NY057 | 5 | DNR | | |
| NY157 | 5 | DNR | | |
| NY189 | 5 | DNR | | |
| NY269 | 5 | DNR | | |
| NY314 | 5 | DNR | | |
| NY315 | 5 | DNR | | |
| NY321 | 5 | DNR | | |
| NY335 | 5 | DNR | | |
| NY371 | 5 | DNR | | |
| NY375 | 5 | DNR | | |
| NY402 | 5 | DNR | 57 / 383 | 14.88% |

Open-ended responses to Question 31(coded).

| | Coding | Existing Variable | New Variable | Multiple | Irrelevant | DNR | Freq Calc | Freq% |
|--------|--------|-------------------|-----------------------------|----------|------------|-----|-----------|-------|
| GA146 | 1 | Autonomy | | | | | | |
| CA100 | 1 | Autonomy | | | | | | |
| CA169 | 1 | Autonomy | | | | | | |
| CA173 | 1 | Autonomy | | | | | | |
| GA156 | 1 | Autonomy | | | | | | |
| NY011 | 1 | Autonomy | | | | | | |
| CA191 | 1 | Autonomy | | | | | 7 / 383 | 1.83% |
| ANON15 | 1 | Compatibility | | | | | | |
| CA264 | 1 | Compatibility | | | | | | |
| GA036 | 1 | Compatibility | | | | | | |
| NY378 | 1 | Compatibility | | | | | 4 / 383 | 1.04% |
| CA028 | 1 | Complexity | | | | | | |
| ANON3 | 1 | Complexity | | | | | | |
| GA279 | 1 | Complexity | | | | | | |
| NY028 | 1 | Complexity | | | | | | |
| NY157 | 1 | Complexity | | | | | 5 / 383 | 1.31% |
| CA111 | 1 | Triability | | | | | 1 / 383 | 0.26% |
| CA247 | 1 | Trust | | | | | | |
| CA306 | 1 | Trust | | | | | | |
| CA037 | 1 | Trust | | | | | | |
| GA032 | 1 | Trust | | | | | | |
| GA105 | 1 | Trust | | | | | | |
| NY110 | 1 | Trust | | | | | | |
| NY165 | 1 | Trust | | | | | 7 / 383 | 1.83% |
| NY056 | 2 | | Abuse of network | | | | 1 / 383 | 0.26% |
| CA156 | 2 | | Agency agreement | | | | 1 / 383 | 0.26% |
| CA217 | 2 | | Agency cooperation | | | | | |
| GA018 | 2 | | Agency cooperation | | | | 2 / 383 | 0.52% |
| NY169 | 2 | | Agency cooperation/politics | | | | 1 / 383 | 0.26% |
| CA193 | 2 | | Agency participation | | | | | |
| GA374 | 2 | | Agency participation | | | | | |
| NY061 | 2 | | Agency participation | | | | | |
| NY161 | 2 | | Agency participation | | | | | |
| NY188 | 2 | | Agency participation | | | | 5 / 383 | 1.31% |
| ANON8 | 2 | | Approval by council | | | | 1 / 383 | 0.26% |
| GA015 | 2 | | Bureaucracy | | | | 1 / 383 | 0.26% |

| | | | | |
|--------------|---|---------------------------------|----------|-------|
| CA004 | 2 | Connecting RMSes | | |
| CA066 | 2 | Connecting RMSes | | |
| CA074 | 2 | Connecting RMSes | | |
| CA110 | 2 | Connecting RMSes | | |
| CA117 | 2 | Connecting RMSes | | |
| CA152 | 2 | Connecting RMSes | | |
| CA286 | 2 | Connecting RMSes | | |
| CA294 | 2 | Connecting RMSes | | |
| CA307 | 2 | Connecting RMSes | | |
| CA337 | 2 | Connecting RMSes | | |
| GA079 | 2 | Connecting RMSes | | |
| GA147 | 2 | Connecting RMSes | | |
| GA154 | 2 | Connecting RMSes | | |
| NY065 | 2 | Connecting RMSes | 14 / 383 | 3.66% |
| | | Control - policies & procedures | | |
| CA025 | 2 | | 1 / 383 | 0.26% |
| ANON1 | 2 | Cost | | |
| ANON2 | 2 | Cost | | |
| GA051 | 2 | Cost | | |
| GA040 | 2 | Cost | | |
| GA130 | 2 | Cost | | |
| ANON4 | 2 | Cost | | |
| ANON7 | 2 | Cost | | |
| ANON9 | 2 | Cost | | |
| <u>CA008</u> | 2 | Cost | | |
| CA017 | 2 | Cost | | |
| CA018 | 2 | Cost | | |
| CA034 | 2 | Cost | | |
| CA036 | 2 | Cost | | |
| CA039 | 2 | Cost | | |
| CA059 | 2 | Cost | | |
| CA080 | 2 | Cost | | |
| CA090 | 2 | Cost | | |
| CA139 | 2 | Cost | | |
| CA141 | 2 | Cost | | |
| CA151 | 2 | Cost | | |
| CA206 | 2 | Cost | | |
| CA218 | 2 | Cost | | |
| CA223 | 2 | Cost | | |
| CA237 | 2 | Cost | | |
| CA242 | 2 | Cost | | |
| CA244 | 2 | Cost | | |
| CA246 | 2 | Cost | | |
| CA248 | 2 | Cost | | |
| CA250 | 2 | Cost | | |
| CA265 | 2 | Cost | | |

