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A Model for the Evaluation of IS/IT Investments

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by

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy
in
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We hereby certify that this dissertation, submitted by Paul M. Tuten, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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Evaluation is a vital—yet challenging—part of IS/IT management and governance. The benefits (or lack therefore) associated with IS/IT investments have been widely debated within academic and industrial communities alike. Investments in information technology *may* or *may not* result in desirable outcomes. Yet, organizations must rely on information systems to remain competitive. Effective evaluation serves as one pathway to ensuring success. However, despite a growing multitude of measures and methods, practitioners continue to struggle with this intractable problem.

Responding to the limited success of existing methods, scholars have argued that academicians should first develop a better understanding of the process of IS/IT evaluation. In addition, scholars have also posited that IS/IT evaluation practice should be tailored to fit a given organization's particular context. Of course, one cannot simply tell practitioners to "be contextual" when conducting evaluations and then hope for improved outcomes. Instead, having developed an improved understanding of the IS/IT evaluation process, researchers should articulate unambiguous guidelines to practitioners.

The researcher addressed this need using a multi-phase research methodology. To start, the researcher conducted a literature review to identify and describe the relevant contextual elements operating in the IS/IT evaluation process: the purpose of conducting the evaluation (*why*); the subject of the evaluation (*what*); the specific aspects to be evaluated (*which*); the particular evaluation methods and techniques used (*how*); the timing of the evaluation (*when*); the individuals involved in, or affected by, the evaluation (*who*); and the environmental conditions under which the organization operates (*where*). Based upon these findings, the researcher followed a modeling-as-theorizing approach to develop a conceptual model of IS/IT evaluation. Next, the conceptual model was validated by applying it to multiple case studies selected from the extant literature. Once validated, the researcher utilized the model to develop a series of methodological guidelines to aid organizations in conducting evaluations. The researcher summarized these guidelines in the form of a checklist for professional practitioners.

The researcher believes this holistic, conceptual model of IS/IT evaluation serves as an important step in advancing theory. In addition, the researcher's guidelines for conducting IS/IT evaluation based on organizational goals and conditions represents a significant contribution to industrial practice. Thus, the implications of this study come full circle: an improved understanding of evaluation should result in improved evaluation practices.

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Chapter 1

Introduction

In this dissertation, the researcher investigated information system (IS) and information technology (IT) evaluation approaches, methods, and techniques used in assessing an organization's IS/IT investments. This resulted in the design of a model to facilitate understanding and improve IS/IT investment outcomes. Recent studies have demonstrated the ability of IS/IT investments to provide positive economic and financial returns (Bharadwaj, Bharadwaj, & Konsynski, 1999; Willcocks & Lester, 1999; Anderson, Banker, & Hu, 2002; McAfee & Brynjolfsson, 2008). Yet, studies have also confirmed the deleterious effects of unsuccessful IS/IT initiatives: cost overruns, the inability to obtain desired benefits, and the partial or complete failure of organizations associated with implementing an unsuccessful project (Khalifa, Irani, & Baldwin, 2000). Evaluation helps to direct the actions taken by organizations (Lagsten & Goldkuhl, 2008). Thus, evaluation serves a vital role in assessing the benefits associated with IS/IT investments, as well as in avoiding the unwanted outcomes associated with failed IS/IT projects. Unfortunately, as asserted by Smithson and Hirschheim (1998, p. 171), IS/IT evaluation represents a "more necessary, and, yet, even more difficult" challenge that "clearly remains a thorny problem" to both researchers and practitioners.

Problem Statement

The problem investigated in this study was the complexity and difficulty faced by practitioners in evaluating investments in IS/IT. Since the introduction of computers, organizations have adopted information technology to add strategic value by mechanisms

such as improving operational efficiencies and creating competitive advantages (Porter & Millar, 1985; Chou, 2002; Bannister & Remenyi, 2005; McAfee & Brynjolfsson, 2008). Correspondingly, the widespread adoption of information technology has also significantly increased organizational expenditures on IS/IT, a well-established and continuing trend (Willcocks & Lester, 1999). Yet despite broad investment in information technology, researchers have questioned its organizational value (Strassman, 1997; Carr, 2004). During the 1980s and early 1990s, a number of economic studies failed to correlate increased IS/IT spending with overall increases in business productivity (Brynjolfsson, 1993). This phenomenon was dubbed the "IT productivity paradox" and is frequently cited in the literature (Brynjolfsson & Hitt, 1998; Willcocks & Lester, 1999; Renkenma, 2000; Anderson, Banker, & Hu, 2002). The productivity paradox, however, may have been over stated. Recent evidence has suggested that IS/IT investments do contribute to overall productivity improvements in aggregate terms across economies and industries, but the circumstances and extent to which these investments improve the performance of a given organization remain uncertain (Brynjolfsson & Hitt, 1998; Willcocks & Lester, 1999; Martinsons & Martinsons, 2002). Likewise, McAfee and Brynjolfsson (2008) also noted a correlation between the growth in IS/IT spending since the mid-1990s and increased competitiveness, especially in IT intensive industries.

What is clear is that the mainstream business and information technology press, as well as the academic literature, abound with numerous examples of successful and failed IS/IT projects. For instance, positive outcomes associated with IS/IT initiatives have been identified at American Airlines (Copeland & McKenny, 1988) and Wal-Mart (Venkatraman, 1999). Chou (2002) also cited the well-known successes of Baxter Healthcare, McKesson HBOC, and the Otis Elevator Company. Likewise, McAfee and

Brynjolfsson (2008) discussed the success of IT-enabled processes to improve customer satisfaction at CVS, one of the largest retail pharmacy operators in the United States of America. In contrast, numerous examples of failed IT projects also exist, such as those of the FoxMeyer Drug Corporation (Ehrhart, 2002), Boo.com (Malmsten, Portanger, & Drazin, 2001), and the London Ambulance Service (Hougham, 1996). Similarly, Spitze (2001) described a "major U.S.-based company" whose failure to implement successfully a global IT strategy cost the company, and more importantly its shareholders, a 50 percent decline in its stock price and market capitalization. Clearly, the empirical evidence demonstrates that organizations may obtain either positive or negative outcomes by undertaking IS/IT initiatives. This fact underscores the need for, as well as the importance of, effective IS/IT evaluation methods.

In response, the literature details numerous tools and techniques designed to address the need for effective IS/IT evaluation. As an example, Renkema (2000) identified over seventy such techniques. In general, evaluation methods may be classified as either traditional/positivist or alternative/interpretivist in their approach. Of these, traditional methods—commonly described as formal, overt, mechanistic, quantitative, and/or ritualistic—are by far the most common, both in number and frequency of application in practice (Hirschheim & Smithson, 1999; Walsham, 1999). According to Walsham, traditional evaluation methods also hold significant legitimacy with senior executives and business managers.

Yet, despite their widespread use, practitioners and researchers have noted several inadequacies with traditional evaluation tools and techniques (Willcocks, 1994; Hirschheim & Smithson, 1999). Moreover, these traditional methods, which are based on a rational/objective (i.e. "scientific) view of information systems, contravene the

prevailing contextualist wisdom that holds that information systems are, first and foremost, social systems in which the roles of social actors are vital (Hirschheim & Smithson; Walsham, 1999; Irani, Sharif, & Love, 2001). Recognizing this view, many researchers have argued that successful evaluation must be contextual—it must address the social and organizational aspects of evaluation and decision-making, as well as their effects on IT investment outcomes (Symons, 1990; Serafeimidis, 1997; Walsham, 1999). As a result, researchers have called for interpretive alternatives to traditional evaluation methods (Smithson & Hirschheim, 1998; Walsham, 1999; Serafeimidis & Smithson, 2000; Irani & Love, 2001; Jones, Hughes, Ferneley, & Berney, 2001; Serafeimidis, 2002).

Regardless of the merits of any particular approach, the literature clearly demonstrates researchers' concentrated efforts on developing evaluation methods, thereby providing a nearly continuous stream of new tools, techniques, and measures (Renkema, 2000). In response, Hirschheim and Smithson (1999) argued that by focusing on developing new means of evaluation, researchers have failed to concentrate on understanding the evaluation process itself. Moreover, as a result of this overemphasis, "much consternation and confusion over evaluation" continued to exist (Hirschheim & Smithson, p. 398). To remedy these circumstances, researchers should first focus on understanding the evaluation process and only then suggest means of evaluating based upon that new understanding.

In critically examining the field, scholars have also noted that IS/IT evaluation approaches need to be more sensitive to the contextual factors acting within and upon organizations (Symons, 1990; Serafeimidis, 1997; Walsham, 1999). In addition, the evaluation process should be able to adapt to a range of contingences and support

multiple evaluation criteria (Farbey, Land, & Targett, 1999; Serafeimidis, 2002; Costello, Sloane, and Moreton, 2007). Nevertheless, as stated by Hirschheim & Smithson (1999, p.398), an increased contextualist emphasis does not "suggest that a structured approach to evaluation is not feasible nor desirable." Not surprisingly, the need for a structured evaluation process is well supported by positivist-oriented researchers (Boloix & Robillard, 1995; Böckle, Hellwagner, Lepold, Sandweg, Schallenberger, Thurdt, et al., 1996). Yet, in their treatise on a post-modern approach to evaluation, Remenyi and Sherwood-Smith (1997) steadfastly maintained the need to approach evaluation in a systematic manner. However, these circumstances present a conundrum: how can researchers create contextually sensitive evaluation methodologies while simultaneously providing practitioners with enough methodological guidance for conducting their evaluations?

Goal

In this study, the researcher's goal was to investigate IS/IT evaluation, including its approaches, techniques, and methods, as well as their application within organizations, and to develop a conceptual model that will offer guidelines for organizations to employ contextually-sensitive evaluation methods. The researcher expects that the conceptual model will facilitate a better understanding of the IS/IT evaluation process and serve as a template for developing guidelines for context-based IS/IT evaluation. Following Renkema (2000), the researcher drew important distinctions between a *model*, *methodology*, and *method*. In this context, a *model* represents an abstract depiction of the IS/IT evaluation process. From this model, the researcher derived a *methodology*: a generalized set of guidelines for designing an organizationally-specific, and therefore contextually-sensitive, evaluation method (Renkema). Finally, a *method* provides a

"systematic process of identifying, appraising, selecting and controlling" IS/IT investments (Renkema, p. 216). At this point, it is important to draw a distinction between a *model* and a *theory*. According to Whetten (2002, p. 46), a *theory* "is best conceived of as the answer to questions of why." In other words, a *theory* presents causal relationships among propositions, as in the addition of *A* results in *B*. In contrast, a conceptual model—which can serve as an important step toward theory development—presents relationships between concepts in a descriptive rather than explanatory manner. Therefore, a conceptual model may represent a contribution to theory, but it is not a theory in and of itself.

To accomplish the goal of developing a conceptual model of IS/IT evaluation, the researcher comprehensively investigated the relevant literature. In particular, the researcher paid attention to existing evaluation approaches, techniques, and methods, as well as theoretical and empirical research that provided an understanding of the application of evaluation techniques and measures within organizations. The researcher also identified, described, and critiqued existing conceptual models and frameworks of IS/IT evaluation, classifying important components and identifying overlooked elements.

In addition, given the objectives for this study, the researcher investigated the literature on building and testing theoretical contributions, especially conceptual models and frameworks. By describing an existing or future world state, models facilitate understanding. Moreover, graphical modeling provides a means of developing complete and systematic conceptualizations (Whetten, 2002). As a result, Whetten described models as being particularly well-suited to developing new explanations and improving long-standing theories. Accordingly, the researcher focused on the literature related to modeling, including graphical modeling logic, notations, and conventions.

To assess the conceptual model developed in this study, the researcher employed a multiple-case study methodology, using Willcocks and Margetts' (1994) research design as a heuristic. In doing so, the researcher purposefully selected case studies from the literature to use in testing the conceptual model. To improve the precision and stability of the findings and enhance the validity of the model, the researcher analyzed five case studies.

Once validated, the researcher utilized the conceptual model of the IS/IT evaluation process, along with a cross-case analysis of the subject cases in this study, to develop a series of practice-oriented guidelines. In turn, these guidelines may be applied in organizations to conduct evaluations using contextually-appropriate methods. As previously stated, the researcher concentrated on the development of the conceptual model, as well as its validation by applying it to existing, published case studies. However, as an exploratory study, the researcher did not empirically apply the methodological framework as part of the scope of this dissertation. Instead, the application of the model's guidelines will contribute to a future stream of research.

Hypotheses, Research Questions & Assumptions

In approaching this topic, the researcher developed a series of hypotheses and supporting research questions. In addition, the researcher created a list of underlying assumptions that has guided the approach toward this study. These considerations are described in the following sections.

Hypotheses & Research Questions

H1. Existing models of IS/IT evaluation are inadequate because they fail to include all of the relevant constructs: the purpose of conducting the evaluation (*why*); the subject of the evaluation (*what*); the specific aspects to be evaluated (*which*); the particular evaluation methods and techniques used (*how*); the timing of the evaluation (*when*); the individuals involved in, or affected by, the

evaluation (*who*); and the external and internal environmental conditions under which the organization operates (*where*).

Q1. What models of the IS/IT evaluation process are presented in the literature?

Q2. How do the constructs (identified in H1) relate to the process of IS/IT evaluation?

H2. An improved conceptual model of IS/IT evaluation provides an effective tool for describing and analyzing evaluation practices.

Q3. Is the researcher's conceptual model valid for describing IS/IT evaluation practices?

Q4. What guidelines may be derived from using the researcher's conceptual model as an analytical tool to existing IS/IT evaluation case studies?

Assumptions

A1. Putting aside philosophical and epistemological arguments about the "true" nature of reality (a source of the positivist / interpretivist dualism in IS evaluation scholarship), the researcher assumes that individuals' *perceptions* or *interpretations* of reality drive their actions.

A2. The researcher believes that the conceptual model of IS/IT evaluation should be non-normative: it should be able to describe equally well the activities of individuals regardless of the correctness or merit of their actions.

A3. Despite the need for contextual appropriateness in IS/IT evaluation, the researcher assumes that practitioners also require a sufficient degree of methodological guidance in order to "get-the-job-done" effectively.

Relevance & Significance

The researcher believes that the results of this study are significant to the IS discipline by advancing knowledge and improving professional practice related to IS/IT evaluation. Specifically, the researcher developed a conceptual model of the IS/IT evaluation process, thereby extending the work of researchers who applied Pettigrew's (1985) contextualist framework to IS/IT evaluation (Symons, 1990; Willcocks & Margetts,

1996; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Klecun & Cornford, 2003). In doing so, the researcher directly addressed the important epistemological issue identified by Hirschheim and Smithson (1999): the need for a better understanding of the evaluation process itself. In addition to the theoretical contributions of this study, the researcher's conceptual model of IS/IT evaluation was utilized to develop guidelines for devising and/or selecting contextually-appropriate evaluation methods within specific organizations. All told, the researcher thinks that the outputs of this study have the potential to advance academic theory and improve professional practice.

The researcher believes that one of the most significant contributions from this study is to the advancement IS/IT evaluation theory, thereby helping to inform subsequent research. To date, numerous IS/IT evaluation methods and techniques have been developed (Renkema & Berghout, 1997). Yet, few generalized prescriptions for applying these methods are available (Renkema & Berghout), and those that are available are limited in applicability (e.g., Farbey, Land, & Targett, 1999). Scholars have argued that by overemphasizing the creation of methods while failing to adequately understand the process of evaluation, researchers have done little to ameliorate the "consternation and confusion over evaluation" (Hirschheim & Smithson, 1999, p. 398). Moreover, Hirschheim and Smithson argued that "scientific" approaches alone are insufficient in attempting to understand the highly subjective process of evaluation, especially given the socio-political dimensions of the process. Remenyi and Sherwood-Smith (1997) also argued for moving beyond modernism's scientific method; instead, they proffered a post-modern approach to evaluation, based on a more integrated, contextual, and holistic view of reality.

Many scholars have recognized the importance of individual and/or organizational context to effective IS/IT evaluation (Symons, 1990; Remenyi & Sherwood-Smith, 1997; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Walsham, 1999; Jones & Hughes, 2000; Irani & Love, 2001; Klecun & Cornford, 2003). Serafeimidis (pp. 20-21) summarized this by arguing that "IS evaluation is not a passive or independent organizational entity... it is highly influenced by the conditions around it, as well as highly impacting its organizational surroundings." To date, much of the discussion of context in the literature has been based upon Pettigrew's (1985) contextualist framework of content, context and process (CCP), which was applied to the domain of IS/IT evaluation by Symons. Yet, the discipline's application of Pettigrew's framework has either explicitly or implicitly overlooked significant contextual elements associated with evaluation. Given these circumstances, the researcher maintains that this study offers a significant contribution to the body of knowledge as it will extend the work of prior scholars by providing a more holistic, integrated, and complete conceptual model of the process of IS/IT evaluation.

In addition to developing a conceptual model to further understanding and inform future inquiry, the researcher proposed a number of guidelines to assist organizations in developing evaluation methods appropriate for their unique context. In terms of industrial practice, while some have suggested that IS academic research need not be directly relevant to practitioners (Kock et al., 2002), the researcher rejected this view in the case of evaluation, because it demands real-world applicability as its *raison d'être*. Moody (2000) described information systems as an applied discipline, as opposed to a pure discipline, because of its focus on the application of IT in practice. In discussing applied disciplines, Phillips (1998) identified two primary objectives for such fields: to

increase knowledge and improve practice. For this reason, the researcher also justified the significance of this study based upon its potential contribution to the advancement of practitioner knowledge and practice. Indeed, in this study, the researcher produced an artifact directly applicable to practitioners: a series of guidelines for developing evaluation methods based upon a given organizational and technical context.

The researcher believes that this approach could improve IS/IT investment evaluation practice for a number of reasons. First, the guidelines are based upon a validated conceptual model of the evaluation process. Second, numerous researchers have demonstrated the efficacy and viability of structured (i.e., model-driven) approaches to IS/IT evaluation in a variety of technical and organizational contexts: software systems (Boloix & Robillard, 1995), computer systems (Böckle et al., 1996), and e-commerce enabled business process reengineering (Tatsiopoulos, Panayiotou, & Ponis, 2002; Pather, Remenyi, & de la Harpe, 2006). Indeed, even scholars that have called for post-modern or interpretive methods recognize the need for providing practitioners with structured methodologies (Remenyi & Sherwood-Smith, 1997; Hirschheim & Smithson, 1999). Third and finally, the IS/IT evaluation literature reflected a clear need for methodological approaches that provide contingencies for addressing a range of technical and organizational variables (Farbey, Land, & Targett, 1999; Serafeimidis, 2002).

Barriers and Issues

The researcher recognized that a number of potential barriers and issues—some philosophical, others more pragmatic—needed to be addressed in this study. Specifically, the researcher identified the following barriers and issues:

- Philosophical challenges inherent in conceptual modeling

- Philosophical and practical difficulties associated with assessing theoretical contributions
- The intractable challenges inherent in IS/IT evaluation
- The conundrum of balancing contextual-sensitivity with sufficient methodological guidance
- The potential lack of industrial awareness and use by practitioners

Philosophical Challenges in Conceptual Modeling

Underlying philosophical assumptions and beliefs influence the selection of modeling methods, as well as the selection of modeling languages and notational schemes. Frank (1999) identified two epistemological challenges faced by scholars in developing conceptual models. First, Frank noted the difficulty associated with assessing a model's quality. For example, models that represent the current "state of the world" may be assessed against the perception of key stakeholders; however, this validation method becomes less viable when the model attempts to address non-observable states (such as future events). Second, Frank discussed the criticality of examining modeling languages (including notational schemes) in order to ensure model quality. Unfortunately, modelers face many difficulties in attempting to evaluate modeling languages and notational schemes as a result of their being "trapped in a network of language, patterns of thought and action" that they cannot fully transcend (Frank, p. 696). Finally, Frank argued that models are often introduced and accepted into a discipline without a critical review by others in the field, possibly as a result of poorly defined quality standards for both model building techniques and the models themselves.

Philosophical and Practical Challenges in Assessing Theoretical Contributions

Related to the prior discussion, the literature also demonstrated the difficulties associated with assessing theoretical contributions. Given that the researcher's goal in

this study was to provide a conceptual model (a form of theoretical contribution), the issue of theory assessment must come to the forefront. Whetten (2002) argued that theoretical contributions must be both *practical* and *good*. Yet, many so-called "contributions" are *neither* good *nor* practical. Moreover, poor theoretical contributions are often dysfunctional, if not blatantly detrimental. Unfortunately, assessing the validity of such a contribution is both "difficult and nebulous" with no "cookbook approach" to accomplishing the task (Webster & Watson, 2002). As a result, the researcher needed to carefully select an appropriate method for testing the conceptual model in this study.

Challenges in IS/IT Evaluation

Information systems and information technology are complex, dynamic, uncertain, and contextually rich entities. Unfortunately, these characteristics make IS/IT evaluation, in the words of Smithson and Hirschheim (1998, p. 171), "a thorny problem" and difficult task. In one study, Ballantine, Galliers, and Stray (1999) highlighted a number of challenges encountered in conducting evaluations, which they grouped into three categories: information requirement, knowledge related, and organizational problems. Information requirement problems reported by a percentage of the respondents included challenges in quantifying relevant benefits (81%), identifying relevant benefits (65%), quantifying relevant opportunity costs (36%), identifying opportunity costs (35%), identifying relevant costs (31%), and quantifying relevant costs (27%). Important knowledge related problems included difficulty in interpreting results (17%) and unfamiliarity with project evaluation techniques (12%). Likewise, organizational problems included lack of time (37%), lack of data/information (19%), and lack of interest (15%). Additional challenges identified in the literature include: the management and calculation of uncertainty/risk (Willcocks & Margetts, 1994), the alignment of IS/IT

strategy and business objectives (Venkatraman, 1999), and the divergent views of disparate stakeholders (Hirschheim & Smithson, 1999; Serafeimidis & Smithson, 1999). Complicating matters further, evaluations must be conducted against the backdrop of a continuously changing landscape of technology. While the aforementioned list of obstacles is not—nor was it intended to be—comprehensive, it nevertheless provides an understanding of the difficulties faced by both IS/IT evaluation researchers and practitioners.