| | | |
|--------------|----------|-------------|
| CA270 | 2 | Cost |
| CA278 | 2 | Cost |
| CA287 | 2 | Cost |
| CA289 | 2 | Cost |
| CA304 | 2 | Cost |
| CA305 | 2 | Cost |
| CA308 | 2 | Cost |
| CA310 | 2 | Cost |
| CA316 | 2 | Cost |
| CA328 | 2 | Cost |
| CA332 | 2 | Cost |
| CA334 | 2 | Cost |
| CA340 | 2 | Cost |
| CA344 | 2 | Cost |
| CA379 | 2 | Cost |
| CA388 | 2 | Cost |
| GA003 | 2 | Cost |
| GA017 | 2 | Cost |
| GA054 | 2 | Cost |
| GA063 | 2 | Cost |
| GA064 | 2 | Cost |
| GA069 | 2 | Cost |
| GA076 | 2 | Cost |
| GA080 | 2 | Cost |
| GA082 | 2 | Cost |
| GA086 | 2 | Cost |
| GA089 | 2 | Cost |
| GA092 | 2 | Cost |
| GA109 | 2 | Cost |
| GA119 | 2 | Cost |
| GA124 | 2 | Cost |
| GA129 | 2 | Cost |
| GA131 | 2 | Cost |
| GA134 | 2 | Cost |
| GA144 | 2 | Cost |
| GA170 | 2 | Cost |
| GA183 | 2 | Cost |
| GA185 | 2 | Cost |
| GA188 | 2 | Cost |
| GA189 | 2 | Cost |
| GA222 | 2 | Cost |
| GA228 | 2 | Cost |
| GA235 | 2 | Cost |
| GA247 | 2 | Cost |
| <u>GA313</u> | <u>2</u> | <u>Cost</u> |
| GA319 | 2 | Cost |

| | | |
|--------------|---|------|
| GA326 | 2 | Cost |
| GA328 | 2 | Cost |
| GA351 | 2 | Cost |
| GA352 | 2 | Cost |
| GA357 | 2 | Cost |
| GA364 | 2 | Cost |
| GA370 | 2 | Cost |
| GA385 | 2 | Cost |
| GA396 | 2 | Cost |
| GA400 | 2 | Cost |
| NY003 | 2 | Cost |
| NY013 | 2 | Cost |
| NY024 | 2 | Cost |
| NY053 | 2 | Cost |
| NY078 | 2 | Cost |
| NY091 | 2 | Cost |
| NY095 | 2 | Cost |
| NY099 | 2 | Cost |
| NY101 | 2 | Cost |
| NY104 | 2 | Cost |
| NY119 | 2 | Cost |
| NY126 | 2 | Cost |
| NY128 | 2 | Cost |
| NY137 | 2 | Cost |
| NY139 | 2 | Cost |
| NY190 | 2 | Cost |
| NY196 | 2 | Cost |
| NY200 | 2 | Cost |
| NY205 | 2 | Cost |
| NY208 | 2 | Cost |
| NY212 | 2 | Cost |
| <u>NY213</u> | 2 | Cost |
| NY214 | 2 | Cost |
| NY257 | 2 | Cost |
| NY268 | 2 | Cost |
| NY290 | 2 | Cost |
| NY305 | 2 | Cost |
| NY316 | 2 | Cost |
| NY327 | 2 | Cost |
| NY329 | 2 | Cost |
| NY331 | 2 | Cost |
| NY339 | 2 | Cost |
| NY362 | 2 | Cost |
| NY367 | 2 | Cost |
| NY371 | 2 | Cost |
| NY384 | 2 | Cost |