Overcoming the Contextual / Prescriptive Paradox

The researcher's goal of developing contextually-sensitive, yet prescriptively-sufficient, guidelines for conducting evaluations represented a difficult conundrum. On the one hand, many scholars have highlighted the importance of addressing organizational, individual, and technical contexts in order to effectively evaluate IS/IT (Symons, 1990; Remenyi & Sherwood-Smith, 1997; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Walsham, 1999; Jones & Hughes, 2000; Irani & Love, 2001; Klecun & Cornford, 2003). On the other hand, researchers have also called for structured evaluations, having recognized practitioners' needs for methodological guidance (Boloix & Robillard, 1995; Böckle et al., 1996; Remenyi & Sherwood-Smith, 1997; Hirschheim & Smithson, 1999). Unfortunately, balancing both demands is problematic. Clearly, it is insufficient to simply tell practitioners to be more mindful of their organizational context. At the same time, explicitly defining which aspects of an IS/IT project should be evaluated—as most methods do—diminishes the ability of a method to address an organization's unique context. Therefore, to meaningfully advance evaluation practice in this study, the researcher had to overcome the paradox of how to simultaneously provide sufficient methodological guidance while ensuring robust contextual sensitivity.

Industrial Awareness and Use

As previously discussed, a litany of evaluation methods, measures, and approaches exist (Renkema, 2000). In addition, researchers have noted that these formal evaluation procedures frequently fail to be undertaken with rigor (Willcocks & Lester, 1999) and are completely avoided by practitioners in many cases (Jones & Hughes, 2000). Lech (2007) noted that practitioners do not generally read academic journals or attend academic conferences. Scholars have recognized this limitation and called for more "ready-to-use" evaluation approaches (Lech, 2005; Videira & Rupino da Cunha, 2005). Given these circumstances, the researcher recognizes that the effect of this project on industrial practice—even if it provides a "better" understanding or means of evaluation—may be limited. While this does not represent a barrier to this study *per se*, it underscores the need for closer academic/industrial collaboration, as well as the demand for a persuasive appeal that emphasizes the importance of evaluation in ensuring IS/IT project success.

Limitations / Delimitations of Study

Recognizing that all scholarly pursuits are constrained to some degree, the researcher has identified a number of limitations and delimitations associated with this research project. In specific terms, the limitations of this study primarily arise from the researcher's methodological decisions. This project rests heavily upon the domain's literature base (whether for developing the conceptual model or analyzing it based upon multiple published case studies). Of course, the researcher cannot control the amount nor quality of this literature. Therefore, the extant literature confines the outcomes of this study. Aside from this practical limitation, the researcher also recognizes that the research methodology in this study imposes certain theoretical limitations as well. Specifically, the conceptual model and guidelines are based upon simplified abstractions of more complex

realities. Thus, while the findings are valid in the context of this study, the model or guidelines may not adequately address or explain a particular alternative situation. Indeed, as noted by Yin (2003), caution should always be exercised in attempting to generalize the findings associated with research based upon case studies.

This dissertation also has a number of delimitations associated with it. As it is primarily a theoretical contribution, the primary delimiting factor is the conscientiousness and skill of the researcher, who must ensure the quality and comprehensiveness of each phase of the study. In addition, the study is also delimited by the choices made by the researcher. For example, the selection of published case studies used in validating the conceptual model in this study could greatly have influenced the outcome of the study. Therefore, the researcher was cautious in making decisions and carefully explicated the process and rationale for reaching such conclusions.

Resource Requirements

The researcher identified a number of significant resources required for the successful completion of this study. First, due to the conceptual and theoretical nature of this study, the researcher required an extensive array of informational resources: books, journal articles, conference presentations, conference proceedings, and Internet-based resources. In addition, the researcher made significant use of the library facilities at Nova Southeastern University, including its electronic library, online journal databases, and distance-education document delivery services. In addition, the researcher made limited use of the library facilities available at the University of South Florida. Second, as an integral part of the study, the researcher developed a conceptual model of the IS/IT evaluation, focusing especially on the contextual factors of the process. In doing so, the researcher relied heavily on the body of literature, particularly reviewing existing

theoretical models and frameworks of the evaluation process. Moreover, to validate initially the nascent conceptual model, the researcher utilized existing case studies found in the literature as part of the testing process. Third and finally, the researcher found that the study demanded a significant number of work-hours to complete as a result of the iterative and rigorous process associated with building and testing a new theoretical contribution, namely the conceptual model of the IS/IT evaluation process.

Summary

In this introduction, the researcher has identified the importance of, as well as challenges associated with, IS/IT investment evaluation. Despite a growing multitude of evaluation measures and methods, practitioners continue to struggle with this intractable challenge. Some scholars have argued that a workable means forward requires a better understanding of the process of IS/IT evaluation. In addition, IS/IT evaluation practice should be tailored to fit an organization's specific context. Of course, one cannot simply tell practitioners to "be more contextually sensitive" when conducting evaluations. Instead, scholars should provide unambiguous methodologies to practitioners based upon an improved understanding of the IS/IT evaluation process.

To address this challenge, the researcher employed a multiphase research process. To begin, the researcher will conduct a comprehensive literature review. Based upon these findings, the researcher developed a conceptual model of the IS/IT evaluation process, using Whetten's (2002) "modeling-as-theorizing" approach. The model was then validated by applying it to multiple case studies identified in the literature. Once validated, the researcher utilized the model to develop a series of guidelines to aid organizations in conducting context-based evaluations. Overall, the following goals served as the foundation for this research:

1. To investigate existing IS/IT evaluation measures, techniques, and methods.

2. To investigate existing conceptual models of IS/IT evaluation, focusing on the contextual elements (both included and excluded), as well as on the relationship between the identified contextual elements in each model.

3. To develop a comprehensive conceptual model of the IS/IT evaluation process.

4. To develop a series of guidelines based upon the conceptual model that aid organizations in conducting context-based evaluations.

In addressing these goals, the researcher believes that the development of a conceptual model of the IS/IT evaluation process advances theory. Moreover, the researcher utilized the conceptual model to provide guidelines by which organizations can develop evaluation methods based on their unique technical and organizational context. In having done so, the implications of this study should come full circle: an improved understanding of evaluation ought to yield improved evaluation practices.

Definition of Terms

Analytical induction. A process in which the researcher seeks evidence to challenge or refine their emergent theories (Harrison, 2002).

Benefit. A term used to describe an advantage, good, or positive outcome obtained by an individual or organization (Willcocks, 1994).

Bounded Rationality. A view that agents (individuals) act in only partly rational ways or make sub-optimal decisions due to resource constraints and limitations in gathering/processing information and solving complex problems (Simon, 1982).

Cost. A term used to describe the amount or equivalent paid or exchanged for something.

***Ex ante*.** A term that refers to predictive evaluation of IS/IT prior to implementation. (Serafeimidis, 1997).

***Ex post*.** A term that refers to the evaluation of IS/IT after it has been implemented (Serafeimidis, 1997).

Formative evaluation. Iterative, ongoing assessments that occur throughout a process in order to guide decisions and provide an opportunity for individual or organizational learning (Remenyi & Sherwood-Smith, 1997).

Interpretivism. A philosophical approach based on the belief that reality (knowledge) arises from socially constructed meanings and thus human experience is rooted in the perception of actions and situations rather than on direct sensory experience (Meredith, Raturi, Amoako-Gympah, & Kaplan, 1989).

IS/IT investment evaluation. A process by which information systems and information technology investments are appraised or assessed to determine their value. In most cases, "investment" implies *ex ante* evaluation; however, IS/IT investments may also be evaluated *ex post* (Serafeimidis, 1997).

IT Productivity Paradox. A term used to describe the seeming lack of information technology's ability to improve economic productivity (Brynjolfsson, 1993).

Model. An abstract depiction / representation of an artifact, event, or process. By describing an existing or future world state, models facilitate understanding. Moreover, graphical modeling provide a means of depicting complete and systematic conceptualizations (Remenyi & Sherwood-Smith 1997, p. 251; Whetten, 2002).

Modernism. An epistemological view that holds "that science provides a knowledge of reality which is exact and efficient and relevant to life in a modern society" (Remenyi & Sherwood-Smith 1997, p. 251).

Method. In the case of this study, a "systematic process of identifying, appraising, selecting and controlling" IS/IT investments (Renkema, 2000 p. 216).

Methodology. In the case of this study, a generalized set of guidelines for designing an organizationally-specific, and therefore contextually-sensitive, evaluation method (Renkema, 2000).

Positivism. A philosophical approach based on the belief that reality (knowledge) comes from the direct sensory experience of objective facts, primarily through the rigorous application of scientific methods (Meredith, Raturi, Amoako-Gympah, & Kaplan, 1989).

Post-modernism. An epistemological view that holds that no single reality exists. Therefore, knowledge may not be universally reliable or permanent, but rather that knowledge is based upon and open to human interpretation" (Remenyi & Sherwood-Smith, 1997).

Summative evaluation. These assessments typically occur at the completion of an activity or event in order to review its outcomes for conceptual, instrumental, or persuasive purposes (Remenyi & Sherwood-Smith, 1997).

Theory. A series of statements or representations that answer "questions of why" by presenting causal relationships among propositions. Moreover, theories go beyond description to explain why acts or outcomes occur (Whetten, 2002, p. 46).

Chapter 2

Literature Review

In this literature review, the researcher explored IS/IT evaluation by examining the underlying assumptions, professional practices, and ongoing concerns of both academicians and practitioners. To do so, IS/IT evaluation was deconstructed into a multitude of contextual elements. Each of these elements was considered separately and then in relation to each other. Next, the researcher identified themes that span this diverse body of literature in order to draw tentative conclusions about the current state-of-the-art. Overall, the researcher demonstrated that the contextual elements of IS/IT evaluation must be better understood in order to advance the field's efficacy and relevance. In the end, this improved understanding should take the form of a conceptual model of IS/IT evaluation, which may be utilized for both descriptive and normative purposes.

Defining IS/IT Evaluation

A clear definition of IS/IT evaluation offers an obvious, yet nonetheless important, departure point for exploring this topic. To begin, a distinction between information systems and information technology should be acknowledged. According to Willcocks (1994), information technology (IT) refers to an organization's hardware, software, and related infrastructure. As a broader concept, information systems (IS) refer to the design of information flows that attempt to meet an organization's informational needs. In theory, information systems may or may not be primarily based on information technology (Willcocks). In practice, however, most information systems—especially those subjected to a formal evaluation process—contain some (often significant)

information technology element. Therefore, for the purpose of this study, the researcher generally used the terms interchangeably and noted any particular instances in which a distinction between the concepts was germane.

With regard to evaluation, Remenyi and Sherwood-Smith's (1997, p. 46) definition was utilized for the purpose of this study:

> *Evaluation is a series of activities incorporating understanding, measurement and assessment. It is either a conscious or tacit process which aims to establish the value of or the contribution made by a particular situation. It can also relate to the determination of worth of an object.*

The researcher selected this definition because it is both holistic and comprehensive in its scope, while remaining consistent with other definitions found in the literature (Symons, 1990; Willcocks, 1994; Serafeimidis, 1997; Hirschheim & Smithson, 1999, Serafeimidis, 2002).

Combining these definitions, IS/IT evaluation may be understood as a process for judging worth that is carried out by one or more individuals in a particular organization, with a particular objective, at a particular phase during a system's life cycle, using one or more particular methods (Serafeimidis, 1997). This understanding may be fragmented by identifying a number of separate, yet interrelated, contextual elements that are determined based upon the circumstances of a particular situation. Brown (2005, p. 174) supported this view by noting that evaluation involves "several element, all of which must complement each other if the exercise is to be a success." According to Serafeimidis (p.25), these elements include:

- Purpose/reasons → *Why?*
- The subject → *What?*
- Criteria/measurement → *Which aspects?*

- Time frame → *When?*
- People → *Who?*
- Methodologies/tools → *How?*

While nearly comprehensive, Serafeimidis' conceptualization overlooked an important contextual element: *where*. Evaluations are conducted in the context of particular organizational operating units or departments, within specific organizations, operating under industry sector and competitive conditions, as well as broader economic forces. In light of these contextual influences, the following contextual element should also be included:

- The locus of evaluation → *Where?*

Taken together, the contextual elements of evaluation serve two important functions. First, they provide a means of categorizing, analyzing, and critiquing existing evaluation methods and techniques. Second, they provide a means of understanding, describing, and modeling the process of IS/IT evaluation, as well as comparing and critiquing existing models and frameworks of the process.

Why: The Purpose of Evaluation

Within organizations, situations arise that necessitate the evaluation of new solutions or the assessment of existing ones. The impetus for conducting an evaluation may be as varied as that which is evaluated, from a change in a firm's strategic direction to the enactment of governmental regulations. Nonetheless, as described in the prior definition of evaluation, the activity is undertaken to accomplish a "particular objective" in the context of a specific situation (Serafeimidis, 1997). Such situations, however, both define and are defined by a myriad of other contextual elements. Therefore, the objective of the

evaluation exercise—the very reason for undertaking the endeavor—is inextricably bound to a series of contextual factors.

In broad terms, four contextual elements define the underlying situation: *what* is to be evaluated, *when* the evaluation is to be conducted, *who* should be included and excluded from the evaluation process, and *where* the evaluation is to take place (i.e., extra- and intra-organizational conditions). The development of a new technology (*what*), the conclusion of a project (*when*), the arrival of a new manager (*who*), or the change of governmental regulations effecting an industry (*where*) all exemplify situations that may precipitate the need for conducting a formal evaluation. Typically, a confluence of these contextual elements will beget the situation that calls for an evaluation. For example, the Health Insurance Portability and Accountability Act of 1996 (HIPAA) has imposed a number of demands on the health care industry in the United States (Novak, 2003). As part of the effort to ensure compliance with HIPAA regulations, IS departments in health care organizations were forced to evaluate their existing infrastructure and processes. Moreover, these evaluations (and any needed modifications) had to be completed on a prescribed timeline in order to ensure compliance by a specific date set forth in the legislation (Novak). This example underscores the interrelated nature of the contextual elements that comprise organizational situations. Having established an appreciation of the interrelatedness of these elements, subsequent sections explore each of the elements individually before returning to a discussion of the role of their interplay in defining the methods and criteria for conducting evaluations in particular contexts.

Where: Extra- and Intra-Organizational Environmental Conditions

Information systems are embedded within organizations that are, in turn, embedded within an external environment (industries, markets, economies, etc.). The evaluation of

information systems, therefore, is inextricably linked to organizational and environmental conditions, because an evaluation is undertaken at a specific moment in time in which particular environmental conditions exist both within and outside of an organization (Myers, Kappelman, & Prybutok, 1997). For the purpose of this study, the researcher distinguished between the *macro* and *micro* contexts of an evaluation. Contextual elements specific to a given evaluation (*who* and *what*) comprise its *micro context*. In contrast, the researcher defined the *macro context* (*where*) of an evaluation as the environmental conditions that transcend the specific subject of evaluation. Prior researchers have identified two broad categories of environmental conditions (that comprise the *macro context*): external and organizational (Ives, Hamilton, & Davis, 1980; DeLone & McLean, 1992; Myers, Kappelman, & Prybutok, 1997). In this study, the researcher used the term *extra-organizational* to describe environmental conditions outside of the organization and the term *intra-organizational* to describe environmental conditions within the organization. The following table summarizes examples of extra- and intra-organizational environmental conditions found in Myers, Kappelman, and Prybutok (1997):

Table 1. Extra- and intra-organizational environmental conditions

Extra-Organizational	Intra-Organizational
- Industry - Competitive environment - Culture - Economy - Availability of resources - Climate	- Mission - Size - Goals - Senior management support - IS executive hierarchical placement - Maturity of IS function - Size of IS function - Structure - Management philosophy/style - Culture - IS budget size

Considered collectively, these variables (as perceived by managers/evaluators) define an organization's direction, resources, opportunities, and constraints. Accordingly, these variables likewise influence the activity of the IS function. That said, Myers, Kappelman, and Prybutok (1997, p.18) cautioned against viewing environmental variables as being "so tightly fixed as to totally restrict strategic movements." In fact, organizations often adopt information systems in order to alter environmental conditions, such as improving a firm's competitive position in the marketplace (Porter & Millar, 1985). In this light, a complex dynamic emerges: IS/IT decision-making is both *influenced by*, but also *influences*, extra- and intra-organizational environmental conditions. Moreover, these conditions remain in a constant state of flux, resulting from staff changes and competitors' actions to natural disasters and geo-political events. In addition, each evaluator may (and likely will) interpret and react to these conditions differently.

When: The Timing of Evaluation

Time influences evaluation in two manners. First, as previously discussed, environmental *conditions-of-the-moment* help to establish context. That is to say, environmental conditions change with the passage of time, and these changes may influence the activities and thoughts of organizational actors (Ives, Hamilton, & Davis, 1980; DeLone & McLean, 1992; Myers, Kappelman, & Prybutok, 1997). For example, a firm in financial turmoil today would likely have different priorities than when it was a successful, growing company. Second, the *evaluation timeframe* also determines the context. In particular, scholars have addressed the relation of evaluation to information systems' complete life cycles (Remenyi & Sherwood-Smith, 1997; Farbey, Land, & Targett, 1999; Serafeimidis, 2002; Nijland, 2004). A common distinction among scholars has been between *ex ante* (a predictive evaluation of an IS prior to its implementation)

and *ex post* (a measured evaluation of an IS after its implementation) assessments (Serafeimidis, 1997; Renkema, 2000; Nijland, 2004). Scholars have also differentiated between *summative* and *formative* evaluations, which may be appropriate at different times in the system's life cycle (Remenyi & Sherwood-Smith, 1997; Nijland, 2004). According to Remenyi and Sherwood-Smith, summative evaluations attempt to predict or measure outcomes in an effort to explain, justify, or assess. As a result, summative evaluations tend to be conducted at specific project milestones; examples include design or post-implementation reviews. In contrast, formative evaluations tend to be more iterative and focused on learning. Thus, formative evaluations typically involve end-users in one or more phases of a system's development life cycle. Common methods for involving users in IS design and development processes include: usability testing, focus groups, prototyping, participatory design, surveys, and structured walk-throughs (Abdinnour-Helm, Chaparro, & Farmer, 2005).

Nijalnd (2004) indicated that evaluation encompasses the lifespan of an information system investment from conception to obsolescence. In the course of a typical system's life cycle, this implies a number of unique phases such as problem identification, analysis, design, development, implementation, operation, and discontinuance (Remenyi & Sherwood-Smith, 1997; Farbey, Land, & Targett, 1999; Nijland, 2004). These distinct but interconnected phases each offer opportunities for evaluation. However, according to Farbey, Land, and Targett, each phase will likely call for different measures and methods of evaluation. This is because each stage of a system's life cycle will also likely have different degrees of uncertainty related to both the system's *objectives* and its *cause and effect* relationships. For example, early stages may involve consensus building to determine the goals and scope of a project, thereby defining the criteria for subsequent

summative evaluations. Similarly, the system design process may include end-user participation and consist of an iterative process of formative evaluation. In contrast, once a design has been agreed to by the end-users and IS professionals, management may conduct a summative evaluation to assess the return associated with the system's estimated costs and predicted benefits. Thus, as depicted in Figure 1, numerous opportunities exist for evaluation at different times during a system's life cycle.

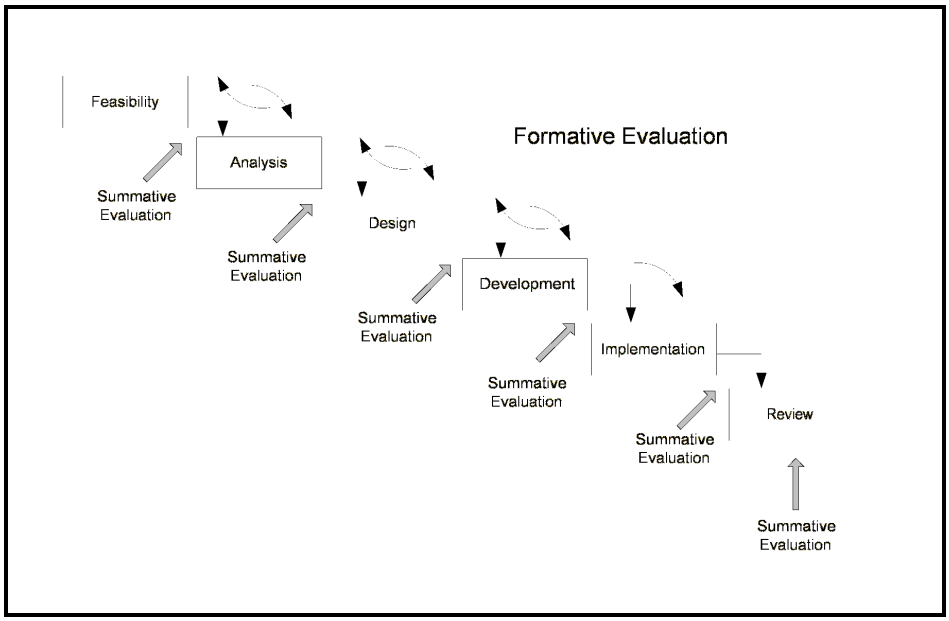

Figure 1. Evaluation opportunities during the IS life cycle (after Remenyi & Sherwood-Smith, 1997)

What: The Object of Evaluation

Of all the contextual conditions, the effect of the subject of evaluation on the selection of appropriate methods and measures may be most intuitively obvious. For example, one may well intuit that differences might exist in the methods and measures used to evaluate a network-based firewall versus an e-commerce web site. Unquestionably, scholars have recognized that different types of IS/IT investments demand distinctive evaluations

(Lucas, 1999; Renkema, 2000; Seddon, Graeser, & Willcocks, 2002; Serafeimidis, 2002). Of course, the countless variety of IS/IT makes the situation complex.

As an example, Renkema (2000) provided a taxonomy of both direct and indirect IT-based infrastructure components found in many organizations. Renkema described direct IT-based infrastructure as integrated into an organization's business processes or its products/services. In contrast, indirect IT-based infrastructure supports business processes and/or the delivery of product/services by an organization. In other words, direct IT-based infrastructure is inseparable from an organization's activities, whereas indirect infrastructure merely underlies those efforts. In terms of direct infrastructure, Renkema listed a number of components:

- organizational control processes (e.g., strategic management, finance, and accounting),
- primary organizational processes (e.g., research and development, marketing, sales, and manufacturing),
- communication facilitation (e.g., office support/automation and communication systems),
- and application control processes (e.g., staff, tools, and procedures dedicated to specific business systems).

In terms of indirect infrastructure, Renkema proffered a longer list of infrastructure (staff, tools, and procedures) dedicated to performing a number of IT-related tasks:

- IT strategy and planning,
- systems development and maintenance (including project management, system analysis/design, software engineering, procurement, and system implementation functions),
- IT operations,
- IT managed operations,

- telecommunications,
- and end-user training / support.

All of the aforementioned categories of direct and indirect IS/IT infrastructure represent potential subjects for IS/IT evaluation. Moreover, each of these groups contain multiple elements that may also be evaluated. In short, modern IS/IT infrastructures contain hundreds or thousands of potential evaluation subjects.

The myriad of potential evaluation subjects necessitates a framework for structuring the various categories. According to Seddon, Graeser, and Willcocks (2002), organizations may evaluate the contribution of IS/IT either in its totality (e.g., the total contribution of IT to the overall organization or some business unit) or on an individual project basis (e.g., the contribution of a specific IT investment to the overall organization or one of its components). Obviously, individual IT investments may vary widely in terms of their scopes, objectives, costs, benefits, and risks.

Recognizing the differences between various IT initiatives, Lucas (1999) identified eight unique types of IT investments: infrastructure, required (no return) managerial control, no other way to do the job, direct return from IT, indirect returns, competitive necessity, strategic application, and transformational IT. Overall, Lucas' "IT Investment Opportunities Matrix" (reproduced in Table 2) offered a succinct synopsis of each investment type. For example, Lucas asserted that required investments should be viewed as a "cost of doing business" with little upside potential, resulting in a low probability of a positive return on investment. In contrast, Lucas argued that strategic applications offered a high-risk / high-return potential. More importantly, Lucas' work underscores the need for context-based evaluation. That is to say, the type of IS/IT investment should assist in determining the *which* (evaluation criteria) and *how* (evaluation method)

elements of the evaluation process. To illustrate this point, consider the prior example. In assessing "required investments," Lucas argued that evaluators should simply seek the lowest cost solution to deliver the required functionality. In contrast, Lucas asserted that "strategic applications" should be evaluated from a longer-term perspective using a suitable approach, such as a real options framework.

Table 2. IT investment opportunities matrix (after Lucas, 1999, pp. 204-205)

IS/IT Investment Type	Nature of Return	Comments
Infrastructure	Possible future benefits; difficult to identify contribution	View as support for current/ planner initiatives; may allow for future investments
Required (no return) managerial control	Expect little to no return	View as a cost of doing business
No other way to accomplish a task / objective	A return is very likely; for example, it may reduce labor costs or generate new revenue	View the ramifications of the new process / task: what impact will that have on the organization?
Direct return from IT	This is the "classic" IS/IT evaluation example	Evaluation possible using formal cost / benefit and financial analysis tools
Indirect return from IT	Returns are hard to identify	Evaluation may require alternative methods to assess / estimate potential benefits
Competitive necessity	If following others in the industry, returns may be limited to retaining position in the marketplace	Evaluation should be based on the cost of *not* investing in the technology
Strategic application	Returns may be hard to identify	Potentially high risk/reward; view in relation to overall organizational strategy (supporting or enabling)
Transformational IT	Returns hard to identify as IT is one component of an organizational change program	Potentially high risk/reward; view in relation to overall organizational change program

In addition to helping to define other contextual elements, a clearly delineated evaluation subject draws a boundary around an evaluation (Serafeimidis, 1997; Serafeimidis, 2002). Put differently, the evaluation subject defines both what *should* and what *should not* be evaluated. However, the subject of evaluation is also shaped by other

contextual factors. As previously noted, evaluations are undertaken in particular contexts for specific reasons. For example, Seddon, Graeser, and Willcocks argued that certain organizational factors "push" managers to conduct evaluations, such as in a time of organizational crisis or because of the arrival of a new senior executive (who wishes better understand the organization). Similarly, new governmental regulations (an extra-organizational environmental factor) might necessitate the adoption—and hence evaluation—of a new technology. Therefore, the *what* (subject) of an evaluation both *defines* and *is defined by* additional contextual factors.

Who: The People Involved in Evaluation

Numerous authors have highlighted the managerial, social, political, and ritualistic aspects of IT evaluation, thereby demonstrating the centrality of people to the evaluation process (Symons, 1990; Remenyi & Sherwood-Smith, 1997; Serafeimidis, 1997; Walsham, 1999; Jones & Hughes, 2000; Serafeimidis & Smithson, 2000; Whittaker, 2001; Klecun & Cornford, 2003). According to Serafeimidis, the *who* element IS/IT evaluation consists of two groups of people: those individuals involved in (or excluded from) the evaluation process (i.e., the evaluators), and those individuals affected by the outcomes of the evaluation (i.e., the stakeholders). These groups need not be mutually exclusive; indeed, numerous researchers have noted that stakeholders do (Serafeimidis & Smithson) and should (Remenyi & Sherwood-Smith) actively participate in the evaluation process. Subsequent sections describe and discuss the roles of, and implications for, both stakeholders and evaluators.

Stakeholders & Evaluation as a Mechanism for Organizational Change

According to Remenyi and Sherwood-Smith (1997, p. 253), stakeholders are "any individual with an involvement in the evaluation process." Examples of stakeholders

include: senior managers, end users / employees, line managers, IT staff, IT managers, financial managers, shareholders, vendors, suppliers, clients/customers, external consultants, regulators, auditors, competitors, industries, and communities/societies (Remenyi & Sherwood-Smith, 1997; Serafeimidis, 1997; Brynjolfsson & Hitt, 1998; Serafeimidis & Smithson, 2000; Kozma, McGhee, Quellmalz, & Zalles, 2004; Nijland, 2004). In this definition, however, "involvement" does not imply a *de facto* participation in the evaluation process itself; rather, "involvement" includes both those individuals *involved in determining* and/or those *influenced by* an evaluation's outcome.

As a mechanism for altering circumstances, scholars have identified IS/IT-related activities as a source of organizational change (Symons, 1990; Klecun & Cornford, 2003; Williams & Williams, 2004), because such activities may influence one or more of the five variables that induce organizational change: people, structures, technologies, tasks, or culture. For individuals, change—no matter its motivation, desirability, or means of execution—may be viewed as a destabilizing, threatening, or disconcerting force (Williams & Williams). Indeed, change may lead individuals to feel senses of loss, anxiety, uncertainty, or unease. Of course, change may be viewed from a number of perspectives: a circumstance that causes anguish for one individual may result in euphoria for another. Thus, no single perspective has a monopoly on the "truth" – different stakeholders or groups of stakeholders may hold diverse views on the same subject (Williams & Williams). Thus, the outcome of an evaluation may materially effect or emotionally affect various stakeholders differently (Serafeimidis & Smithson, 2000).

Evaluators & Stakeholder Involvement in the Evaluation Process

According to Serafeimidis (1997), evaluators are the individuals responsible for conducting an actual evaluation. Similarly, Walsham (1999, p. 374) identified IS

evaluators as including "any person charged with carrying out a formal evaluation exercise," as well as managers conducting assessments with a "formal legitimacy" due to their organizational role. Additionally, stakeholders often informally evaluate important aspects of their personal and professional lives (Serafeimidis). Thus, stakeholders—including those not involved in a formal evaluation—will likely form their own assessments of a proposed or actual IS/IT artifact.

Scholars and practitioners commonly conceptualize evaluators as undertaking the exercise based on a number of quantitative and/or qualitative criteria, including technical, economic, or strategic considerations (Smithson & Hirschheim, 1998; Walsham, 1999; Jones & Hughes, 2000; Irani & Love, 2001; Whittaker, 2001; Serafeimidis, 2002; Nijland, 2004). Scholars have also noted that formal evaluators may function as facilitators, teachers, learners, reality shapers, consensus builders, or change agents in organizations (Symons, 1990; Walsham, 1999; Jones & Hughes, 2000; Whittaker, 2001; Nijland, 2004). Whatever the case, Walsham noted that evaluators may serve both functional and symbolic purposes. In other words, the practices of evaluators also represent a form of organizational ritual demonstrating "management competence" (Walsham, p. 374), perpetuating the myth of the archetypal rational "modern manager" (Introna, 1997, p. 22), or providing a means of political control (Serafeimidis, 1997; Walsham, 1999; Whittaker, 2001). Considered collectively, therefore, Walsham viewed evaluators as being builders and shapers of organizations (through the social construct of reality), as well as moral agents concerned with and influenced by norms, values, and power relations.

In attempting to understand the complex, multi-faceted role of the IS evaluator, most researchers have ascribed two dichotomous models of evaluators, based largely on

conceptualizations of "managers" found in the business literature (Whittaker, 2001). In an effort to advance the understanding of IS evaluators, Whittaker's dissertation focused on a hermeneutic exploration of the stereotypical dualism of IS managers (i.e., evaluators) and offered a post-dualist view of their motivations and actions. Based upon Whittaker's research, the following sections describe three archetypes of evaluators: the objective / rational model, the subjective / political model, and Whittaker's post-dualist model.

Evaluator Archetypes: The Objective / Rational Model

In this functionalist view, evaluators may be viewed as rational/objective (e.g., unbiased) actors using rational/objective (e.g., scientific and/or unbiased) methods to predict or measure the value of an IS/IT artifact (Whittaker, 2001). This conceptualization of an evaluator arises from the view of the archetypical, but nonetheless mythical, "modern manager," as described by Introna (1997, p. 22):

> *…the perfect, rational and purposive being who is the expert of technology; the engineer of industrial and commercial society; the 'master of the ship' who efficiently and effectively pursues goal and objectives, always striving to do better, to achieve more with less; a character of moral standing; a noble professional achieving noble ends.*

In keeping with this archetype, one would expect that IS evaluators / managers would rigorously undertake formal evaluations, using the myriad of existing methods, in order to predict or measure the value of an IS/IT element or function. However, empirical research demonstrates that this is simply not the case in practice. For example, Ballantine, Galliers, and Stray (1999) found that despite widespread *ex ante* IS evaluations being conducted (87% of respondents), a much smaller percentage of organizations in the sample (44% of respondents) utilize formal / defined procedures for doing so. In addition, the researchers noted that only 56% of the respondents engaged in post-implementation

evaluations. In a more recent study, Seddon, Graeser, and Willcocks (2002) found that relatively few firms consistently conduct rigorous evaluations of all their IT investments. In particular, the researchers found that: 32% of respondents attempted to measure the total contribution of IT to overall business performance; 68% evaluated projects at the feasibility stage; 69% evaluated projects during the development phase; 50% conducted post-implementation evaluations of projects; and 61% of respondents claimed to assess the overall IT function in terms of its service quality. What is more, researchers have also found that in situations where formal evaluations are conducted, the evaluators often undertake the exercise simply as a step in gaining project approval or as a hurdle in a project management process (Hirschheim and Smithson, 1999; Whittaker, 2001; Nijland, 2004).

According to Whittaker (2001), these circumstances represent a paradox. Given that different types of systems require different forms of evaluation and that many measures/methods of evaluation exist, why do rational/objective managers fail to consistently or rigorously perform IS/IT evaluation? To explain this paradox, some scholars have suggested that it arises from the practical difficulties associated with conducting evaluations. Seddon, Graeser, and Willcocks (2002, p. 21) noted the following challenges faced by evaluators: identifying and measuring benefits, evaluating the costs associated with a specific benefit, identifying "likely business impacts," establishing ownership of the IT investment (including assigning responsibility for benefit delivery), personnel constraints, and time constraints. Yet, while evaluators doubtlessly face practical challenges, other scholars have suggested that an alternative explanation for their actions comes from the subjective / political nature of IS evaluation

(Symons, 1990; Serafeimidis, 1997; Hirschheim and Smithson, 1999; Walsham, 1999; Whittaker, 2001; Tuten, 2003; Nijland, 2004).

Evaluator Archetypes: The Subjective / Political Model

In contrast to rationally objective forms of evaluation, Whittaker (2001) characterized the alternative extreme of the predominating dualistic view of evaluators as being personally subjective and politically significant. Indeed, numerous scholars have recognized the political / social implications of IS/IT evaluation (Symons, 1990; Serafeimidis, 1997; Walsham, 1999; Jones & Hughes, 2000; Whittaker, 2001; Nijland, 2004). Serafeimidis, for example, discussed "political influence" and "hidden agendas" as factors influencing the acts of IS evaluators. Building on this theme, Walsham discussed the existence of evaluators' *overt* and *covert* intentions. According to Walsham, covert intentions may result from personal self-interest; however, covert aims may also arise from higher (non-selfish) motives: shielding others from perceived harm (e.g., protecting co-workers' jobs), recommending changes gradually to improve acceptance and reduce anxiety, and protecting others from emotional distress (e.g., mitigating the "pain" associated with "telling someone truth").

Regardless of their motivation or intention, in this archetype evaluators are seen to ground their assessments in "personal, subjective judgement" (Whittaker, 2001, p. 72). According to Whittaker, managers respond negatively to this notion, viewing subjectivity as an inferior epistemological basis in comparison to objectivity. Yet, when asked, managers state that descriptions of political and subjective evaluation ring true. Given this skepticism regarding subjectivity and the culture of most organizations (dominated by the myth of the "modern manager"), Whittaker argued that managers often cloak

personal, subjective judgments in the garb of formal evaluation methods in an effort to follow organizational rituals and appear to be solidly rational/objective actors.

Evaluator Archetypes: The Post-Dualist Model

Moving beyond the dichotomy of rational/objective or political/subjective actors, Whittaker (2001) conceptualized IS/IT evaluation as a hermeneutic process, an approach suggested by other researchers, such as Jones and Hughes (2000). As a hermeneutic process, Whittaker viewed evaluation as a mechanism by which a manager (or evaluator) comes to an understanding about an information system. In following this path, Whittaker ultimately dismissed both stereotypes as being insufficient, too simplistic, and creating a false dichotomy. Thus, Whittaker (p. 86) argued that managers are in "in-the-world" and evaluate systems "in-order-to-get-the-job-done." In this manner, Whittaker relied heavily on Introna's (1997) conceptualization of management based on the work of the German philosopher Martin Heidegger, in particular hermeneutical phenomenology. Overall, Introna argued that this viewpoint afforded a more realistic portrait of the manager. Introna's key insights include:

- By being "in-the-world," managers cannot isolate themselves from the world. Therefore, fully rational and objective decisions—which require complete detachment—are philosophically implausible.

- Managers are also "thrown into the world" (p. 43). This implies that managers cannot control everything. Situations, decisions, problems, and solutions may be forced upon managers by outside forces.

- Managers are primarily concerned with "getting-the-job-done" (p. 44).

- Managers will use the resources that are readily available (equipment, people, information) in order to get-the-job-done. Furthermore, unless a specific breakdown occurs, managers tend to view these resources holistically rather than as independent artifacts.

- Managers' work tends to be complex, fragmented, and *ad hoc*.

- Managers are frequently entangled in complex, multi-dimensional involvements. To cope with these circumstances, managers reconcile disparate interests through the means of negotiation and interpersonal communication, while operating under the constraints of often informal and tacit parameters involving a multitude of stakeholders.

- Managers will only use information that is close at hand and clearly relevant to assist them in making sense of a situation.

While Introna's (1997, p. 46) argument may dispel the "myth of the rational manager," it does not suggest that IS evaluators are irrational, solely politically motivated, or inclined toward absolute subjectivity. Indeed, Whittaker (2001) argued that an IS/IT evaluator must be able to effectively use pragmatic judgement (i.e., their logical thought processes) and additional information (i.e., their intuitive understandings), both of which are shaped by the evaluator's local context. In this sense, evaluators operate under the constraints of a bounded rationality (arising from their situation of being "in-the-world") that allows them to function pragmatically in order to reconcile disparate stakeholder interests and develop a situational understanding that, in turn, enables them to "get-the-job-done."

Group Evaluation: Dialogic and/or Participatory Evaluation

While the previous discussion may help to explain the motivations and actions of individual evaluators, it does not explicitly address the dynamics inherent when a group of individuals attempt to predict or assess the value of an IS/IT investment. As previously noted, scholars have described IS evaluation as a political and social process (Walsham, 1999; Jones & Hughes, 2000; Whittaker, 2001; Williams & Williams, 2004). Furthermore, researchers have recognized that different stakeholders or groups of stakeholders hold unique and often contradictory views on similar subjects (Serafeimidis, 1997; Serafeimidis & Smithson, 2000; Williams & Williams, 2004). These circumstances

underscore this important question: in light of their disparate viewpoints, how does a group of evaluators reach a consensus regarding the value of an IS/IT investment?

Based upon her hermeneutic analysis, Whittaker (2001) asserted that group evaluation decisions are reached through dialogues—which Whittaker referred to as "skillful conversations"—that are mediated by organizational power relationships. Put more simply, evaluators talk among themselves in order to reach a consensus, and these conversations are shaped by the communicative acts and perceived views of those with the greatest organizational authority involved (directly or indirectly) in the evaluation. Although such a process appears highly political, Whittaker argued that a genuine and ethical understanding (i.e., evaluation decision) might be reached if the conversation is both improvised (thereby allowing for seemingly extemporaneous outcomes) and deconstructive (thereby allowing for an openness to the "other" rather than simply accepting existing dogma/attitudes/views without critical reflection).

As an alternative yet similar model, Remenyi and Sherwood-Smith (1997, p. 252) described *participatory evaluation* as "an educational process" by which stakeholders "produce action-oriented knowledge about the nature and qualities" of an IS and "articulate their views and values to reach a consensus about future action." In other words, the authors described the group evaluation process as one of negotiation between stakeholders. As conceptualized by the authors, participatory evaluation outcomes result from individuals' interpretive and non-neutral evaluations being validated through a process of group negotiation. Remenyi and Sherwood-Smith cautioned that a participatory evaluation does not result in an "objective" evaluation; nevertheless, the process reduces the likelihood of individual / interpretive bias through the mechanisms of group negotiation and consensus building.

Summary: The Role of IS Evaluators

This section has demonstrated and described the involvement of people in the evaluation process, including both *stakeholders* (who are affected by an evaluation's outcome and therefore often informally, at least, evaluate such systems) and *evaluators* (who are granted the organizational authority to conduct formal evaluations). In this role, evaluators perform as both change agents (building and shaping their organizations) and moral actors (concerned with organizational norms, values, and power relationships). Historically, authors and scholars have described managers/evaluators from one side or the other of a dualistic coin: the "objective/rational" or "subjective/political" manager. Yet, with critical reflection neither characterization appears sufficiently robust. Instead a post-dualist understanding suggests evaluators are "in and of the world" with a pragmatic need to "get the job done" on a daily basis. Therefore, one may best understand individual evaluators as using both their rational/logical ability and their intuitive understandings of their localized context in order to assess solutions and decide on courses of action. When extended to a group, the evaluation process consists of dialogic negotiations (often mediated by organizational power dynamics) that validate or invalidate each evaluator's non-neutral assessments. Therefore, organizational stakeholders (both included and excluded from the formal evaluation process) are significantly involved in the outcome of the evaluation and the implications of its resultant actions.

Which: Evaluation Criteria/Measures

According to Serafeimidis (1997, p. 26), "evaluation involves the measurement of certain variables and the comparison of these measurements against certain criteria." Fortunately or unfortunately, an abundance of potential measures for use in evaluations

exist. Therefore, the purpose of this section will be threefold: to describe the constellation of potential measures, to establish the specific nature of such measures, and to ground the discussion in the context of established models of IS success.

In an effort to synthesize the body of IS success research, DeLone and McLean (1992) postulated a holistic, multidimensional model that defined both the process and casual relationships associated with IS success. Since its 1992 publication, the DeLone and McLean IS Success Model has enjoyed widespread adoption in many research studies and undergone a number of reformulations, including a revision by DeLone & McLean (2003). In the context of this study, DeLone and McLean's model provides many important insights into IS success. First, their research demonstrates the multidimensional and interdependent nature of the elements that contribute to IS success. Second, the nature of IS success factors warrants that each element should be carefully defined and measured. Third, DeLone and McLean (2003, p. 11) argued that the measures of IS success should be based upon the "objectives and context of empirical investigation." While the authors were specifically writing about the application of the model to IS research, the concept of selecting measures contingent upon contextual factors may be logically extended to investigations (i.e., evaluations) in organizations. Fourth and finally, to simplify and increase comparability, the authors recommended attempting to minimize the number of different measures used for a given IS success dimension.

The DeLone and McLean IS Success Model (Figure 2) depicts six dimensions of IS success: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. The system quality and information quality dimensions address efficiency concerns in terms of measures of technical (system) and semantic (information) success. The four remaining variables address effectiveness measures of

success. In this manner, DeLone and McLean (1992) distinguished between how well a thing was done (*efficiency*) and whether the correct thing was done (*effectiveness*).

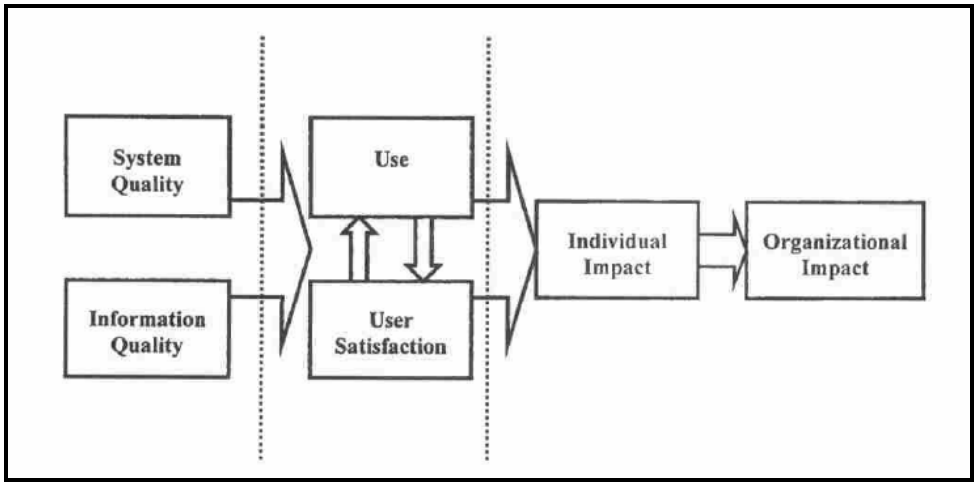

Figure 2. DeLone & McLean (1992) IS Success Model

Between its publication in 1992 and mid-2002, the DeLone and McLean IS Success Model was cited in no fewer than 285 refereed journal articles and conference papers. During that period of time, a multitude of researchers empirically investigated the associations between the success dimensions proffered in the original model (DeLone and McLean, 2003). When collectively considered, these studies provide strong evidence of the model's associations and casual relationships.