| | | | | |
|--------|---|-------------------------------|-----------|--------|
| NY388 | 2 | Cost | | |
| NY401 | 2 | Cost | | |
| NY402 | 2 | Cost | | |
| CA042 | 2 | Cost | | |
| CA043 | 2 | Cost | | |
| CA049 | 2 | Cost | | |
| CA052 | 2 | Cost | 128 / 383 | 33.42% |
| CA041 | 2 | Cost and agency participation | | |
| CA053 | 2 | Cost and agency participation | 2 / 383 | 0.52% |
| CA058 | 2 | Cost and legal requirements | 1 / 383 | 0.26% |
| CA230 | 2 | Cost and politics | 1 / 383 | 0.26% |
| ANON12 | 2 | Cost and technology | 1 / 383 | 0.26% |
| NY258 | 2 | Data entry | 1 / 383 | 0.26% |
| CA167 | 2 | Data security | | |
| CA214 | 2 | Data security | | |
| CA215 | 2 | Data security | | |
| CA238 | 2 | Data security | | |
| CA315 | 2 | Data security | | |
| GA083 | 2 | Data security | | |
| GA108 | 2 | Data security | | |
| GA140 | 2 | Data security | | |
| GA387 | 2 | Data security | | |
| NY021 | 2 | Data security | | |
| NY098 | 2 | Data security | | |
| NY122 | 2 | Data security | | |
| NY129 | 2 | Data security | | |
| NY159 | 2 | Data security | | |
| NY192 | 2 | Data security | | |
| NY211 | 2 | Data security | | |
| NY288 | 2 | Data security | 17 / 383 | 4.44% |
| GA210 | 2 | Doesn't exist yet | 1 / 383 | 0.26% |
| GA220 | 2 | Egos | | |
| CA273 | 2 | Egos/turf battles | | |
| GA294 | 2 | Egos/turf battles | | |
| GA358 | 2 | Egos/turf battles | | |
| GA403 | 2 | Egos/turf battles | | |
| NY057 | 2 | Egos/turf battles | | |
| NY112 | 2 | Egos/turf battles | | |
| NY149 | 2 | Egos/turf battles | | |
| NY230 | 2 | Egos/turf battles | | |
| NY275 | 2 | Egos/turf battles | | |
| NY361 | 2 | Egos/turf battles | 117 / 383 | 2.87% |

| | | | | |
|--------|---|--------------------------------------|---------|-------|
| NY306 | 2 | Equipment infrastructure needs | | |
| NY173 | 2 | Equipment, lack of | 2 / 383 | 0.52% |
| NY302 | | Excessive restrictions | 1 / 383 | 0.26% |
| NY201 | | Fear of new technology | | |
| NY267 | | Fear of new technology | 2 / 383 | 0.52% |
| CA031 | | Having technology to do it | 1 / 383 | 0.26% |
| CA060 | | Implementation | 1 / 383 | 0.26% |
| CA231 | | Info overload/actionable data | 1 / 383 | 0.26% |
| NY354 | 2 | Information available | 1 / 383 | 0.26% |
| CA254 | 2 | IT issues | | |
| GA024 | 2 | IT issues | | |
| GA058 | 2 | IT issues | | |
| NY041 | 2 | IT issues | | |
| NY221 | 2 | IT issues | | |
| NY314 | 2 | IT issues | | |
| NY390 | 2 | IT issues | 7 / 383 | 1.83% |
| CA020 | 2 | Limited info entered into system | 1 / 383 | 0.26% |
| ANON14 | 2 | Manpower | 1 / 383 | 0.26% |
| CA011 | 2 | MOU difficulty | | |
| CA185 | 2 | MOU difficulty | 2 / 383 | 0.52% |
| NY357 | 2 | Need uniform policies | 1 / 383 | 0.26% |
| GA021 | 2 | Not getting the data you need | 1 / 383 | 0.26% |
| CA001 | 2 | Other agencies won't join | 1 / 383 | 0.26% |
| GA186 | 2 | Policies and legal issues | 1 / 383 | 0.26% |
| CA051 | 2 | Policies and procedures | 1 / 383 | 0.26% |
| NY399 | 2 | Political approvals | 1 / 383 | 0.26% |
| NY270 | 2 | Politics | 1 / 383 | 0.26% |
| CA226 | 2 | Privacy, legal issues, data security | 1 / 383 | 0.26% |
| NY343 | 2 | Recall of sealed cases | 1 / 383 | 0.26% |
| NY087 | 2 | System downtime | 1 / 383 | 0.26% |
| GA166 | 2 | Time for data entry | | |
| NY135 | 2 | Time for data entry | 2 / 383 | 0.52% |