Building on DeLone and McLean's (1992) original model, scholars have attempted to reformulate it (Seddon, 1997), extend its scope (Myers, Kappelman, & Prybutok, 1997), respecify it for a particular domain (Molla & Licker, 2001), or explicitly examine it in the context of IS/IT evaluation (Lomerson & Tuten, 2005). In some cases, these modifications were the result of criticisms. Seddon (1997, p.240) seemed especially unimpressed with DeLone and McLean's model, calling it "both confusing and misspecified." In particular, Seddon identified their attempt to combine both process and variance (casual) explanations into a single IS success model as being highly

problematic. To provide a "clearer, more theoretically sound" model, Seddon (p.252) respecified DeLone and McLean's model by splitting it into two variance sub-models (use and success) and explicitly discouraging a process-based interpretation of the model. In doing so, the author added four new variables: expectations, consequences, perceived usefulness, and net benefits to society. Likewise, Seddon significantly redefined the links between the variables. In all, Seddon's reformulation and extension resulted in the model depicted in Figure 3.

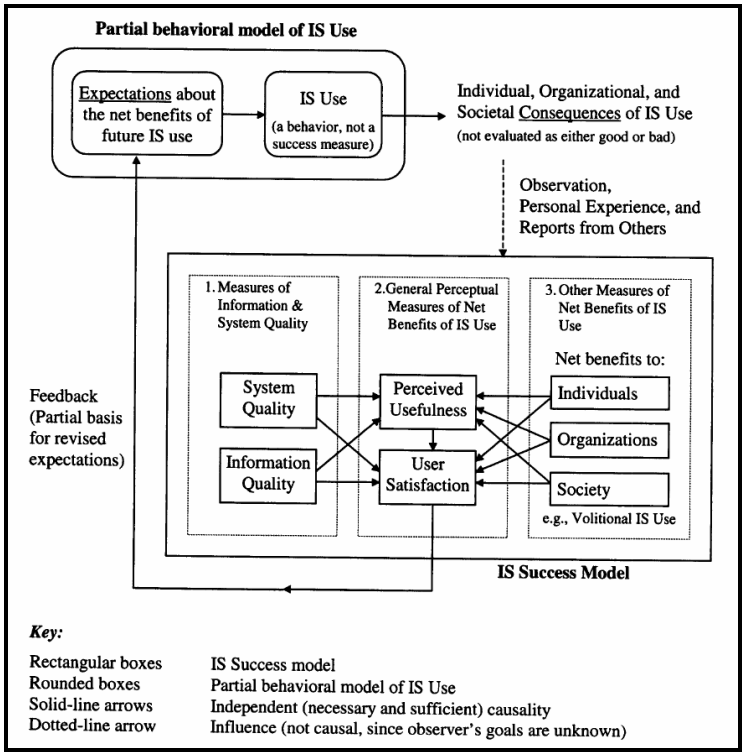

Figure 3. Respecified version of DeLone and McLean's IS Success Model (Seddon, 1997, p.245)

In contrast to Seddon's reformulation, Myers, Kappelman, and Prybutok merely extended DeLone and McLean's (1992) model by adding "workgroup impact" and "service quality" dimensions. The authors argued for the former as an alternative level of analysis and because it often serves as an important intermediate step for extending individual impacts to the organizational level. As for the latter, the authors added this

dimension in recognition of the changing view/role of information systems, which has progressed from that of technical artifacts to those of services in support of business processes. In 2003, DeLone and McLean updated their model by also adding a service quality dimension, distinguishing between "use" and the "intention to use" an information system, and combining "individual impacts" and "organizational impacts" into a single "net benefits" dimension, as shown in Figure 4.

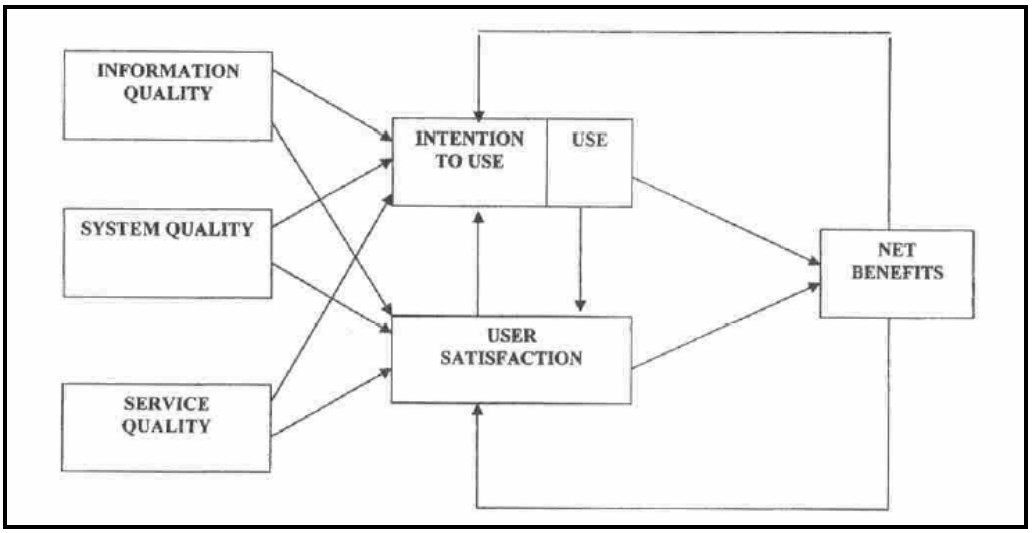

Figure 4. Updated IS Success Model (DeLone & McLean, 2003, p. 24)

Measures of IS/IT Success

As noted in the prior models, many dimensions appear to be associated with (or are at least theorized to be associated with) IS success. Each of these dimensions may be estimated or measured using one or more metrics. Therefore, in attempting to formulate a reasonably comprehensive taxonomy of IS/IT success measures, one must first determine which dimensions ought to be included in the taxonomic structure. For the purpose of this study, the researcher synthesized the IS success models contained in the aforementioned studies: DeLone and McLean (1992); Myers, Kappelman, and Prybutok (1997); Seddon (1997); and DeLone and McLean (2003).

To begin, the success dimensions were broadly divided into three categories: *measures of quality*, *measures of use / impacts of use*, and *measures of impacts*. Seddon (1997) drew a distinction between "consequences" (value neutral descriptions of outcomes) and "net benefits" (the value of outcomes as seen from a particular stakeholder's point of view). While "net benefits" could be negative from a particular stakeholder's viewpoint, the term tends to connote a positive outcome. For that reason, the researcher employed the term "impacts" to imply value-neutral descriptions of outcomes, thereby leaving the judgment of value to individual stakeholders/evaluators.

In each of the three categories, the researcher included all of the dimensions found in the four studies (DeLone and McLean, 1992; Myers, Kappelman, & Prybutok, 1997; Seddon, 1997; DeLone and McLean, 2003). In an effort to be both concise and comprehensive, the researcher eliminated duplicate constructs and utilized those that are most specific. As an example, rather than using DeLone and McLean's (2003) "net benefits" dimension, the researcher employed the four specific categories of impacts identified in the three earlier studies: individual impact, workgroup impact, organizational impact, and societal impact. Based upon the aforementioned procedure, Table 3 depicts the categorization of IS success dimensions found in these studies.

Table 3. Dimensions of IS/IT success

Measures of Quality	Measures of Use / Impacts of Use	Measures of Impacts
System Quality Service Quality Information Quality	Use Intention to Use User Satisfaction Perceived Usefulness Expectations of Impacts of Future Use	Individual Impacts Group Impacts Organizational Impacts Societal Impacts

As previously discussed, each of these IS/IT success dimensions have one or (often) more measures associated with them. The following sub-sections briefly discuss each success dimension and provide a sample of the relevant / potential measures identified in the literature.

System Quality Measures

As a broad category, system quality measures tend to focus on the performance characteristics of the artifact being evaluated, thereby demonstrating an engineering/technical orientation toward assessment of the system. In one of the most well known papers on system quality measures, Hamilton and Chervany (1981) listed many examples, including response time, turnaround time, data accuracy, data currency, reliability, degree of completeness, ease of use, and system flexibility. Similarly, DeLone and McLean (1992) cited numerous performance-based measures of system quality, such as response time, reliability, accessibility, error rates, accuracy, ease of use (usability), and resource utilization. Likewise, Seddon (1997) defined system quality measures including the extent to which a system contained "bugs," as well as its consistency of user interface, ease of use, quality of documentation, and (in some cases) the quality and maintainability of a program's code.

In addition to performance measures, some scholars have asserted that system quality may also be measured in terms of its economic benefit. For example, cost-benefit analysis provides a means of assessing the value of individual systems (King & Schrems, 1978; Sassone, 1988). In this sense, one may evaluate the system from an investment utilization perspective. However, in the context of this study, the researcher did not include such economic metrics as measures of system quality, because doing so would muddle the distinction between measures of a system's technical characteristics and

measures of a system's impacts. For example, a poorly performing system (such as one with slow response times) may still yield positive economic outcomes. Moreover, an economic analysis of such a system would likely fail to notice that the system was performing poorly, thus in all likelihood diminishing the ability of the system to maximize its positive effects. Therefore, system quality measures are confined to those addressing the inherent characteristics of the system under evaluation, such as the examples of metrics presented in Table 4.

Table 4. Selected measures of system quality

Measures of System Quality
- Response time - Turnaround time - Data accuracy - Date currency - Reliability - Degree of completeness - Ease of use / usability - System flexibility / extensibility - System accessibility - Error rates - Resource utilization - "Bug" counts - Consistency of user interface - Quality of documentation - Quality of program code - Maintainability of program code

Service Quality Measures

According to Myers, Kappelman, and Prybutok (1997), a service quality perspective views IS as a function that addresses the information technology requirements of the broader organization. This perspective has grown in importance as the view of IS/IT has changed from being purely technical artifacts (i.e., products) to becoming services in support of business processes (DeLone and McLean, 2003). Likewise market-driven changes have encouraged this paradigm shift, such as the prevalence of end-user computing, the decentralization of some IS/IT resources, the rise of *software-as-service*

models (e.g. application service providers), and a greater diversity of procurement sources for IS services. These conditions imply that IS managers should be more keenly aware of their customers' (both internal and external) expectations and perceptions of the services provided by their IS department (Myers, Kappelman, & Prybutok).

According to Parasuraman, Zeithaml, and Berry (1985) service quality (in the context of consumer perceptions) has many determinants including reliability, responsiveness, competence, access (i.e., ease of contact, hours of availability), courtesy, communication, credibility, security, understanding/knowledge of the customer, and tangibles (i.e., physical evidence of the service's qualities, such as appearance). Having identified these determinants, Parasuraman, Zeithaml, and Berry (1988) developed an instrument to measure service quality, SERVQUAL, which they validated in a series of subsequent articles (Myers, Kappelman, & Prybutok, 1997). Beginning in the early 1990s, researchers began applying Parasuraman *et al*.'s stream of research to the IS context. For example, Nath (1992) developed a framework to improve service quality using information technology. More commonly, researchers have attempted to address IS service quality by adapting the 22-item SERVQUAL instrument to an IS context, such as in Pitt, Watson, and Kavan (1995). According to DeLone and McLean (2003), the IS-based SERVQUAL instrument addresses five dimensions:

- Tangibles (e.g., does IS have current hardware and software?)
- Reliability (e.g., is the IS department dependable?)
- Responsiveness (e.g., do IS employees promptly serve end-users?)
- Assurance (e.g., do IS employees have the knowledge to do their job well?)
- Empathy (e.g., does the IS dept. have their end-users' best interests at heart?)

IS scholars have debated the efficacy of using the SERVQUAL instrument to measure IS service quality. Van Dyke, Kappelman, and Prybutok (1997) argued that while service quality is an important dimension of IS success, the SERVQUAL measure has problems with reliability, as well as discriminant, convergent, and predictive validities. In contrast, other scholars have suggested that SERVQUAL may accurately represent users' perceptions and provide adequate reliability, convergent validity, and discriminant validity (Jiang, Klein, & Crampton, 2000; Jiang, Klein, & Carr, 2002). DeLone and McLean (2003) wrote that while SEVQUAL needs continued development and validation, service quality (when properly measured) may represent a significant component of IS success in some contexts. Given the dearth of comprehensive IS service quality measures found in the IS literature, IS scholars might also profit by looking to additional metrics found in the marketing discipline, such as Rust, Zahorik, and Keiningham's (1995) Return on Quality (RoQ) measure of the financial impact of service quality improvements to a business. In conclusion, Table 5 provides a sample of existing and potential IS service quality measures.

Table 5. Selected measures of service quality

Measures of Service Quality
- **SERVQUAL** (Parasuraman, Zeithaml, & Berry, 1988; Pitt, Watson, & Kavan, 1995) - **Return on Quality (ROQ)** (Rust, Zahorik, & Keiningham, 1995)

Information Quality Measures

Rather than measure quality in terms of system- or service-related attributes, information quality measures focus on the output produced by information systems.

Bailey and Pearson (1983) recognized nine elements of information system "output" quality: accuracy, precision, currency, timeliness, reliability, completeness, conciseness, format, and relevance. In contrast, King and Epstein (1983) identified an alternative set of information quality measures: currency, sufficiency, understandability, freedom from bias, timeliness, reliability, relevance to decisions, comparability, and quantitativeness. More recently, Rainer and Watson (1995) employed accuracy, timeliness, conciseness, convenience, and relevance as measures of information quality. Similarly, Seddon (1997) identified relevance and timeliness as metrics of information quality. However, because not all IT applications inform decision-making, information quality measures may not always be particularly relevant.

Table 6. Selected measures of information quality

Measures of Information Quality
- Accuracy - Precision - Currency - Timeliness - Reliability - Completeness - Conciseness - Format - Relevance - Sufficiency - Understandability - Freedom from bias - Comparability - Quantitativeness - Convenience

In examining Table 6, one important distinction should be considered. DeLone and McLane (1992, p. 65) stated that many information quality measures are often from the perspective of the user and are thus "fairly subjective in character." As a result, many of these individual measures are also included in the metrics that comprise the "measures of use / measures of impacts of use" section of this literature review. For example, Bailey

and Pearson's (1983) foundational study offers an effective example of this cross-pollination. Therefore, in the interest of clarity, the researcher distinguished between individual measures of information quality (Table 6) and measures of user satisfaction.

Use Measures

In this study, the researcher applied Seddon's (1997, p. 246) definition of use: "IS use means using the system." Such a definition may seem overly simplistic. Nevertheless, it clearly delineates *measures of use* from other related, yet all too often conflated, *measures related to use* (such as perceived usefulness and user satisfaction). McLean and DeLone (1992) offered a lengthy review of studies of IS use and provided a list of related measures, such as frequency of use, usage charges, time per session, hours of usage per week, regularity of use, number of information requests, and binary metrics (use vs. non-use). Myers, Kappelman, and Prybutok (1997) offered the following measures: subsystem use, relative use, increases in usage, frequency of use, and regularity of use. In addition, Seddon suggested that hands-on hours, hours spent reviewing reports, use frequency, number of users, and use/non-use may serve as measures of IS use. Table 7 provides a summary of selected measures of IS use.

Table 7. Selected measures of use

Measures of Use
- Frequency of use - Usage charges - Time per session - Hours of usage per week - Regularity of use - Number of information requests - Binary metrics (use vs. non-use) - Subsystem use - Relative use - Increases in usage - Hands-on hours - Hours spent reviewing reports - Number of users

As a measure of IS success, however, use may not always prove effective. Seddon and Kiew (1996) noted that "use" often serves as a proxy for "usefulness," based upon the assumption that a system that is used implies that its use is beneficial. In the case of systems that may be voluntarily used, this relationship may be the case. However, for systems that are mandated to be used, "use" and "usefulness" may be unrelated constructs. In a similar manner, practitioners and researchers should not assume that "use" and "benefits from use" maintain a positive and direct relationship (Seddon, 1997). DeLone and McLean (2003), however, argued that in many cases "use" may serve as a proxy for usefulness and/or "benefits from use," especially in the case of business-to-consumer e-commerce where use is voluntary. For example, in researching e-commerce success, Molla and Licker (2001, p. 6) stated that while studies of other systems have replaced "use" with "usefulness" in DeLone and McLean's model "we prefer to maintain Use [*sic*] as in the original work," because "in e-commerce systems Use [*sic*] is largely voluntary." Nevertheless, use remains a complex variable requiring different measures in different contexts. For that reason, other categories of use-related measures are examined in subsequent sections of this literature review.

Intention to Use Measures

In their recent revision of the IS Success model, DeLone and McLean (2003) delineated between the "use" of and the "intention to use" an information system. Specifically, they proffered a more thorough conceptualization of the relationship between use and user satisfaction: actual use influences user satisfaction with a system, user satisfaction affects a user's intent to use a system, and the intent to use a system effects its actual usage. DeLone and McLean (2003), however, failed to offer any specific

"intention to use" measures. However, in their earlier study, DeLone and McLean (1992) listed a few such measures, including motivation to use and anticipated level of use. Unlike quantitative utilization measures, assessing intent involves investigating users' perceptions and stated beliefs. For this reason, behavioral models may prove useful. For example, Davis's (1989) Technology Acceptance Model (TAM) offered an explanation of the relationship between perceived ease of use and perceived usefulness (independent variables) and the intention to use a system (dependant variable). As such, while surrogate factors may exist, there are relatively few unique measures of intent to use an information system, aside from those listed in Table 8 that directly query end-users about their usage plans.

Table 8. Selected measures of intent to use an information system

Measures of Intent to Use
- Motivation to use - Anticipated level of use - Self-reported intention of use

User Satisfaction Measures

Both scholars and practitioners have widely accepted user satisfaction—a respondent's assessment of the use or the use of the output of an information system—as a measure of IS success (DeLone & McLean, 1992; Mahmood, Burn, Gemoets, & Jacquez, 2000). However, Seddon (1997) defined this construct as a subjective evaluation of all of the various outcomes (e.g., individual, organizational, etc.) associated with the use of an information system as ranked on a pleasant-unpleasant continuum. In pondering the disparity between these definitions, the researcher has noted distinctions in the unit of analysis, specifically stakeholders, considered. For example, Mahmood, Burn, Gemoets,

and Jacquez specifically addressed *end-user* satisfaction with information technology. In contrast, Seddon applied the term "user" as being nearer to a synonym for "stakeholder," thereby extending beyond end-users to others (such as managers, executives, owners, or shareholders). What is more, this reading explains Seddon's (p. 246) criticism of widely applied and empirically validated user satisfaction measurement instruments as "falling a long way short of the [*sic*] measuring this idealized construct." For the purpose of this study, therefore, the researcher examined this construct from the perspective of end-user satisfaction.

A significant stream of user satisfaction research may be traced to the work of Bailey and Pearson (1983), who developed a survey instrument based on 39 factors believed to affect user satisfaction. In a follow-up study, Ives, Olson, and Baroudi (1983) developed a short-form version of the User Information Satisfaction instrument consisting of 13 items by eliminating those factors found to have lower statistical correlations to user satisfaction. In doing so, the researchers attempted to enhance the literature support for the instrument, remove psychometrically unsound scales, and reduce the survey time required to assess overall satisfaction with an information system. Baroudi and Orlikowski (1988) confirmed the reliability and validity of the UIS short-form instrument for evaluating user satisfaction.

In addition to UIS, a number of alternative measures of user satisfaction are found in the literature. For example, Doll and Torkzadeh (1988) created the End-User Computing Satisfaction (EUCS) survey instrument, which contrasted traditional IS satisfaction measures (primarily concerned with a system's output) with those measures germane in an end-user computing environment (such as ease of use). Doll and Torkzadeh's EUCS

instrument consists of 12-items that measure five components of end-user satisfaction: content, accuracy, format, ease of use, and timeliness.

With successive generations of information technology, the stream of research related to end-user satisfaction has continued to grow. During this period of time both the UIS and ECUS models have continued to be tested, refined, and adapted to changing technology contexts including the mainframe, the personal computer, and wire-based networking technologies (Wang & Liao, in press). This evolution is necessary, because overall end-user satisfaction results from a multitude of variables (Mahmood, Burn, Gemoets, & Jacquez, 2000). For that reason, Wang and Liao recently presented a model of mobile commerce (m-commerce) user satisfaction, called MCUS. In summary, Table 9 presents a list of examples of user satisfaction measures.

Table 9. Selected measures of user satisfaction of an information system

Measures of User Satisfaction
- User Information Satisfaction [UIS] (Bailey & Pearson, 1983; Ives, Olson, & Baroudi, 1983)
- End-User Computing Satisfaction [EUCS] (Doll & Torkzadeh, 1988)
- Mobile Commerce (M-Commerce) User Satisfaction [MCUS] (Wang & Liao, in press)

Perceived Usefulness Measures

As previously discussed, many interrelated elements affect overall end-user satisfaction results. Mahmood, Burn, Gemoets, and Jacquez (2000) presented a conceptual model (Figure 5) that demonstrates the factors affecting IT end-user satisfaction.

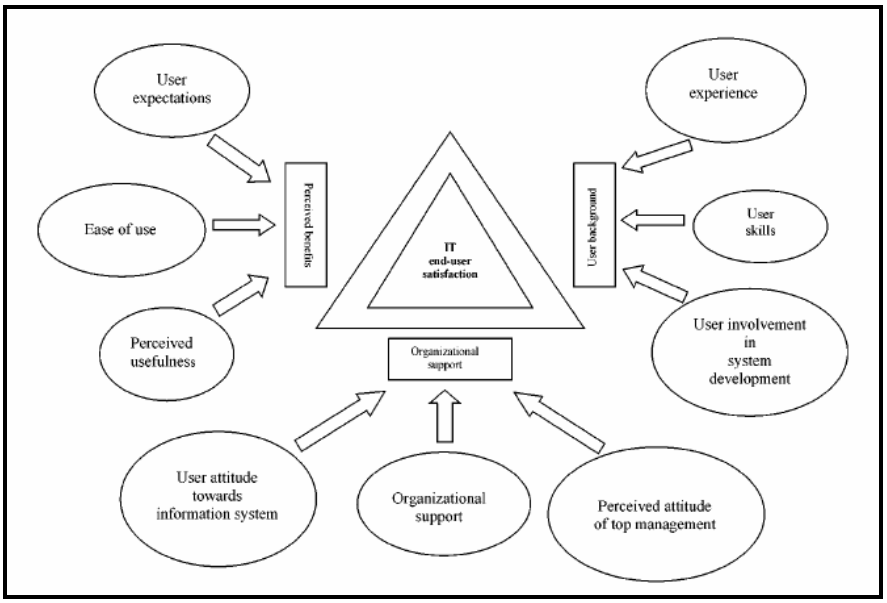

Figure 5. Factors affecting IT end-user satisfaction (Mahmood, Burn, Gemoets, & Jacquez, 2000, p. 753)

Of these factors, a number of researchers have established a strong, positive correlation between "perceived usefulness" and end-user satisfaction (Davis, 1989; Mahmood, Burn, Gemoets, & Jacquez, 2000; Calisir & Calisir, 2004). Seddon (1997) defined "perceived usefulness" as a stakeholder's subjective assessment of the degree to which an information system has enhanced performance, whether individual, departmental, or organizational. Seddon, however, carefully delineated between "perceived usefulness" and "net benefits," suggesting that the former generally does not account for associated costs while the later (by definition) must do so. According to Calisir and Calisir, users that perceive an IS to be valuable (i.e., improving some condition) are more likely to be satisfied with it than users who do not. Therefore, in this study, perceived usefulness has been used as a surrogate measure for stakeholder satisfaction.

Davis' (1989) Technology Acceptance Model (TAM) instrument, which consists of two six-item scales, measures an information system's perceived usefulness as well as its

perceived ease of use. Calisir and Calisir's (2004) study also included survey questions regarding perceived usefulness in the context of an Enterprise Resource Planning (ERP) system. Table 10 summarizes these examples of perceived usefulness measures. However, unlike user satisfaction, relatively few standardized instruments exist for measuring this construct.

Table 10. Selected measures of the perceived usefulness of an IS

Measures of Perceived Usefulness
- Technology Acceptance Model [TAM] (Davis, 1989)
- Self-reported end-user assessments (quantitative and/or qualitative)

Expectations of Impacts of Future Use Measures

As part of his expectancy-theory model, Seddon (1997) included an element termed "expectations about the net benefits of future IS use." In doing so, Seddon distinguished between a stakeholder's assessment of the prior impacts of an information system and their expectations about the outcomes associated with an information system's future use. Further, Seddon argued that a direct, positive relationship exists between expectations about the impacts of future use and actual system usage. That is to say, in the absence of external forces (such as a mandatory use policy) an end-user that expects to derive a net benefit from using a system will do so, whereas an end-user that expects to suffer from using a system will not. This concept may also be extended to other stakeholders; for example, management will encourage the use of a system they anticipate to provide a net benefit. In that sense, this element helps to explain the relationship between expected and/or predicted net benefits and information system use. Like other perceptual measures, standardized instruments for measuring the expected impacts of future IS use are largely

absent. However, context-specific instruments, such as the one employed in Calisir and Calisir (2004), could be created to inquire about expected outcomes of use. In addition, broader decision-making and consensus-building methods, such as the Delphi technique, might be appropriate to assess stakeholders' expectations about future impacts of use. Stakeholder feedback could also be measured quantitatively and presented as a variance-weighted sum (Seddon). Table 11 summarizes possible measures for this IS success element.

Table 11. Selected measures of expectations of impacts of future IS use

Measures of Expectations of Impacts of Future IS Use
- Group decision-making and/or consensus-building procedures, such as: - Delphi technique - Quantitative survey / analysis (e.g., variance-weighted sum of responses) - Qualitative feedback - Dialogic negotiation

Individual Impact Measures

In discussing the outcomes associated with IS use, DeLone and McLean (1992) argued that it is difficult to unambiguously define the term "impact," because it may be viewed from a multitude of perspectives and include a broad array of subjective and objectives measures. For example, the impact of an IS on individuals may be viewed behaviorally: how the IS has effected an individual's actions (e.g., frequency/duration of use, reports selected, and activities performed). In contrast, individual IS impacts may also be evaluated from a performance perspective: how the IS has effected an individual's performance (e.g., individual productivity, rate of learning, and decision-making effectiveness). Likewise, DeLone and McLean noted that individuals could be directly asked to subjectively assess a system's worth or to place a monetary value on the

output of the system. Offering a more cursory treatment of the subject, Myers, Kappelman, and Prybutok (1997) offered the following examples of individual impact measures: overall benefit of IS use, executive efficiency, decision quality, decision time, and decision confidence.

In addition to the aforementioned metrics, the Task-Technology Fit (TTF) model and its associated measurement instrument address the relationship between information systems and individual performance (Goodhue, 1995; Goodhue & Thompson, 1995). The TTF model rests on Goodhue's supposition that better outcomes (i.e., improved individual performance) occur when an individual's task and the technology they utilize to accomplish that task are well matched. Goodhue and Thompson identified eight TTF dimensions: data quality, data locatability (i.e., the ability to locate required data), authorization (i.e., the authority to access required data), data compatibility, ease of use/training, production timeliness, system reliability, and relationship with users (i.e., ability to address changing business needs). In testing their model, Goodhue and Thompson found that TTF and utilization accurately predict performance. Therefore, as a surrogate for IS success, TTF and utilization measures should be included in performance measurements. Table 12 lists selected measures of individual IS impact.

Table 12. Selected measures of the impact of IS on individuals

Measures of the Impact of IS on Individuals
- Changes in an individual's actions (e.g., frequency/duration of use, reports selected, and activities performed)
- Changes in an individual's performance (e.g., individual productivity, rate of learning, decision effectiveness, decision quality, decision time, decision confidence, and executive efficiency)
- Individual's subjective assessment of IS' value (e.g., place a monetary value on the output of the system
- Task-Technology Fit [TTF] (Goodhue, 1995)

Group Impact Measures

Although DeLone and McLean (1992) excluded this element, Myers, Kappelman, and Prybutok (1997) argued that the impact of information systems on groups represents an important level of analysis, particularly as this level serves as an essential step in extending individual impacts to the organizational level. Similarly, Seddon (1997, p. 246) stated that "groups of individuals" represent one of four "principal types of stakeholders" involved in IS success assessments. Likewise, George (2000) identified groups within firms as a possible level of analysis for IS evaluations. Indeed, in revising their model, DeLone and McLean (2003) collapsed the individual- and organizational-level effects into a single "net benefits" category, explicitly stating that the researcher must determine the level of analysis based upon the evaluation's context.

Myers, Kappelman, and Prybutok (1997) provided the following list of potential group impact measures: improved participation, improved communication, solution effectiveness, solution quality, and meeting thoroughness. Dennis, Wixom, and Vandenberg (2001) extended the Task-Technology Fit (TTF) literature to include group support systems, thereby suggesting that such a measure might be appropriate for measuring the impact of IS on groups within an organization. Table 13 provides a summary of potential measures of the impact of information systems on groups.

Table 13. Selected measures of the impact of IS on groups

Measures of the Impact of IS on Groups
- Improved participation - Improved communication - Solution effectiveness - Solution quality - Meeting thoroughness - Task-Technology Fit [TTF] for Group Support Systems [GSS] (Dennis, Wixom, and Vandenberg, 2001)

Organizational Impact Measures

In discussing the effect of IS on organizations, DeLone and McLean (1992) noted a disconnect between IS practitioners and researchers: while organizational performance measures were of importance to practitioners, researchers historically have tended to eschew using performance measures in field-based research due to the difficulties associated with attempting to isolate the effect of IS from alternate effects (unrelated to IS) on business performance. Moreover, in comparison to the research related to individual impacts, DeLone and McLean found the literature related to IS' organizational impacts to be fairly sparse and primarily consisting of measures of financial performance (e.g., return on investment, cost reduction, and profit contribution). In contrast, Myers, Kappelman, and Prybutok (1997) presented a more diverse, albeit brief, list of possible measures of IS' organizational impacts: cost savings, improved customer service, improved productivity, return on investment, and increased data availability.

In reviewing more recent IS literature, the diversity of organizational impact measures has continued to expand and may be roughly divided into three categories: objective/quantifiable intra-organizational measures, subjective/qualitative intra-organizational measures, and extra-organizational measures. Recent articles related to objective intra-organizational measures include return-on-investment (Dehning & Richardson, 2002), cost (David, Schuff, & St. Louis, 2002), productivity (King, 1998; Hitt, Wu, & Xiaoge, 2002), profitability (King, 1998), and growth (Silvius, 2006). A number of fairly recent studies of subjective intra-organizational measures have included the effect of IS on organizational structure (Heintze & Bretschneider, 2000), innovation (Dewett & Jones, 2001; Silvius, 2006), communication (Heintze & Bretschneider), change (Heracleous & Barrett, 2001), decision-making (Heintze & Bretschneider;

Seddon, Graeser, & Willcocks, 2002), and efficiency (Dewett & Jones). Finally, contemporary studies have also investigated measures of extra-organizational impacts such as the effect of IS on customer service (Karimi, Somers, & Gupta, 2001), competitive advantage (Kearns & Lederer, 2004), stock market valuation (Sriram & Krishnan, 2003), and inter-organizational relationships (Dewett & Jones; den Hengst & Sol, 2002). Table 14 provides a selected list of IS organizational impact measures.

Table 14. Selected measures of the impact of IS on organizations

Measures of the Impact of IS on Organizations

- Examples of objective/quantifiable intra-organizational impacts
  - Return-on-investment
  - Cost
  - Productivity
  - Profitability
- Examples of subjective/qualitative intra-organizational impacts
  - Organizational structure
  - Innovation
  - Communication
  - Change
  - Decision-making
  - Efficiency
- Extra-organizational impacts
  - Customer service
  - Competitive advantage
  - Stock market valuation
  - Inter-organizational relationships

Societal Impact Measures

In critiquing DeLone and McLean's (1992) model of IS success, Seddon (1997) proposed the addition of analyzing IS effects at a societal level. In this context, societal impacts refer to the effects of IS/IT beyond the scope of an individual organization. George (2000) also reflected the need for evaluation beyond the level of a single organization by including "sector" (industrial) and "macro" (national and global economic) analysis categories in his conceptual framework. As with group level

measures, DeLone and McLean (2003) concurred with the view that an appropriate level of analysis should be selected based upon the evaluation's context, thereby tacitly supporting a societal level assessment of IS outcomes.

In practice, evaluations with a scope that extends beyond individual organizations have taken many forms. As a few examples, researchers have studied the "IT productivity paradox" at an economy or industrial level (Brynjolfsson, 1993; Brynjolfsson & Hitt, 1998), the educational outcomes associated with providing IT to students in developing countries (Kozma, McGhee, Quellmalz, & Zalles, 2004), and the value of e-government initiatives (Gupta & Jana, 2003). Banister (2005) also discussed the need for the evaluation of the societal impacts of innovative developments such as cyborg and nano technology, artificial intelligence, and robotics. Of course, commercial enterprises working on such developments are unlikely to fund a critical analysis of the broader societal implications of their innovations. Indeed, the literature review suggests that evaluations that extend beyond the scope of an individual organization are typically undertaken as part of a research study and commonly conducted by academic researchers. Consequentially, measures of the societal impacts of IS are difficult to generalize because the evaluation criteria are often tightly bound to the unique context associated with each study. This relationship is demonstrated in Table 15.

Table 15. Selected measures of the impact of IS on society

Measures of the Impact of IS on Society

- Often the focus of a particular academic study, such as:
  - IT "productivity paradox" research (Brynjolfsson, 1993; Brynjolfsson & Hitt, 1998)
  - Educational outcomes (Kozma, McGhee, Quellmalz, & Zalles, 2004)
  - E-government value (Gupta & Jana, 2003)

The Relationship Between Evaluation Criteria and Methods

The preceding sections have examined the measures associated with the dimensions of IS/IT success: quality, use / impacts of use, and impacts (DeLone & McLean, 1999; Seddon, 1997; DeLone & McLean, 2003). Each of these dimensions' sub-categories have one or more associated success measures. In order to assess a given success dimension, an evaluator must estimate or determine the value of one or more measures. To evaluate multiple success dimensions, the evaluator will almost always need to determine the value of multiple measures. To guide practitioners in evaluating IS/IT investments, IS scholars and practitioners have devised a number of methods, techniques, or approaches for selecting, utilizing, and/or combining a variety of IS success measures. The ensuing section of this literature review demonstrates the interconnectedness of IS/IT evaluation procedures and IS success measures. In some cases, such as discounted cash flow (DCF) techniques, tight linkages exist between the evaluation technique and its measure(s). In contrast, other approaches provide more flexibility; for example, the Critical Success Factors (CSF) method provides a mechanism to assist executives in determining which specific measures should be evaluated. Therefore, evaluators must be familiar with IS success measures, as well as the numerous evaluation methods, techniques, and approaches used in selecting or applying specific metrics.

How: IS/IT Evaluation Methods, Techniques, and Approaches

Given the intractable challenges associated with conducting evaluations, researchers have focused on developing better evaluation tools and techniques as a means of advancing IS/IT evaluation knowledge (Hirschheim & Smithson, 1999). Indeed, the literature is saturated with evaluation methodologies and approaches. In fact, a sizable quantity of the literature has been devoted to describing and categorizing evaluation

methods (e.g., Farbey, Land, & Targett, 1999; Hirschheim & Smithson, 1999; Renkema, 2000; Whittaker, 2001; Irani & Love, 2002; Serafeimidis, 2002; Nijland, 2004). In one of the more comprehensive overviews, Renkema (2000) identified over seventy unique methods for IT investment appraisal found in the literature up to the mid-1990s. What is more, this number likely represents only a small portion of the entire collection of evaluation methods. For instance, Renkema did not include strictly technical evaluation methods (e.g., performance measurements), nor did the author include the highly plausible myriad of unpublished techniques (of varying quality and originality) developed or customized by organizations outside of academia (e.g., companies, governmental agencies, and consulting firms).

Given countless existing methods, a broader framework for categorizing and understanding evaluation techniques seems highly desirable, if not necessary. Smithson and Hirschheim (1998) offered such a framework by dividing IS/IT evaluation approaches into two broad categories based upon their underlying epistemological assumptions: objective/rational or subjective/political. In the objective/rational category, Smithson and Hirschheim further divided the objective/rational category into two zones: *efficiency* (i.e., "doing things correctly") and *effectiveness* (i.e., "doing the correct things"). In the case of the subjective/political category, Smithson and Hirschheim described this as the *understanding* zone (i.e., "discovering why things are done").

Serafeimidis (2002) adapted this framework, yet continued to offer classifications based on three streams of research: technical, economic, and interpretive alternatives. Each of Serafeimidis' constructs parallel those offered by Smithson and Hirschheim:

- Technical →Efficiency
- Economic → Effectiveness

- Interpretive Alternatives → Understanding

In this study, the researcher utilized Smithson and Hirschheim's (1998) less ambiguous terms of *efficiency* and *effectiveness*, because Serafeimidis' (2002) technical stream includes measures, such as total cost of ownership (TCO), that appear economic rather than technical (yet are efficiency oriented). However, the researcher applied Serafeimidis' *interpretive* label, because the term is more commonly applied in the literature and suggests a broader scope. Thus, the researcher employed the framework depicted in Figure 6 for organizing the literature review of existing evaluation methods, techniques, and approaches.

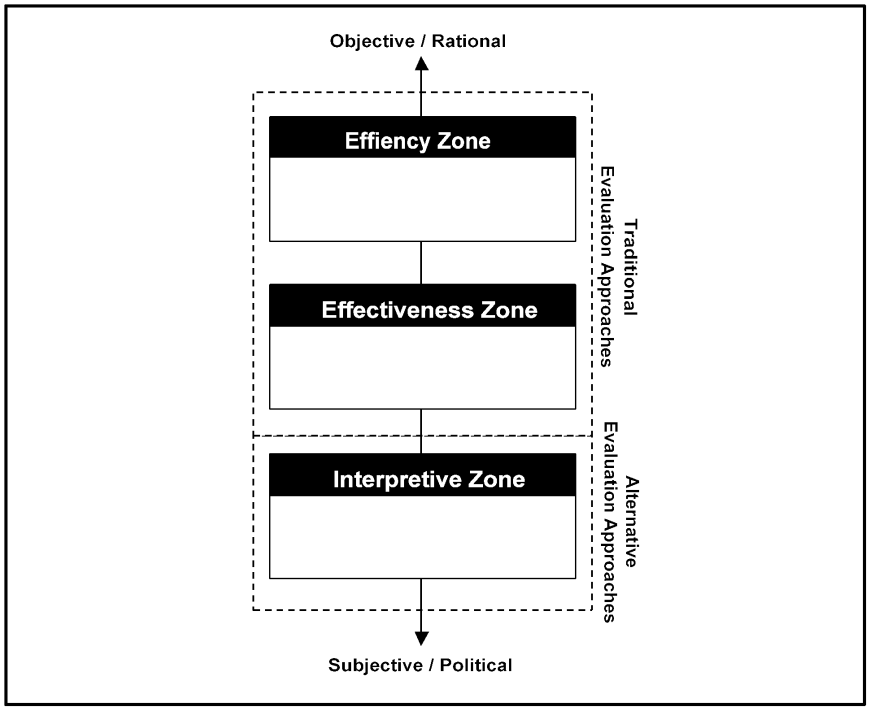

Figure 6. IS/IT evaluation methods framework (after Smithson & Hirschheim, 1998)

Traditional Evaluation Approaches: Overview

According to Hirschheim and Smithson (1999), traditional IS/IT evaluation practice operates from an objective/rational viewpoint, focusing on the efficiency and

effectiveness of solutions. Such evaluation approaches are grounded in a positivist epistemology—an epistemology that, when applied to this context, holds that information systems are inherently objective and rational. Therefore, practitioners should evaluate information systems using objective/rational methods.

Overall, researchers have tended to describe traditional evaluation methods as formal, overt, ritualistic, mechanistic, quantitative, and/or prescriptive in their efforts to determine the costs, benefits, and risks associated with IS/IT investments (Hirschheim & Smithson, 1999; Walsham, 1999; Serafeimidis & Smithson, 2000; Serafeimidis, 2002). Nevertheless, researchers have suggested that formal evaluation frequently fails to be undertaken with rigor (Willcocks & Lester, 1999) and is completely avoided by practitioners in many cases (Jones & Hughes, 2000). In a recent study of IS/IT evaluation practices in European companies, researchers found that only one third of the organizations surveyed conducted formal evaluations (Hallikainen, Hu, Frisk, Eikebrokk, Päivärinta, & Nurmi, 2006). Yet, Walsham (1999, p. 368) maintained that when organizations perform IS/IT evaluation, they tend to employ traditional methods that hold "considerable legitimacy" with executives and managers. This finding was supported by Hallikainen, Hu, Frisk, Eikebrokk, Päivärinta, and Nurmi's (2006) study that found that quantitative evaluation methods were widely used by the organizations conducting formal evaluations.

Given the abundance of evaluation methods, the researcher followed the procedure outlined in Chapter 3 to identify and select the representative methods included in this review. To that end, Figure 7 depicts the classification of all 17 methods included in this schema.

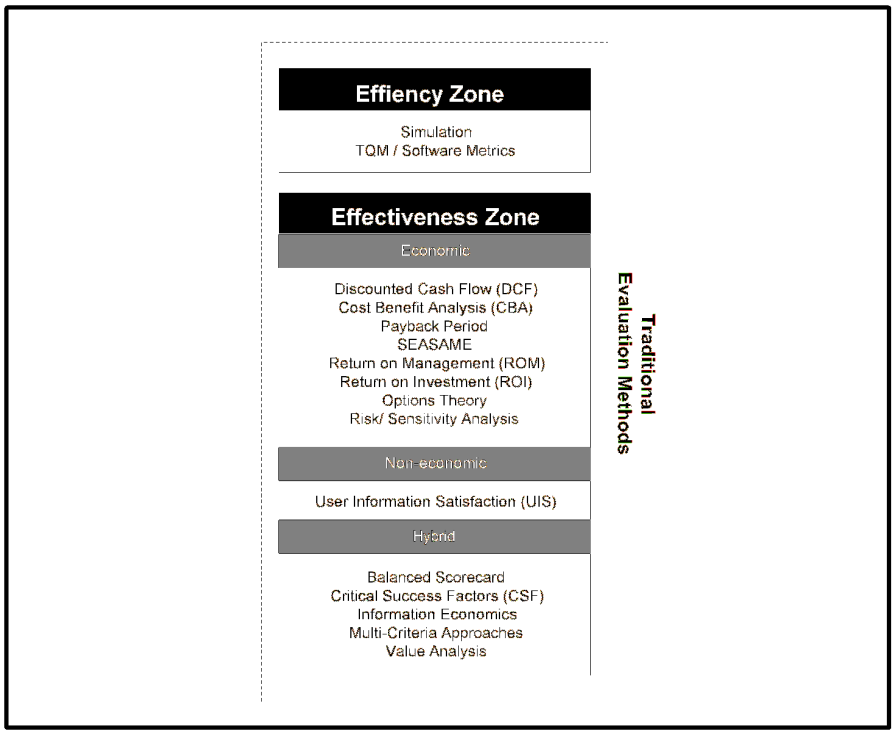

Figure 7. IS/IT evaluation methods framework: traditional methods included in literature review

Efficiency Zone: Evaluation Methods

According to Serafeimidis (1997, 2002), the efficiency stream of IS/IT evaluation emphasizes issues of reliability, performance, and cost control. Consequently, researchers have focused attention on system and software quality control techniques and measures. For example, Hirschheim and Smithson (1999) identified hardware/software monitoring (performance measurement), simulation (performance prediction), code inspection, and software metrics (quality control mechanisms) as representative efficiency-oriented evaluation methods. These methods correspond closely with the numerous system quality and performance measures identified by DeLone and McLean (1992): response time, reliability, accessibility, error rates, accuracy, and resource utilization. In reviewing the literature, two dominate streams of efficiency-oriented evaluation methods appeared. First, numerous authors addressed the domain of "software metrics" and extensions to

that approach derived from the Total Quality Management (TQM) movement. Second, scholars have also focused on simulation techniques to predict (and thus ultimately improve) system/software quality.

Software Metrics & Total Quality Management

According to Fenton and Neil (1999), the term "software metrics" describes a number of software engineering activities that attempt to quantitatively measure or predict the characteristics of software code. Dating from the late 1960s, the vast majority of software metrics are based upon a fundamental measure: lines of code (LOC). Using this unit of measurement, practitioners and scholars devised a number of alternate metrics for constructs such as programmer productivity (LOC per programmer per time interval) and software quality (number of defects per LOC). Fenton and Neil also indicated that LOC had been used as a surrogate measure for complexity, thereby enabling the crude prediction of software quality. However, the proliferation of a multitude of high-level and eventually object-oriented languages necessitated the development of alternative metrics for software complexity and size (Halstead, 1977; Zuse, 1991).

Beyond the development of individual metrics, Basili and Rombach (1988) encouraged a comprehensive approach, based upon ideas from the Total Quality Management (TQM) movement, to ensure that the selection of metrics were driven by organizational goals. Fenton and Neil (1999) stated that Basili and Rombach's GQM (Goal-Question Metric) was widely adopted in the software engineering community and continues to serve as a touchstone in many organizations' software metrics programs. Indeed, the scholars argued that successful metrics programs demand clear and specific goals and objectives.