| | | | | |
|--------------|---|---------------------------------------|----------|-------|
| CA182 | 2 | Time to implement | | |
| GA013 | 2 | Time to implement | | |
| GA139 | 2 | Time to implement | | |
| NY320 | 2 | Time to implement | 4 / 383 | 1.04% |
| CA044 | 2 | Training | | |
| CA078 | 2 | Training | | |
| CA153 | 2 | Training | | |
| CA349 | 2 | Training | | |
| CA362 | 2 | Training | | |
| GA214 | 2 | Training | | |
| <u>NY240</u> | 2 | Training | | |
| NY310 | 2 | Training | | |
| NY335 | 2 | Training | | |
| NY391 | 2 | Training | | |
| NY392 | 2 | Training | 11 / 383 | 2.87% |
| NY259 | 2 | Unlimited access to all info | 1 / 383 | 0.26% |
| CA065 | 2 | Use in patrol cars | 1 / 383 | 0.26% |
| CA082 | 2 | Vendor Issues | | |
| CA154 | 2 | Vendor Issues | | |
| CA240 | 2 | Vendor Issues | 3 / 383 | 0.78% |
| NY312 | 3 | Apathy and politics | 1 / 383 | 0.26% |
| CA319 | 3 | Autonomy and cost | | |
| NY406 | 3 | Autonomy and liability | 1 / 383 | 0.26% |
| NY048 | 3 | Compatibility and Picked Wrong System | 1 / 383 | 0.26% |
| GA057 | 3 | Connecting RMSes and Cost | | |
| CA314 | 3 | Connecting RMSes and Cost | | |
| CA341 | 3 | Connecting RMSes and Cost | 3 / 383 | 0.78% |
| CA350 | 3 | Connecting RMSes and data security | 1 / 383 | 0.26% |
| GA382 | 3 | Cost and agency cooperation | | |
| GA253 | 3 | Cost and agency cooperation | | |
| NY280 | 3 | Cost and agency cooperation | 3 / 383 | 0.78% |

| | | | | |
|--------------|---|---------------------------------------|---------|-------|
| CA140 | 3 | Cost and autonomy | 2 / 383 | 0.52% |
| CA207 | 3 | Cost and compatability | 1 / 383 | 0.26% |
| NY323 | 3 | Cost and connecting RMSes | 4 / 383 | 1.04% |
| NY370 | 3 | Cost and data security | 1 / 383 | 0.26% |
| NY151 | 3 | Cost and IT issues | 1 / 383 | 0.26% |
| NY274 | 3 | Cost and lack of access for sm. Depts | 1 / 383 | 0.26% |
| NY254 | 3 | Cost and lack of reliable network | 1 / 383 | 0.26% |
| GA329 | 3 | Cost and No electronic RMS | 1 / 383 | 0.26% |
| GA093 | 3 | Cost and overcoming old thinking | 1 / 383 | 0.26% |
| GA106 | 3 | Cost and technology | 1 / 383 | 0.26% |
| NY342 | 3 | Cost and training | 1 / 383 | 0.26% |
| GA065 | 3 | Cost and trust | | |
| <u>NY238</u> | 3 | Cost and trust | 2 / 383 | 0.52% |
| GA350 | 3 | Cost and vendor issues | 1 / 383 | 0.26% |
| NY074 | 3 | Cost, training and complexity | 1 / 383 | 0.26% |
| NY023 | 3 | Data security and turf/trust | 1 / 383 | 0.26% |
| CA234 | 3 | Governance models and cost | 1 / 383 | 0.26% |
| GA377 | 3 | Training and agency participation | | |
| NY326 | 3 | Training and agency participation | 2 / 383 | 0.52% |
| ANON10 | 3 | Training and cost | | |
| NY234 | 3 | Training and cost | | |
| NY216 | 3 | Training and cost | 3 / 383 | 0.78% |
| NY066 | 3 | Training and maintenance | | |
| NY181 | 3 | Training and maintenance | 1 / 383 | 0.26% |
| CA386 | 3 | Trust and data | 1 / 383 | 0.26% |