Unlike many forms of IS/IT evaluation, organizations appear to utilize software metrics in some capacity. Unfortunately, empirical research suggests that increased activity does not always imply improved quality in industrial metrics practices. Fenton and Neil (1999) indicated that industrial metrics activities are:

- Poorly motivated – rather than recognizing intrinsic benefits, practitioners typically inaugurate metrics programs to satisfy an external assessment body, such as to achieve a higher level of the Capability Maturity Model (CMM).

- Poorly executed – rather than utilize improved procedures, practitioners typically ignore best practice guidelines for data collection and analysis and instead rely on techniques that were proven to be invalid decades ago.

- Poorly selected – rather than using newer or alternative techniques, practitioners routinely apply LOC metrics for measuring everything from quality (defect counts) to complexity (as a function of size). While LOC metrics are easy to compute and simple to understand, they lack the robustness required for many tasks, especially predicting software quality.

Simulation

According to Fenton and Neil (1999), one of the goals of software metrics research has been to develop successful predictors of system/software reliability. In doing so, the authors clearly distinguished between software failures (i.e., defects identified during software operation—that is to say, reliability) and mere faults (defects identified during the development process). Additionally, the authors indicated that stochastic modeling has proven effective in predicting reliability in cases where failure data may be collected from operational use. Unfortunately, such modeling may not always be a useful form of prediction. For example, stochastic modeling would allow an individual to predict the relative likelihood of a failure in a particular automobile based upon the prior performance of identical vehicles' operating behaviors. However, stochastic modeling would be unable to accurately predict the reliability of a particular vehicle without a sufficient amount of empirical performance data for comparable vehicles. In a similar

manner, stochastic modeling would likely prove ineffectual in predicting the reliability of a software system prior to its actual operation.

Indeed, Fenton and Neil (1999, p. 152) found that most approaches involving statistical models and metrics for predicting software quality suffer "from a variety of flaws" and contain "many methodological and theoretical mistakes." In short, the authors concluded that "traditional statistical (regression-based) methods are inappropriate for defects prediction" (p. 153). Therefore, to better predict system quality, scholars have proffered alternative methods using decision support and simulation techniques that better handle cause and effect relationships, uncertainty, and incomplete information (all characteristics of nascent, complex systems).

Thwin and Quah (2005) employed Artificial Neural Networks (ANNs) to predict software quality using objected-oriented methods. In particular, the researchers attempted to predict the number of defects in a class (i.e., faults) and predict the number of modified lines of code in a class (i.e., maintenance effort) using a set of independent variables related to object-oriented measures of inheritance, complexity, coupling, cohesion, and memory allocation. In conducting their study, Thwin and Quah used two neural network models, the Ward Neural Network and the General Regression Neural Network (GRNN). Consistent with earlier studies, the researchers found neural network modeling techniques—particularly the GRNN model—to be effective in accurately predicting faults and estimating maintenance efforts.

Fenton and Neil (1999) utilized Bayesian Belief Networks (BBNs), which are based on Bayesian probability, to predict software defects. In their research, they found that BBNs offered significant advantages over traditional statistical approaches. According to the authors, BBN benefits include:

- addressing uncertainty in estimates,
- explicating tacit assumptions (thereby, making the decision-making process more visible and auditable),
- improving the visualization of complex relationships that influence reasoning,
- allowing for both objective and subjective evidence in probability distributions,
- forecasting with incomplete and/or missing data,
- and, enabling "what if" scenario analysis to estimate the effect of changes.

Moreover, Fenton and Neil pointed to the availability of software tools that would shield practitioners from having to directly perform complex Bayesian calculations.

Given the failure of many metrics found in the academic research literature to gain industrial acceptance, Fenton and Neil's (1999, p. 157) call for "metrics-based management decision support tools that build upon relatively simple metrics that we know are already being collected" seems highly appropriate. By integrating familiar metrics into user-friendly decision support systems, industrial practice may be advanced through the application of simulation techniques based on ANNs or BBNs. Moreover, such tools could provide valuable insights for reflective practitioners into their underlying estimation and decision-making processes.

Effectiveness Zone: Evaluation Methods

In the previous section, efficiency zone methods involved "doing a thing right" (i.e., controlling costs, ensuring quality, etc.). In contrast, methods located in the effectiveness zone focus on "doing the right thing" (i.e., measuring or predicting the relative contribution of an IS to organizational goals and objectives). Broadly speaking, these rational/objective effectiveness methods may be subcategorized into one of three groups of methods: economic, non-economic, and hybrid.

Economic methods originate in the disciplines of economics and/or finance (Serafeimidis, 2002). These industrially popular methods tend to assess value in strictly quantitative terms, typically monetary units. The scope of economic methods ranges from longstanding discounted cash flow techniques and cost benefit analysis to more contemporary options theoretic and risk analysis approaches. In contrast to economic methods, non-economic methods exclude explicit financial or economic considerations in their evaluation process. Given the considerable weight practitioners apply to monetary implications (Walsham, 1999), few rational/objective non-economic methods are widely cited in the literature. The notable exception is user satisfaction, particularly the User Information Satisfaction (UIS) method. Finally, hybrid approaches consist of techniques that may consider financial/economic implications, as well as one or more non-economic dimensions. Each of these categories and their representative methods will be explored in the subsequent sections of this literature review.

Economic Methods: Introduction

Economic methods appear frequently in the academic literature and seem to hold considerable legitimacy in industrial practice (Walsham, 1999; Serafeimidis, 2002). As a consequence, the majority of effectiveness-oriented evaluation methods are found in this section. In particular, the researcher discussed each of the following widely cited methods: Discounted Cash Flow (DCF) techniques, Cost/Benefit Analysis (CBA), payback period, Systems Effectiveness Study and Management Endorsement (SESAME), Return on Management (ROM), Return on Investment (ROI), options theory, and risk sensitivity analysis.

Payback Period

Of the economic approaches, evaluators likely find the payback period to be one of the most simplistic measures to calculate. According to Renkema and Berghout (1997), the payback period represents the length of time between when an IS investment is undertaken and the point at which the investment is recouped as a result of incoming cash flows. This calculation may be made either *ex ante* or *ex post*. In the case of *ex ante* evaluation, the payback period is calculated based upon estimated cash flows. Evaluators base their decision upon a comparison of the estimated payback period versus the time period in which the investment must be recouped (Renkema & Berghout). Thus, if the estimated payback period exceeds the organization's maximum acceptable payback period, the investment will not be made. Despite its simplicity, the payback period calculation suffers from serious inadequacies, specifically its failure to account for the time value of money and the risks associated with undertaking the investment (Dué, 1989).

Discounted Cash Flow (DCF) Methods

To account for the time value of money, a number of methods utilize the discounted cash flow (DCF) technique. By reducing the value of future cash flows (based upon how far they are into the future), this technique accounts for both a monetary unit's loss of spending power (resulting from inflation) over time and the uncertainty associated with attempting to estimate this degradation in the future cash flow's value (Renkema, 2000). In doing so, methods based upon DCF assume that decision-makers are risk averse. The advantages of DCF methods include their ability to easily compare and contrast alternative investments, the ease with which the calculations may be computed, and the

fact that both cost and income cash flows may expressed in present value, thereby accounting for the time value of money (Farbey, Land, & Targett, 1999; Lucas, 1999).

Frequently cited in the literature, the net present value (NPV) and internal rate of return (IRR) methods utilize the discounted cash flow technique in calculating the yield of an investment while accounting for both the time value of money and the investment's associated risk. As put forth in Lucas (1999), an analyst calculates NPV by first establishing the present value of a project's total cost and total benefit. The analyst then subtracts the cost's present value from the benefit's present value; the difference equals the net present value. To complete the analysis, evaluators compare each alternative's NPV and select the solution that affords the greatest return. In contrast, the IRR is equivalent to the discount rate that makes the present value of a solution's income stream equal to zero (Renkema, 2000). Having calculated the IRR for a number of alternative investments, the evaluator may compare the respective internal rates of return for each alternative or compare the IRR to the hurdle rate of return (i.e., the minimum acceptable internal rate of return) imposed by the organization or project's sponsor (Farbey, Land, & Targett, 1999).

Although widely employed by practitioners, when utilized in *ex ante* evaluation to estimate the value of an IS investment, both NPV and IRR suffer conceptual problems. Lucas (1999) identified six challenges associated with applying DCF methods to IT investment evaluations. First, an analyst must base their calculations on estimated costs and benefits; however, accurately estimating an IT project's costs and benefits is a difficult task. Second, techniques such as NPV assume that the benefits are actually realized—it does not account for conversion effectiveness problems. Third, both the NPV and IRR methods do not allow for variability in interest rates during the analysis period.

Fourth, the methods are not well suited to analyzing investments, such as those in underlying infrastructure, that do not offer clear short-term payoffs and highly uncertain long-term benefits. Fifth, NPV and IRR fail to explicitly address risk. Indeed, Farbey, Land, and Targett (1999) indicated that the application of an appropriate hurdle rate of return does not ameliorate the challenge, as it fails to account for the large elements of uncertainty inherent in many IT projects. Sixth and finally, Lucas pointed out that DCF methods of evaluation do not address the implications of *not* undertaking an investment (e.g., for a system necessary to remain competitive in the marketplace, what is the cost of not making such an investment?). In addition, Farbey, Land, and Targett stated that DCF methods do not apply well to investments with uncertain lifetimes, a frequent challenge in the case of information technology. For these reasons, Whittaker (2001) described the use of such techniques as a crude form of evaluation.

Cost/Benefit Analysis (CBA)

Though not the originators of the method, King and Schrems (1978) provided a relatively early and comprehensive introduction to cost/benefit analysis in the domain of information systems. Specifically, the authors both described the technique and expounded upon some of the challenges associated with the method. King and Schrems indicated that CBA may be used as either an *ex ante* or *ex post* evaluation method; however, the authors suggested that the method might be most commonly used as a means of providing quantitative justification for politically-motivated decisions.

According to King and Schrems (1978), the process of conducting a cost-benefit analysis consists of five steps:

1. Selecting an analyst
2. Identifying and selecting the alternatives

3. Identifying and measuring the associated costs and benefits
4. Comparing the alternatives
5. Performing the analysis itself

In each of these steps, a number of alternatives exist. For example, the organization may choose to rely on an in-house analyst, an outside consultant, or an external organization (such as the Small Business Administration) to conduct the cost/benefit analysis. Likewise, CBA may utilize a variety of techniques to identify and measure (*ex post*) or estimate (*ex ante*) both the costs and benefits associated with a given project (King & Schrems; Sassone, 1988). Therefore, cost-benefit analysis is best understood as "a set of techniques for computing the return on individual projects or sets of projects within firms" (Whittaker, 2001, p. 33). In general terms, cost/benefit analysis utilizes the Discount Cash Flow (DCF) technique in its calculations (King & Schrems; Whittaker). Because of this, CBA demands that all costs and benefits be expressed in monetary units; therefore, analysts may find it difficult (if not impossible) to measure or estimate certain less tangible costs and benefits. In some cases, "surrogate" values may be utilized to ascribe a monetary value to an indirect cost or benefit; however, King and Schrems (p. 23) cautioned that "great care must be used" in employing surrogate values.

As stated in Whittaker (2001), numerous scholars have asserted that cost/benefit analysis provided a suitable means of evaluating information technology investments that sought cost displacement and/or cost avoidance through automation. With the evolving role of information technology from an automational to a transformational tool, scholars have come to question the suitability of traditional cost/benefit analysis in addressing less tangible and less direct benefits (Farbey, Land, and Targett, 1999; Whittaker, 2001). Furthermore, because CBA utilizes the underlying techniques of DCF methods, the same

conceptual problems (as discussed previously) apply. Finally, the use of surrogate measures introduces the appearance of artificiality into the analysis. Thus, decision-makers may reject the evaluation's outcome, because they distrust the analyst's surrogate values (Farbey, Land, and Targett).

Despite the conceptual difficulties associated with CBA, scholars have suggested enhancements to the basic method. Sassone (1988) surveyed a number of methods for better quantifying an IS investment's benefits for inclusion in CBA calculations: decision analysis, cost displacement/avoidance, structural models, cost effectiveness analysis, breakeven analysis, subjective analysis, time savings times salary, and the work value model. In other cases, scholars have expanded CBA to form new methods, such as SESAME (Lincoln, 1988).

Systems Effectiveness Study and Management Endorsement (SESAME)

SESAME, which was developed at IBM, offers a means of comparing the financial returns of an automated information system versus those of a reasonable manual alternative (Lincoln, 1988). It is an expansion of traditional CBA; indeed, the method demands that an analyst conduct two separate cost/benefit analyses and then compare the results of both. Unlike some methods, however, SESAME was prescribed for use in conducting only *ex post* evaluations; thus, the method is unsuitable for pre-implementation investment appraisals.

Aside from the *ex post* constraint, SESAME suffers from other limitations. Whiting, Davies, and Knul (1996) pointed out that because both alternatives are assumed to produce the same end-result, the method implicitly accounts for intangible benefits. The authors argued, however, that this assumption is flawed—the alternatives may well result in disparate collateral benefits. For example, end-users may prefer the automated system

to the manual system or *vice versa*. Whittaker (2001, p. 40) also questioned the underlying assumption of the methodology by stating that the "real likelihood of a 'reasonable manual alternative' is very low indeed."

Return on Investment (ROI)

Like cost/benefit analysis, return on investment (ROI) may involve several different measures of investment return. However, unlike CBA, it lacks a universally accepted definition and a more-or-less collectively ascribed to set of principals. For example, Farbey, Land, and Targett (1999) equated ROI with both non-discounted (e.g., payback period) and discounted (e.g., NPV and IRR) financial analysis methods. In contrast, other authors have purposefully categorized ROI as a non-discounted technique (Whittaker, 2001). Likewise, ROI may be derived from a number of ratio calculations, the simplest of which are based on the following formula:

$$ROI = (Gross\ Benefit - Investment\ Cost) / Investment\ Cost$$

However, a number of other possible ratios may be used for calculating ROI, such as operating income return on investment, return on employed capital, return on total assets, and return on common equity (Scott, Martin, Petty, & Keown, 1999). In other cases, ROI may simply be equated to the cumulative cash flow associated with an investment over time.

Given the disparity in working definitions of return on investment, practitioners and academicians should exercise caution in using the term. So while it is commonly described in the trade press (Huber, 2005; Porter-Roth, 2005), evaluators should ensure that everyone shares a common understanding of the meaning of the term in their local context. In addition, evaluators should be aware of the underlying techniques' specific advantages and limitations.

Return on Management (ROM)

Strassman (1990) asserted that information technology contributes to organizational value by enhancing management productivity. Operating under this theory, evaluators may estimate/measure the economic benefit of an IT investment by calculating the net change in management productivity. According to Strassmann, Return on Management may be calculated using this formula:

ROM = Net Value Added by Management / Full Cost of Management

To calculate the *net value added by management*, an analyst deducts the following from total revenue: purchases, shareholder value add, costs of operations, and the costs of management. The calculation for the *full cost of management* is easier: it equals total costs less the costs of operations. The ratio of these two factors equates to the Return on Management.

According to Smithson and Hirschheim (1998), methods that attempt to evaluate information systems using single statistical ratios ought to be treated with extreme care. In fact, scholars have particularly cautioned about the allure of the employing the Return on Management measure. Whittaker (2001), for instance, critiqued the method's underlying rationale that asserted a causal relationship between information technology and management productivity, particularly as changes in management productivity may result from a multitude of confounding variables unrelated to the use of information technology. As a result, Whittaker (p. 39) argued that "the technological determinism of this method cannot be warranted," and therefore "the measure, however it is used, has little value."

Options Theory

According to Lucas (1999), investments in information technology today may enable an organization to undertake future IT initiatives. In this sense, one may consider a current IT investment as providing an option to facilitate a future IT project. In recognition of this view, Lucas asserted that researchers have drawn upon various options pricing models found in the finance literature (for the valuation of stock options) in an effort to ascribe a value to the options associated with undertaking an IT investment. In particular, options pricing models are especially beneficial in evaluating IT investments that enable subsequent capabilities (e.g., improving infrastructure). Nevertheless, researchers have raised concerns regarding the use of options pricing models. Lucas asserted that the application of options pricing models to nontradable assets (e.g., information technology as opposed to common stock) might be theoretically unsound. As a consequence, the author recommended that IT investment decisions should not be made solely on the basis of options pricing models for two reasons. First, the estimates required in such calculations are difficult to accurately predict. And, second, a "by the numbers" approach does not precisely fit the context of IT investments (as nontradable assets). Moreover, Kim and Sanders (2002) suggested that IT practitioners may have difficulty calculating options values due to the complexity of the procedure and a lack of familiarity with such financial techniques.

As an alternative to options pricing models, Kim and Sanders (2002) presented a more flexible and less quantitative approach based on real options theory. In developing their model, the authors distilled the real options theory to a more simplistic two-factor model consisting of interaction effects and competitor reactions (which the authors asserted were the fundamental factors that influenced an investment's return). In doing so, Kim

and Sanders stated that by using this model evaluators would be better able to understand the strategic impacts of IT investments, thereby assisting them in developing improved strategies for managing their firm's existing and future IT portfolio. Nevertheless, Kim and Sanders concede that this approach suffers from some of the same limitations as options pricing models, specifically in relying upon potentially undependable assumptions about risk (e.g., technical and organization risks, which are obviously not priced by financial markets in the context of IT investments) and timeframes (e.g., estimates regarding the time to exercise-date and variances in the rate of return over time). As a result of its limitations, Lucas (1999) recommended that practitioners should employ options theoretical approaches with caution and as only a part of a comprehensive evaluation program.

Risk / Sensitivity Analysis

As previously discussed, some economic methods have attempted to address the risk associated with investments in IS/IT by the simplistic application of discount rates. However, such methods are viewed as rather crude techniques for evaluating risks; to that end, researchers have proposed more advanced techniques for simulating/evaluating risks. For example, Whittaker (2001) highlighted the use of stochastic analysis or subjective probability distributions. In performing this technique, an analyst uses a range of possible values rather than a single point estimate in calculating possible outcomes. In a similar manner, an analysis may be performed to determine the sensitivity of the outcomes of an alternative to changes in the values of its parameters (Scott, Martin, Petty, & Keown, 1999). In doing so, if a small change in a variable results in relatively large change in the outcome, the outcome is considered to be sensitive to that variable. As a

result, the variable may need to be estimated with a high degree of accuracy, or the solution may need to be redesigned to lower its sensitivity to that factor.

Although the use of stochastic methods may improve the efficacy of risk evaluations, these techniques are not without limitations. Whittaker (2001) pointed to the difficult and often arbitrary task of determining values for the selective distribution. In addition, evaluators often lack a sufficient base of similar cases to draw assumptions about the selective distribution. Likewise, the technique often fails to completely account for randomness.

Non-Economic Methods: Introduction

As previously discussed, non-economic methods exclude explicit financial or economic considerations during the evaluation process. Given practitioners' pragmatic focus on the "bottom line" (i.e., the monetary implications of investment decisions), few rational/objective non-economic methods are widely cited in the literature. This contrasts with interpretive (subjective/political) methods that primarily focus on non-economic assessments. In the rational/objective literature stream, techniques for measuring user satisfaction, particularly the User Information Satisfaction (UIS) method, provide the notable exception.

User Information Satisfaction (UIS)

As noted in the "Evaluation Criteria/Measures" section of this literature review, user satisfaction has been widely accepted as a valid measure of IS Success. In particular, Bailey and Pearson's (1983) User Information Satisfaction (UIS) measure has been frequently cited and utilized (Baroudi & Orlikowski, 1988). Like some other measures / methods of IS evaluation, User Information Satisfaction describes both the unit of analysis (measure) and the process for conducting the evaluation (method). Given that, it

is appropriate to discuss UIS in both the measures and methods sections of this literature review.

To summarize the prior discussion of UIS, the method consists of administering the UIS survey instrument to end-users and then analyzing the results statistically (Bailey & Pearson, 1983; Ives, Olson & Baroudi, 1983). Given this empirically and quantitatively oriented procedure, UIS would seem to be appropriately described as a "rational / objective method" for evaluating information systems. However, as Seddon (1997) argued, user satisfaction is a *subjective* evaluation of the outcomes associated with the use of an information system on a pleasant-unpleasant continuum. In this sense, UIS provides a mechanism to *rationally and/or objectively describe* what is inherently a subjective measure (an individual's perceptions about an information system's usefulness). This understanding of UIS highlights an important point raised by Smithson and Hirschheim (1998). Rather than viewing methods dualistically as either "rational/objective" or "subjective/political," one should consider evaluation methods as ranging across a continuum from objectivism to subjectivism.

Hybrid Methods: Introduction

Hybrid approaches may utilize financial/economic factors and/or non-economic dimensions to evaluate information systems. All of the following methods have been associated with the rational/objective stream of IS evaluation techniques. However, consistent with the prior discussion of an objective-subjective continuum of evaluation methods, these approaches vary considerably with respect to their degree of apparent objectivity, as demonstrated by either their reliance on quantitative measures or empirically observable outcomes. For example, in practice Parker, Benson, and Trainor's (1998) Information Economics relies heavily on their quantitative "enhanced ROI"

metric. In contrast, Rockart's (1979) Critical Success Factors (CSF) method utilizes a dialogic approach to uncover executives' explicit and implicit goals and objectives. In this sense, the term "hybrid" provides an apt description for this group's diversity of methods and measures.

Balanced Scorecard

Kaplan and Norton (1992, 1996) developed the Balanced Scorecard to provide managers with a concise, yet holistic, view of their organization in order to direct their actions toward future competitive success. To accomplish this goal, the Balanced Scorecard attempts to link an organization's long-term strategic direction to its short-term activities. Prior to developing the Balanced Scorecard, Kaplan and Norton noted that senior managers in organizations were being overwhelmed with data, thereby prolonging analysis and impeding decisions (Mooraj, Oyon, & Hostettler, 1999). Moreover, they believed that managers tended to excessively privilege financial performance measures in making decisions—a poor strategy in that financial performance reflects the outcomes associated with past decisions, yet provides little insight into future circumstances. To that end, Kaplan and Norton developed the Balanced Scorecard to assist managers in identifying the measures and drivers most critical to realizing the organization's future objectives.

Specifically, the Balanced Scorecard comprises four perspectives: financial, customer, internal business processes, and learning and growth. As such, it attempts to balance both internal and external outlooks on the organization by examining shareholder, customer, employee, and process views. In doing so, Kaplan and Norton's framework provides a means to explicitly link the organization's strategy with these perspectives and into operational themes for managerial execution (Mooraj, Oyon, & Hostettler, 1999). To

select the limited number of measures, the Balanced Scorecard methodology relies on identifying cause-and-effect relationships between each segment of the framework. For example, to achieve a financial aim such as increasing revenue via additional sales, the organization must establish linked operational factors. One such series of linkages might include generating new sales (financial) by attracting new customers (customer) through better market intelligence (internal business process) brought about by improved marketing skills (learning and growth).

In examining the role of the Balanced Scorecard in IS/IT evaluation, Whittaker (2001) noted that the framework was not originally intended as an information systems tool. Nevertheless, the Balanced Scorecard may prove useful in this context as information systems are designed to support organizational objectives across the perspectives outlined in Kaplan and Norton's framework. Yet in order to be applied in the context of IS/IT, the organization and (if relevant) subordinate business units must have a clearly defined strategic direction, expressed in terms of the balanced scorecard. In addition, Mooraj, Oyon, and Hostettler (1999) cautioned that the BSC does not address the difficulties associated with the informal elements of selecting measures nor does it explicitly deal with the method's social implications.

Critical Success Factors

Motivated by the deluge of data but lack of "real information" faced by senior managers (especially chief executive officers), Rockart (1979) presented the Critical Success Factors (CSF) method for defining executives' information needs. Conceptually, Rockart grounded CSFs in earlier business research focused on "success factors," which may be defined as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization" (p. 85). Given their

importance, Rockart argued that the performance of each of these critical areas should be continually measured and reported. Thus, the CSF approach developed aims at assisting executives in defining, measuring, and reporting on these factors.

As described by Rockart (1979), in practice the CSF method involves two to three discussions between an executive and an analyst. In the first meeting, the executive's goals and their underlying CSFs are recorded and discussed. Throughout this initial discourse, the executive and analyst refine the list of recorded CSFs by clarifying, combining, restating, and eliminating them as required. Additionally, the executive and the analyst create an initial list of potential measures for the CSFs (ranging from traditional accounting/financial metrics to subjective assessments). In the second meeting, the analyst summarizes the first meeting's outputs, presents a refined list of factors, and discusses the measures and possible reports with the executive. Depending on the circumstances, a third meeting may be required to gain final agreement from the executive on the measures and the format of the report(s) (Rockart, 1979).

Farbey, Land, and Targett (1999, p. 189) describe the CSF method as a "well-known strategic approach to evaluating information systems." Interestingly, the authors argued that the significance of the CSF method resides in its ability to build consensus about the issues that managers regard as important. That is to say, by agreeing to the relative importance of the various issues faced by an organization, managers will be better positioned to strategically apportion the firm's resources. It should be noted, however, that this common application of the concept of CSFs extends beyond Rockart's (1979) intended scope for the method. Indeed, Rockart (p. 88) cautioned against the use of CSFs for strategic planning and argued that its use should center on "information needs for management control," especially "data needed to monitor and improve existing areas of

business." In this sense, the contemporary application of CSFs appear to be more an extension of the conceptual antecedents Rockart relied upon, as opposed to an explicit application of the CSF method as a means of addressing executives' information requirements.

Information Economics

In developing Information Economics, Parker, Benson, and Trainor (1988) sought to create a comprehensive methodology for evaluating the overall contribution of IS/IT in terms of business value. More specifically, the authors defined value as equaling "the true economic impact" of IS/IT investments. At its core, Information Economics represents a domain specific version of cost-benefit analysis, customized "to cope with the particular uncertainties and intangibles" associated with IS/IT investments (Farbey, Land, & Targett, 1999, p. 188). For tangible costs and benefits, Parker, Benson, and Trainor prescribe a traditional cost-benefit analysis approach of making ROI calculations. To assess intangibles, the authors developed a more complex ranking and scoring tool. The outcome of this tool, as well as the "simple ROI benefit" calculation, results in an assigned score that may be used by evaluators (in particular, executives) to make relative comparisons between tangible and intangible factors. Thus, Information Economics provides a means of identifying, measuring, and ranking the tangible and intangible factors associated with IS/IT investments, including elements such as risk, uncertainty, and competitive advantages.

In developing the theory underlying their methodology, Parker, Benson, and Trainor (1988) extended traditional cost-benefit analysis along three dimensions: value linking, value acceleration, and value restructuring. Value linking assesses the economic impact of an information system across the functional area it effects. Value acceleration

examines the value of future systems that would be made possible by the proposed system. Value restructuring considers the benefits of enhanced employee and departmental skills and understanding fostered by the proposed system's introduction, thereby enabling a progression from lower- to higher-value work activities.

In assessing the value of an IS/IT investment, Parker, Benson, and Trainor (1988) defined six dimensions that contribute to value:

- enhanced ROI (as previously described),
- strategic alignment, which focuses on a project's estimated contribution to the organization's strategy,
- competitive advantage, which focuses on a project's potential to provide an advantage in the marketplace,
- management information, which assesses a project's ability to provide information relevant to core business activities,
- competitive response, which estimates the degree of risk associated with not undertaking a project,
- and strategic IS architecture, which examines the role of a project in the organization's comprehensive IS architectural plan.

When combined, Parker, Benson, and Trainor (1988, p.235) argue that these tools enable managers "to be better able to develop rational investment priorities for decision making among all investment alternatives."

According to Whittaker (2001), many authors have described Information Economics as rigorous. For example, Farbey, Land, and Targett (1999, p. 189) noted the method's "attempt to bridge the quantitative / qualitative divide" and its ability to recognize intangible costs, uncertainty, and risk. Nevertheless, scholars have also been critical of the methodology, including Strassmann (1990) and Willcocks (1994). One criticism notes that while the computational tools may prove useful, the methodology fails to synthesize

them into a coherent investment appraisal strategy. Likewise, Farbey, Land, and Targett pointed out that the methodology was time consuming to perform, required substantial expertise, and may be needlessly complex in some circumstances.

Multi-criteria Approaches

As opposed to a single methodology, multi-criteria methods represent an alternative approach to traditional cost-benefit analysis (Farbey, Land, & Targett, 1999). In lieu of measuring costs and benefits based on monetary value, multi-criteria approaches assess the relative value of projects/outcomes based upon the evaluators' preferences. Farbey, Land, and Targett described a typical multi-objective evaluation process in which goals, objectives, and/or alternatives are ranked by evaluators, who apply a preference weight to each. This process may be assisted by a computer-based decision support system capable of carrying out the required calculations and performing relevant statistical tests (e.g., for sensitivity or robustness). According to Serafeimidis (1997, p. 52), this approach may emphasize "the process of obtaining agreement through exploration, mutual learning and negotiation." In so far as that is the case, this approach could be considered interpretive—as a means of enhancing understanding. Nevertheless, in practice, methods that arise from this approach tend to be more quantitative and mechanistic. For example, Boloix and Robillard (1995) described a method of multi-criteria evaluation employing both objective and subjective assessments of the quality and sophistication of software-based systems.

At their best, multi-criteria approaches provide a means by which different viewpoints may be explored, conflicts may be exposed, and consensus may be built. For that reason, Farbey, Land, and Targett (1999) suggested that these methods might prove especially useful in circumstances where a large number of disparate stakeholders are involved,

when strategy must be decided, or a number of design alternatives with divergent outcomes exist. Likewise, Serafeimidis (1997) argued that multi-criteria approaches offer an effective means to negotiate, resolve conflicts, and achieve consensus.

Portfolio Approaches

The majority of evaluation methods focus on investments at the project-level. That is to say, most approaches fail to explicitly examine proposed systems in the context of an organization's overall IS/IT infrastructure. In contrast, portfolio approaches allow evaluators to assess a given investment in relation to other ongoing and/or forthcoming projects (Nijland, 2004). Caution, however, should be exercised when using the term *portfolio approach* as it may be understood in one of two manners. On the one hand, it may be understood as the use of portfolios (e.g., grids) as a decision-making tool. On the other hand, it may be viewed as a type of financial portfolio, in which practitioners attempt to optimize a series of assets (IS/IT resources) in an effort to effectively balance risks and returns (Renkema, 2000). In the case of the second definition, Renkema argued that such an approach is really an extension the economic / financial methods discussed in the previous sections of this chapter. Therefore, in this study and literature review, *portfolio approaches* refer to methods that employ the use of decision-making grids.

While a number of methods exist that employ grids and/or mapping in the decision-making process, Renkema and Berghout's (1997) Investment Portfolio method has continued to be cited in the more recent literature in the domain (Renkema, 2000; Nijland, 2004). For that reason, the researcher examined it here as representative of such approaches. Specifically, the Investment Portfolio method examines three criteria of the proposed initiative: its contribution to the overall organization (business domain) its contribution to the organization's IT infrastructure (IT domain), and its financial return

(using a NPV calculation). Each of these elements are represented in a four quadrant grid with the contribution to the business domain (low to high) serving as the Y-axis and the contribution to the IT domain (low to high) serving as the X-axis. The NPV of the investment is plotted on the chart as a circle: the larger the circle the greater the expected return. By plotting multiple projects on such a grid, evaluators may quickly assess the relative contribution of each to the organization. In addition, different stakeholders may use the framework to explicate their assessment and preferences. By doing so, the Investment Portfolio method may be used to assist in making contrary views explicit, encouraging debate, and gaining consensus through discourse.

Value Analysis

Unlike approaches that emphasize efficiency (e.g., controlling costs), value analysis focuses on the value added by a particular investment. Indeed, Melone and Wharton (1984) proffered the method based upon the assumption that innovations and competitive advantages tend to be garnered through increases in value, as opposed to decreases in cost. Unfortunately, the authors also noted that value tends to be derived from both tangible and intangible sources, making identification and assessment more difficult. This implies that such subjective assessments may fail to be accurately measured. Value analysis, therefore, represents a methodology to improve the accuracy of measurements of the value added by IT investments.

In practice, value analysis is a multi-stage iterative process that starts with a prototype system. These simple models may then be extended and modified until all aspects of the solution have been carefully defined. Typically, the method also involves some element of participatory design, including the involvement of end-users who provide feedback on the benefits and limitations of the proposed solution. According to Farbey, Land, and

Targett (1999), value analysis may also involve the application of the Delphi method to establish objectives and assess benefits. However, the primary difference between value analysis and other evaluation methods is that it attempts to establish a "satisfiable solution," rather than predict/measure the benefits of a final/proposed design.

According to Molina (2003), value analysis offers many benefits: rapid identification of user requirements, improved communication between analysts and end-users (resulting in a user-tailored system and greater stakeholder satisfaction), and a continuous evaluation process (allowing continuation or stoppage of the project at any point based upon expected outcomes). Yet, Molina also asserted that value analysis has substantial limitations: establishing surrogate measures of value may prove difficult, prototyping might prove both costly and time consuming, and estimating final costs and benefits may be difficult during the prototyping process (as requirements change). On balance, however, Farbey, Land, and Targett (1999) suggested that this method may prove most advantageous in circumstances where evaluators are attempting to balance the delivery of multiple benefits, such as improved productivity and enhanced user satisfaction.

Traditional Evaluation Approaches: Limitations & Criticisms

Over the past decade, many authors have critiqued traditional IS/IT evaluation approaches, pointing to inadequacies and suggesting potential areas for improvement (Smithson & Hirschheim, 1998; Walsham, 1999; Serafeimidis & Smithson, 2000; Irani & Love, 2001; Jones, Hughes, Ferneley, & Berney, 2001; Serafeimidis, 2002). According to Walsham, traditional evaluation approaches have tended to eschew less quantifiable variables such as the political environment within an organization, as well as the cultural and attitudinal differences among stakeholders. Walsham, along with Hirschheim and Smithson (1999), argued that traditional evaluation is often performed by IS professionals

and non-user stakeholders, thereby ignoring critical user opinions within organizations. Serafeimidis and Smithson (2000) concurred with this assessment by positing that traditional evaluation approaches tend to overlook and undervalue the views of end-users. Given these circumstances, traditional IS/IT evaluation approaches seem to disregard the view that information systems are socio-technical systems in which the roles of social actors are vital (Hirschheim and Smithson 1999; Walsham, 1999; Irani, Sharif, & Love, 2001).

Moreover, recognition exists among practitioners and academics alike that strategic IT investment decisions frequently result in poor outcomes and that many of the existing evaluation tools and techniques are inadequate (Willcocks 1994). Ballantine, Galliers, and Stray (1999) identified numerous problems associated with traditional evaluation methods, including difficulties in quantifying and identifying relevant costs and benefits. In addition, Willcocks and Lester (1999) noted that traditional evaluation fails to be undertaken with rigor. This finding could be explained by the contention that traditional IS/IT evaluation frequently serves as a form of organizational ritual, thereby continuing to perpetuate the myth of rational management (Walsham, 1999; Jones & Hughes, 2000). Given these circumstances, the argument for alternative evaluation methods arises from more than divergent philosophical viewpoints (i.e., positivist vs. interpretivist epistemologies); instead, researchers argue that the limited successes of traditional approaches necessitate the investigation of new and potentially more effective IS/IT investment evaluation methods including more holistic, contextual alternatives.

Alternative / Interpretive Evaluation Approaches: Overview

Based upon the preceding criticisms of traditional evaluation methods, numerous scholars have called for alternative approaches to IS/IT evaluation (Smithson &

Hirschheim, 1998; Walsham, 1999; Irani & Love, 2001; Jones, Hughes, Ferneley, & Berney, 2001; Serafeimidis, 2002; Klecun & Cornford, 2003; Hedman & Borell, 2005). As previously discussed, traditional evaluation methods are based on objectivist assumptions about the nature of reality. That is to say, researchers and practitioners who employ these methods treat information systems as "defined objects in a real world" that may be classified, measured, and evaluated through the use of nomothetic (i.e., "scientific") methods: empirical observation, rational differentiation, and quantitative techniques (Whittaker, 2001, p. 59). From this perspective, researchers rely on simplified models of reality in developing traditional evaluation tools and techniques. However, many scholars have come to conceptualize information systems as more than merely technological objects suitable for positivistic study. In contrast, they view information systems as complex social and political entities with a technological element (Hirschheim and Smithson, 1999; Walsham, 1999; Whittaker, 2001, Irani, Sharif, & Love, 2001). Therefore, these scholars have argued that traditional IS evaluation methods are inadequate precisely because they are based on oversimplified models of what is a complex socio-technical reality.

In contrast to traditional evaluation, an interpretive approach uses ideographic methods to evaluate information systems. That is to say, evaluation is based on subjective concepts such as personal observation, individual judgment, differing perspectives, dialogic negotiation, constructive/deconstructive interaction, and contextual factors/values (Whittaker, 2001; McDaniel, 2002; Klecun & Cornford, 2003;). As a practical matter, the activity surrounding interpretive evaluation tends to follow one of two paths. First, scholars have suggested that researchers should use interpretive methods to develop a deeper understanding of the actual process of evaluation (Hirschheim &

Smithson, 1988; Symons, 1990; Smithson & Hirschheim, 1998; Walsham, 1999). Second, scholars have described methods based on interpretive theories and/or techniques for use by practitioners in evaluating information systems (Walsham, 1999; Whittaker, 2001; Serafeimidis, 2002; Molina, 2003).

Interpretive Evaluation: In Search of "Understanding"

In order to improve outcomes, Smithson and Hirschheim (1998) argued that scholars should work to better understand the evaluation process by applying interpretive techniques. In this sense, interpretive methods appear to be used as a technique to better understand evaluation, as opposed to a tool for directly conducting better evaluations (Whittaker, 2001). This interpretation, however, overlooks the full intent of the authors. From a constructivist perspective, participants *create* reality through both understanding and constructing an evaluation. According to Whittaker (p. 62), "evaluation outcomes are not descriptions of reality, but meaningful constructions that enable the participants to make sense of the situation." Put another way, Smithson and Hirschheim's call for explicitly considering the evaluation process leads to sense-making through collaborating, teaching, learning, discussing, negotiating, and consensus-building. According to Walsham (1999), such an interpretive approach allows evaluators to become shapers of reality and agents of change.

Interpretive Evaluation: Examination of Methods

In reviewing the IS evaluation literature, one finds a multitude of evaluation methods that are either explicitly or tacitly associated with a post-positivist paradigm (Smithson & Hirschheim, 1998; Farbey, Land, & Targett, 1999; Walsham, 1999; Whittaker, 2001; McDaniel, 2002; Serafeimidis, 2002; Klecun & Cornford, 2003). What is more, the subjectivity of interpretive evaluation results in approaches that differ widely in terms of

their primary concerns and methodological guidance, if provided at all. For this reason, it is difficult to neatly categorize these methods (which is, ironically, a fundamental tenet generally ascribed to by interpretivists about any simplification of reality). Nevertheless, in closely examining the literature, the researcher found that the majority of interpretive methods are roughly divisible into one of four groups: individual appraisals, dialogic methods, organizational learning exercises, and contingency approaches.

Individual appraisals are based upon the subjective assessment of an evaluator. Examples of individual appraisals include art criticism (formalized critiquing and judging by connoisseurs), professional review (examination by recognized experts and/or peers), and informal evaluations (unofficial and often covert assessments based on stakeholders' perceptions) (Farbey, Land, & Targett, 1999; Hirschheim & Smithson, 1999; McDaniel, 2002). Individual appraisals may be officially sanctioned by the organization or conducted personally and/or covertly. In addition, while individual appraisals reflect the views of a single evaluator, an organization could utilize multiple individual appraisals as part of a broader evaluation methodology. Such an approach would be analogous to a consumer consulting multiple independent movie reviews, thereby providing more than one connoisseur's opinion. However, when multiple individual appraisals are used, the individual reviewing the experts' assessments must assimilate any disparate findings.

Unlike individual appraisals, dialogic methods utilize interpersonal communications as a mechanism for conducting evaluations. Within the literature, these methods take many forms. For instance, Farbey, Land, and Targett (1999) pointed to "adversarial methods" in which two participants would formally present arguments and supporting evidence (akin to courtroom procedures). McDaniel (2002) described a similar approach, attaching a "quasi-legal" moniker to it. Rather than accentuating conflicts, other scholars

have focused on the opportunity to use dialogue to negotiate differences and reach consensus. As an example, Remenyi and Sherwood-Smith (1997) treat negotiation activities as the glue that binds participatory evaluations together. Indeed, according to the authors, participative evaluations culminate in negotiations that allow evaluation party members to move from personal, subjective assessments to a group-validated consensus and agreed course of action. In a similar manner, Whittaker's (2001) aforementioned "skillful conversations" mediated by organizational power relationships describes another model for reaching group evaluation decisions through dialogue. In addition, Klecun and Cornford (2003) described other examples of evaluation strategies based on negotiation. In all, the frequency of dialogic evaluation methods found in the literature suggests the approach enjoys significant popularity among post-positivist researchers.

Whereas dialogic methods focus on interpersonal communication as a means of consensus-building or decision-making, organizational learning exercises stress the educational implications of conducting evaluations. Hence this stream of literature most closely aligns with Hirschheim and Smithson's (1988, 1999) call for an approach to evaluation that fosters "understanding." Similarly, Walsham (1999) stressed the opportunity for interpretive evaluation to foster organizational learning. As an example of learning from evaluation, Irani, Sharif, and Love (2001) presented a case study of a mid-sized manufacturing firm in the United Kingdom that recovered after a failed manufacturing resource planning (MRP) system implementation. According to the researchers, the project originally stumbled because the firm did not sufficiently consider human and organizational factors during their initial *ad hoc* evaluation process. By examining their evaluation practices (and subsequent project failure), the firm's staff

recognized that their inability to evaluate the project's qualitative costs and benefits contributed to the failure. In particular, they found that effective evaluation methodologies must enfranchise their organization's staff by privileging their knowledge, experience, and perceptions. By concerning themselves with "softer" (human and organizational) issues, the firm developed a series of "constructs for success" used in successfully creating a custom MRP system. This case study corresponds to what Klecun and Cornford (2003, p. 132) called a "responsive/illuminative" method in which investigators are "immersed in the an operating environment for a purpose of learning and understanding."

Finally, contingency approaches attempt to address the complex, contextual milieu in which evaluations occur by offering guidelines based upon some set of contextual factors. According to Serafeimidis (2002), the need for contingency approaches stems from the diversity of IS projects and the inability of researchers to find a single method rich enough to address such contextual variety. Although a number of contingency approaches have been offered, most methods follow a basic formula: examine the context of the information system to be evaluated, follow the approach's guidelines to classify the information system, and use the approach's classification to select the appropriate evaluation method. Based upon this description, one could argue that contingency approaches are nearly indistinguishable from some traditional evaluation methods; indeed, Serafeimidis identified a number of "contingency methods" that have already been described in this study as "hybrid approaches," such as Parker, Benson, and Trainor's (1988) Information Economics. As another example, Farbey, Land, and Targett's (1999) "matching process" utilizes a series of two-by-two matrices to systematically match up IS projects with appropriate evaluation methods. In all,

contingency approaches are interpretive insofar as they cause evaluators to explicitly consider certain contextual factors; however, many contingency approaches ultimately involve the use of rational/objective evaluation methods.

Interpretive Evaluation Approaches: Limitations & Criticisms

Interpretive evaluation approaches have been criticized for their relativism and lack of normative guidelines (Klecun & Cornford, 2003). Given the privileged status of traditional (especially economically-oriented) methods and the enculturation of scientific management principles, such criticisms should be of little surprise. In terms of practical limitations, Walsham (1999) pointed to the extended time horizon (and thus expense) associated with conducting interpretive evaluations, as well as the potential negative affects on evaluators (such as anxiety and fear) associated with discussing previously unspoken or "hidden" problems in a public forum. Walsham also noted political criticisms attached to interpretive evaluation. On the one hand, scholars have argued that powerful interests might resist interpretive evaluation in order to maintain their hegemony. Whereas, on the other hand, scholars have also suggested that those with power could use interpretive methods as a form of democratic ritual to support their positions. Walsham (p. 278) concluded that the role of organizational politics in interpretive IS evaluation is important, as well as "complex, context specific, and not necessarily negative."

In contrast to criticisms that label interpretive methods as too subjective, some scholars have posited that existing post-positivist methods are not interpretive enough. For example, Whittaker (2001, p. 67) argued that interpretive approaches seem to be used for "analytical purposes" or "as a basis for new kinds of methods." Whittaker (p. 63) took particular aim at contingency approaches that must "objectify and simplify reality for

classification." Whittaker (p. 63) identified streams of research to better understand IS evaluation, such as Symons' (1990) work based on Pettigrew's (1985) contextualist framework, as "more essentially interpretive, at least in their epistemology." However, the author claimed that researchers often take up an interpretive approach in an order to develop better formal/rational evaluation methods.