| | | security | | | |
|--------|---|----------------|---------------------------|---------|-------|
| | | Trust and turf | | | |
| | | battles | | | |
| NY363 | 3 | | | 1 / 383 | 0.26% |
| GA179 | 4 | | Paperwork | 1 / 383 | 0.26% |
| NY064 | 4 | | Mandated | 1 / 383 | 0.26% |
| ANON11 | 4 | | Grant | 1 / 383 | 0.26% |
| NY008 | 4 | | Feels agency too small | 1 / 383 | 0.26% |
| NY031 | 4 | | Long time to get it | 1 / 383 | 0.26% |
| NY369 | 5 | | | DNR | |
| NY332 | 5 | | | DNR | |
| ANON5 | 5 | | | DNR | |
| ANON6 | 5 | | | DNR | |
| ANON13 | 5 | | | DNR | |
| CA005 | 5 | | | DNR | |
| CA009 | 5 | | | DNR | |
| CA010 | 5 | | | DNR | |
| CA021 | 5 | | | DNR | |
| CA029 | 5 | | | DNR | |
| CA040 | 5 | | | DNR | |
| CA096 | 5 | | | DNR | |
| CA174 | 5 | | | DNR | |
| CA178 | 5 | | | DNR | |
| CA194 | 5 | | | DNR | |
| CA241 | 5 | | | DNR | |
| CA256 | 5 | | | DNR | |
| CA258 | 5 | | | DNR | |
| CA313 | 5 | | | DNR | |
| CA351 | 5 | | | DNR | |
| CA359 | 5 | | | DNR | |
| CA367 | 5 | | | DNR | |
| CA369 | 5 | | | DNR | |
| CA381 | 5 | | | DNR | |
| GA001 | 5 | | | DNR | |
| GA002 | 5 | | | DNR | |
| GA004 | 5 | | | DNR | |
| GA019 | 5 | | | DNR | |
| GA023 | 5 | | | DNR | |
| GA042 | 5 | | | DNR | |
| GA055 | 5 | | | DNR | |
| GA075 | 5 | | | DNR | |
| GA098 | 5 | | | DNR | |
| GA100 | 5 | | | DNR | |
| GA133 | 5 | | | DNR | |

| | | | | |
|--------------|---|-----|---------|--------|
| GA148 | 5 | DNR | | |
| GA151 | 5 | DNR | | |
| GA164 | 5 | DNR | | |
| GA174 | 5 | DNR | | |
| GA190 | 5 | DNR | | |
| GA195 | 5 | DNR | | |
| GA207 | 5 | DNR | | |
| GA223 | 5 | DNR | | |
| GA224 | 5 | DNR | | |
| GA254 | 5 | DNR | | |
| GA255 | 5 | DNR | | |
| GA261 | 5 | DNR | | |
| <u>GA273</u> | 5 | DNR | | |
| GA359 | 5 | DNR | | |
| GA362 | 5 | DNR | | |
| GA383 | 5 | DNR | | |
| GA388 | 5 | DNR | | |
| GA393 | 5 | DNR | | |
| GA402 | 5 | DNR | | |
| NY007 | 5 | DNR | | |
| NY012 | 5 | DNR | | |
| NY032 | 5 | DNR | | |
| NY054 | 5 | DNR | | |
| NY086 | 5 | DNR | | |
| NY109 | 5 | DNR | | |
| NY124 | 5 | DNR | | |
| NY163 | 5 | DNR | | |
| NY189 | 5 | DNR | | |
| NY206 | 5 | DNR | | |
| NY250 | 5 | DNR | | |
| NY260 | 5 | DNR | | |
| NY269 | 5 | DNR | | |
| NY294 | 5 | DNR | | |
| NY298 | 5 | DNR | | |
| NY321 | 5 | DNR | | |
| NY364 | 5 | DNR | | |
| NY375 | 5 | DNR | | |
| NY383 | 5 | DNR | | |
| NY315 | 5 | DNR | 7 / 383 | 19.06% |

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