Examining the Puzzle: Understanding Evaluation in Context

Researchers, particularly those outside of the United States, have examined the importance of context in evaluation. Some have proposed contingency approaches that assist in selecting between (primarily) traditional evaluation methods based on a limited number of contextual factors (Farbey, Land, & Targett, 1999; Serafeimidis, 2002; Costello, Sloane, and Moreton, 2007). Other researchers have discussed the value of using interpretive methods to improve the evaluation process. For instance, Jones and Hughes (2000) proposed the use of hermeneutic and situated evaluation techniques. Likewise, Whittaker (2001) proposed a dialogic approach to evaluation in order to build a consensus and reach a shared situational understanding.

More broadly, evaluation researchers have attempted to use contextual analysis to better understand the process of evaluation, as well as to provide methodological guidance to practitioners. The literature contains a number of models of the evaluation process. Most of these models have been adapted from Pettigrew's (1985) contextualist framework of content, context and process (CCP). Pettigrew used the CCP framework to better understand the factors related to the management of change within organizations. Recognizing similarities between the management of organizational change and information systems, Symons (1990) applied Pettigrew's framework to the practice of IS/IT evaluation. Pettigrew's original framework is presented graphically in Figure 8**.**

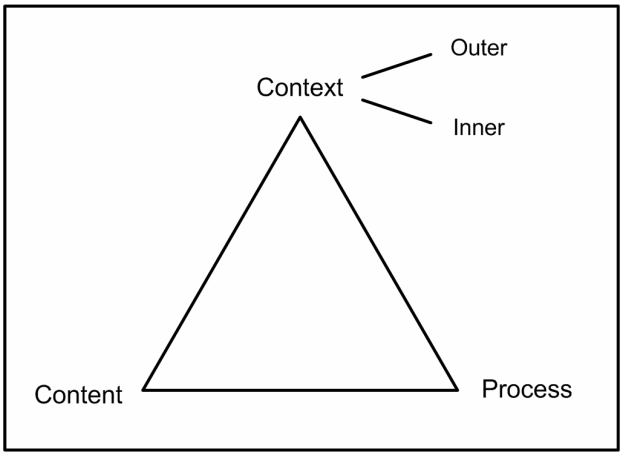

Figure 8. Content, Context, and Process framework (Pettigrew, 1985)

Symons (1990) described Pettigrew's (1985) CCP framework in detail: "content" refers to the *what* of evaluation, "context" refers to the *why* of evaluation, and "process" refers to the *how* of evaluation. Many researchers have either adopted or discussed the framework over the past decade (Willcocks & Margetts, 1996; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Klecun & Cornford, 2003). Yet, despite its widespread use, only minor alterations have been offered. For example, Willcocks and Margetts added a historical element to the "context" category. Klecun and Cornford redrew the model and extended the "context" category by adding a *who* element (Figure 9).

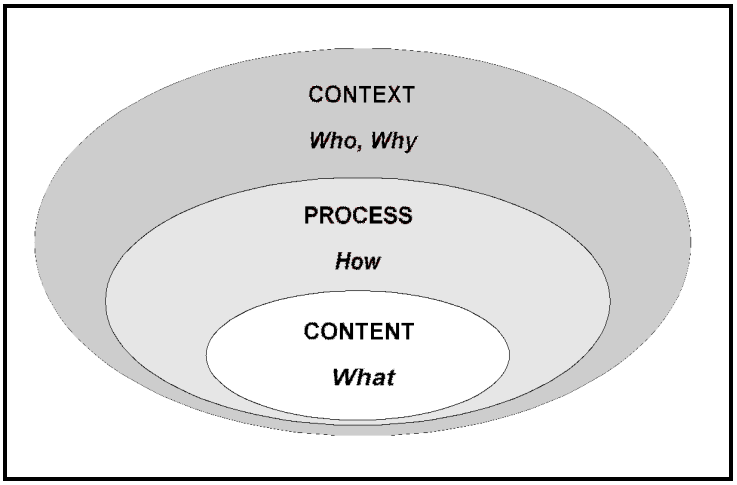

Figure 9. Rings of the CCP framework "onion" (Klecun and Cornford, 2003, p. 414)

In all, Pettigrew's (1985) framework—as applied in the information systems discipline in its broadest forms—has explicitly contained up to four factors that may influence the evaluation process: *who*, *what*, *why*, and *how*. Nevertheless, the literature highlights three contextual factors that have been overlooked: *when*, *which*, and *where*. This suggests that existing models of the IS/IT evaluation process are incomplete.

While it is regrettable that a more comprehensive conceptual framework does not exist, the conclusion is consistent with Hirschheim and Smithson's (1999) assertion that the drive for developing evaluation methods has drawn attention away from understanding the process of evaluation. As a result of these circumstances, Hirschheim and Smithson argued that future research should focus on understanding the subject of enquiry: the actual evaluation process. On a similar note, in crafting a retrospective of the European Conference on IT Evaluation proceedings from 1994 to 2005, Berghout and Remenyi (2005, p. 89) concluded that the field needed a "theory of IT evaluation" to pull together its "wide range of theoretical and practical thinking." Indeed, perhaps only through the development of a more complete understanding of the evaluation process might meaningful guidelines be developed to aid organizations in conducting structured, yet contextually appropriate evaluations.

Literature Review: Key Themes

In examining a subset of the domain's literature, Berghout and Remenyi (2005, p. 89) commented that "IT evaluation is very fragmented and to the outsider it looks quite disjointed." In shaping this literature review, the researcher has tried to present a deconstructed view of IS/IT evaluation by examining each of its contextual elements and their interrelationships in isolation. Now it is time to synthesize these fragmented,

disjointed, and sometimes seemingly contradictory insights into a unified whole. That is to say, what narratives emerged that carried throughout this body of literature? In response to this question, the researcher found seven key themes.

1.) IS/IT Evaluation is an Intractable Problem for Researchers and Practitioners

In simple terms, practitioners and academics agree on two important points: 1) IT investment decisions too frequently result in poor outcomes, and 2) that many of the existing evaluation practices, tools, and techniques do not remedy these failures. The evidence suggests that the vast majority (over 65%) of organizations engage in pre-implementation evaluations, although barely a majority engages in any form of post-implementation evaluation (Ballantine, Galliers, & Stray, 1999; Seddon, Graeser, & Willcocks, 2002). However, scholars have noted that far fewer organizations utilize formal procedures and that evaluations often lack rigor (Ballantine, Galliers, & Stray; Willcocks & Lester, 1999). Indeed, researchers claim that evaluators often treat the exercise as a hurdle to gaining project approval or as a burden in managing the project (Hirschheim and Smithson, 1999; Whittaker, 2001; Nijland, 2004). What explains this lackluster performance?

In the literature, researchers have pointed to a number of deficiencies with traditional evaluation methods. For example, Ballantine, Galliers, and Stray (1999) cited difficulties in quantifying and identifying relevant costs and benefits. Recognizing the importance of user satisfaction to IS success, scholars have also suggested that traditional evaluation methods overlook critical end-user perspectives (Walsham; Serafeimidis and Smithson, 2000; Irani, Sharif, & Love, 2001; Nijland, 2004). Alternatively, researchers have contended that IS/IT evaluations are politically purposeful, represent a form of

organizational ritual, and seek to perpetuate the myth of modern, rational management (Walsham; Jones & Hughes, 2000, Whittaker, 2001; Nijland).

In response to the limitations of traditional methods, scholars have proposed interpretive evaluation alternatives. However, these approaches have been criticized for their subjectivism and lack of normative guidelines (Klecun & Cornford, 2003). Additionally, Walsham (1999) identified potentially significant economic, psychological, and political implications associated with applying these methods to practice. Moreover scholars, such as Whittaker (2001), have leveled significant epistemological criticisms against post-positivist approaches that appear to embrace object/rational methods.

For their part, academicians have struggled to understand the complex domain of evaluation (Hirschheim and Smithson, 1999; Berghout and Remenyi, 2005). In addition, IS/IT academic researchers face practitioners' claims of irrelevancy regarding their efforts (Kock et al., 2002); indeed, the term "academic" sometimes has a pejorative connotation (as in "an *academic* exercise"). In response, researchers have focused attention on devising better evaluation measures and methods. However, in doing so, scholars may simply be getting much better at solving the wrong problem. Instead, attention should be directed toward developing a more complete understanding of the evaluation process itself (Hirschheim & Smithson, 1988, 1999; Smithson & Hirschheim, 1998; Berghout & Remenyi, 2005).

2.) IS/IT Evaluation is About More Than Estimating or Measuring Outcomes

Returning to the beginning of this literature review, Remenyi and Sherwood-Smith (1997, p. 46) defined evaluation as "a series of activities incorporating understanding, measurement and assessment." As noted previously, to date much attention has focused on evaluation measures and methods—the "measurement and assessment" part of

Remenyi and Sherwood-Smith's definition. However, a holistic view of IS/IT evaluation suggests that it is—and that it should be—encompassing of more than this limited scope. In particular, scholars have stressed the organizational learning and social implications of evaluation (Hirschheim & Smithson, 1988, 1999; Smithson & Hirschheim, 1998; Walsham, 1999; Jones & Hughes, 2000;Whittaker, 2001; Serafaimidis, 2002; Nijland, 2004; Berghout & Remenyi, 2005).

As an example of organizational learning, Irani, Sharif, and Love (2001) presented a case study that highlighted the ability of an organization to improve through reflectively practicing evaluation and learning from past experiences. Beyond organizational learning, other scholars have underscored the dialogic—that it to say, interpersonal communication—aspects of evaluation. Through this process, evaluators might better understanding their organization's context, consider divergent viewpoints, negotiate desired outcomes, and reach a consensus about a course of action. Thus, when viewed holistically, evaluation provides opportunities for organizational and individual improvement beyond the outcomes directly associated with the object of the assessment.

3.) IS/IT Evaluation Practice is (and should be) Pragmatic

Introna (1997) and Whittaker (2001, p. 86) argued that evaluators operate "in-the-world" and focus on getting the job done. In addition, managers (i.e., evaluators) are "thrown into the world" and therefore must address situations brought about by forces outside of the their control (Introna, p.43). Moreover, their perceptions are shaped by their local context. These circumstances suggest that evaluators operate in neither a strictly rational nor subjective manner. Instead, evaluators use their logical reasoning skills, as well as their intuitive understandings, in order to reach a workable conclusion (Whittaker). In short, evaluators seem to be pragmatic.

What is more, the evidence suggested that this is unlikely to change. Perhaps, this also explains the seeming paradox of why practitioners frequently engage in evaluation, yet fail to do so rigorously? Introna's (1997) reflections on managers (i.e., decision-makers) offered three salient points:

- Managers primarily focus on getting the job done.
- Managers often address complex, fragmented, multi-dimensional issues in an *ad hoc* manner.
- Managers only use information that is readily available and clearly relevant.

Taken together, these insights may explain (at least in part) this phenomenon. For example, an IS manager might need to select between developing a custom software solution in house versus buying a commercial off-the-shelf (COTS) application. For all but the simplest of applications, the IS manager would face a complex, multi-dimensional problem that could be evaluated using a myriad of methods and measures. However, the IS manager might also feel pressure from senior executives to make a decision quickly and get on with implementing the solution. Under these pressures, the IS manager would likely conduct (or delegate responsibility for) an evaluation and make a decision based upon readily available information (likely using easy to calculate measures and familiar evaluation methods). Is this hypothetical example typical of IS evaluation practice? It probably depends on the organization, but it seems reasonable to assume that most IS practitioners have (sometimes conflicting) demands that extend beyond conducting a single evaluation. Therefore, if IS as an applied discipline seeks to both further knowledge and improve practice, IS researchers should strive for pragmatic solutions that reflect the contextual realities of practitioners (Phillips, 1998; Moody, 2000).

4.) IS/IT Evaluation is Moving Beyond the Positivist / Interpretivist Dualism

Much of the IS/IT evaluation research—including the majority of this literature review—is structured around a rational/objective versus political/subjective dichotomy. Without regard to philosophical concerns or the historical basis for this divide, the literature reflects a trend away from this dualistic worldview. As evidence, consider three brief examples from this literature review:

1. The prior discussion of "pragmatic" management that is neither exclusively objective nor subjective (Introna, 1997; Whittaker, 2001).

2. The recognition that evaluation methods span a continuum that ranges from the highly objective (e.g., discounted cash flow methods) to mostly subjective (e.g., art criticism) (Hirschheim & Smithson, 1988, 1999; Serafeimidis, 1997; Smithson & Hirschheim, 1998; Farbey, Land, & Targett, 1999).

3. The development of contingency approaches that have resulted from the diversity of IS projects and the inability of existing methods to address their contextual richness (Serafeimidis, 2002; Nijland, 2004). Such approaches use positivist and/or interpretive techniques to conduct evaluations (Whittaker, 2001).

Assuming this trend holds, what does it imply about evaluation research and practice? Upon reflection, two themes emerge. First, it could demonstrate immaturity in the philosophical / theoretical foundations of this field. Put another way, it suggests that a preferable theoretical underpinning for IS/IT evaluation might exist. Second, it could imply that multi-paradigmatic or hybrid methods offer the most promising course. To be sure, both traditional rational/scientific and alternative interpretivist methods have limitations (Walsham, 1999; Whittaker, 2001; Klecun & Cornford, 2003). Therefore, flexibly combining positivist and interpretivist methods might result in meta-methodologies that build upon each method's strengths, while ameliorating their limitations.

5.) IS/IT Evaluation Involves Many Complex, Related Contextual Elements

The contextual richness of IS/IT evaluation demands the methodological flexibility described above. Throughout this literature review, IS/IT evaluation has been described as a process to assess a specific IS/IT object (*what*) that is carried out by one or more individuals (*who*) in a particular organization (*where*), with a particular objective (*why*), at a particular phase during a system's life cycle (*when*), using one or more methods (*how*) to measure / estimate selected attributes (*which*). What is more, each of the contextual factors help to shape the outcome of an evaluation: a single change in one element could result in a vastly different conclusion. Therefore, an understanding of IS/IT evaluation rests on an understanding of these contextual factors and their relationships.

6.) IS/IT Evaluation Has Focused Too Much Attention on Measures and Methods

Regardless of the relative importance of all contextual elements, the literature clearly demonstrates that researchers have concentrated their efforts on investigating and developing evaluation methods and measures. As noted by Hirschheim and Smithson (1999), the intense focus of researchers on developing new evaluation tools and techniques has slowed the understanding of the evaluation process itself. Moreover, this lack of a holistic understanding has allowed "much consternation and confusion over evaluation" to continue to exist (Hirschheim & Smithson, p. 398). Berghout and Remenyi (2005, p. 88) echoed this view by claiming that "so far the energy expanded on research in this field has not produced much insight into the core problems." In other words, by overemphasizing the *how* and *which* of evaluation, researchers have failed to sufficiently investigate and understand the interplay between other contextual factors: *who*, *what*, *when*, *where*, and *why*.

7.) IS/IT Evaluation Needs a Holistic Theory for Descriptive and Normative Purposes

Recognizing the fragmentation of its research, Berghout and Remenyi (2005) called for the development of a unified theory of IS/IT evaluation. This view is consistent with Hirschheim and Smithson's (1988, 1999) requests for a better understanding of the evaluation process itself. As previously argued, IS/IT evaluations are comprised of a number of related contextual elements. And to further the field, these elements must be better understood.

With that said, evaluations are also more than the sum of their parts. Assessment outcomes change as contextual elements vary in relation to each other. Therefore, the relationships between IS/IT evaluation's contextual elements also demand a better understanding. This view supports Berghout and Remenyi's (2005) call for a holistic IS evaluation theory. Indeed, a theory of IS/IT evaluation that offers a broad understanding of this multifaceted topic could be used for two purposes. First, it could provide the basis for a richer, more consistent description of existing IS/IT evaluation practices. In this sense, it would build upon the contextualist framework research of many scholars, such as Symons (1990), Serafiemidis (1997, 2002), Walsham (1999), and Klecun and Cornford (2003). Second, it could offer normative guidelines for conducting contextually appropriate evaluations, thereby providing assistance to practitioners and reducing the "relevancy gap" between academic research and professional practice.

Summary

What should be done to improve both evaluation research and practice? Based upon the seven themes found in this literature review, it appears that IS/IT evaluation is an intractable difficulty that offers much potential for organizational improvement and increased IS success. However, academicians often overlook practitioners' pragmatic

needs to "get-the-job-done" in order to move on to other concerns; thus, both sides may miss opportunities to further their own understandings. That said, the trend away from rigid, dualistic epistemological assumptions about the nature of evaluation offers the possibility of advancing the field's *rigor* and *relevance*.

In this literature review, the researcher established that evaluations are comprised of numerous, interrelated contextual elements that must be better understood holistically. These elements include: the purpose of conducting the evaluation (*why*); the subject of the evaluation (*what*); the specific aspects to be evaluated (*which*); the particular evaluation methods and techniques used (*how*); the timing of the evaluation (*when*); the individuals involved in, or affected by, the evaluation (*who*); and the external and internal environmental conditions under which the organization operates (*where*). Each of these constructs was examined in detail by the researcher in this literature review, including particular emphasis on the specific criteria / measures of evaluation (*which*) and methods / techniques of evaluation (*how*). In addition, the researcher reviewed existing models that depicted the process of IS/IT evaluation, noting the limitations and differences found in each instance. In the subsequent sections of this dissertation, the researcher describes using these findings to construct a more robust and comprehensive conceptual model of IS/IT evaluation, assess its validity, and then offer professional practitioners guidelines for conducting IS/IT evaluations based upon their organization's unique goals and circumstances.

Chapter 3

Methodology

The researcher utilized a multiphase approach in this study, consisting of four main stages: a comprehensive literature review, the development of a conceptual model of IS/IT evaluation that facilitates a better understanding of the process's individual constructs and their relationships, the validation of the conceptual model via a meta-analysis of multiple case studies (as well as the development of guidelines for conducting contextual evaluations within particular organizations), and the reporting of the results of this study. While distinct, each stage built upon the contributions of its predecessors. Each step was also designed to assist in the researcher in testing hypotheses and answering research questions. To reiterate, the researcher proposed the following hypotheses and research questions in Chapter 1:

H1. Existing models of IS/IT evaluation are inadequate because they fail to include all of the relevant constructs: the purpose of conducting the evaluation (*why*); the subject of the evaluation (*what*); the specific aspects to be evaluated (*which*); the particular evaluation methods and techniques used (*how*); the timing of the evaluation (*when*); the individuals involved in, or affected by, the evaluation (*who*); and the external and internal environmental conditions under which the organization operates (*where*).

Q1. What models of the IS/IT evaluation process are presented in the literature?

Q2. How do the constructs (identified in H1) relate to the process of IS/IT evaluation?

H2. An improved conceptual model of IS/IT evaluation provides an effective tool for describing and analyzing evaluation practices.

Q3. Is the researcher's conceptual model valid for describing IS/IT evaluation practices?

Q4. What guidelines may be derived from using the researcher's conceptual model as an analytical tool to existing IS/IT evaluation case studies?

The researcher conducted a comprehensive literature review (Step 1) to address H1 and provide answers to Q1 and Q2. The researcher then used the literature review findings to develop the conceptual model in this study (Step 2). The researcher's conceptual model represents the central artifact of this study, providing the critical link between H1 and H2. Next, the researcher validated the conceptual model based upon published case studies and then utilized it to develop normative guidelines for conducting evaluations (Step 3), thereby addressing H2 by answering Q3 and Q4 respectively. The researcher then reported the findings associated with each of the hypotheses and research questions and discussed implications for both future academic research and professional practice (Step 4). The subsequent sections of this chapter provide a detailed description of the procedures associated with each of these steps.

Step 1: Conduct Comprehensive Literature Review

According to Webster and Watson (2002), a review of prior and relevant literature serves as the cornerstone of any academic project, creating the requisite foundation for the advancement of knowledge. As a result, literature reviews facilitate the development of theoretical contributions. Indeed, Webster and Watson suggested that conceptual models—a potential outcome of a comprehensive literature review—often represent an important first step toward theory development. As such, the researcher's comprehensive literature review represented an important step toward achieving the objective for this study: the design and validation of a conceptual model to facilitate a better understanding of IS/IT evaluation.

In their article on writing literature reviews, Webster and Watson (2002, p. xv) argued that "a high-quality review is complete and focuses on concepts." In doing so, the authors outlined two important issues that were addressed in the literature review of this study. First, the review encompassed as much relevant literature on the topics as possible. That is to say, the researcher attempted to ensure that the literature review was comprehensive. To that end, the researcher followed Webster and Watson's guidance of employing a structured approach to literature identification:

1. The researcher sought contributions found in leading journals, both within the discipline (e.g., MIS Quarterly and the Communications of the AIS) and within the specialty (e.g., The Electronic Journal of Information Systems Evaluation).

2. The researcher performed initial searches of journal databases (e.g., ProQuest and WilsonWeb), conference proceedings (e.g., AMCIS and ICIS), and related monographs (such as the Wiley Series in Information Systems). Likewise, relevant sources outside of the IS discipline were explored as warranted by preliminary findings; for example, the researcher's literature review uncovered relevant evaluation literature derived from organizational theorists and educational researchers.

3. The researcher worked *backward*, reviewing the citations identified in the articles examined in the prior step.

4. The researcher also used citation indexes, such as Thompson's Web of Knowledge, to work *forward* in identifying more recent articles that cited important works uncovered in the previous steps.

Second, the researcher developed a concept-oriented literature review. Unfortunately, literature searches tend to be author-centric: that is to say, connections between sources are explicitly based on authorship, not underlying concepts. As a result, the researcher followed a method to transition from an author- to a concept-oriented approach. Webster and Watson (2002) suggested that authors compile a concept matrix to assist in synthesizing the literature. A concept matrix provides "a logical approach to grouping and presenting the key concepts" uncovered in a literature search (Webster & Watson, p.

xvii). Given the breadth and depth of the required literature review, the researcher employed concept matrices to guide its development. As an example, Table 16 demonstrates the structure and topology of a concept matrix.

Table 16. Example of concept matrix (after Webster & Watson, 2002)

Articles	Concepts				
	A	B	C	D	...
1	X		X	X	
2		X		X	X
...	X	X			X

In approaching this literature review, the researcher also followed Webster and Watson's (2002) admonition to clearly delineate the key variables of interest and boundaries of the effort, including the level(s) of analysis, limitations, scope of review, and underlying values/assumptions. To that end, the researcher utilized George's (2000) framework of IT evaluation research to delineate the review's boundaries. Given the focus of this study, the researcher concentrated on topics relevant to conducting IS/IT evaluation in organizations (e.g., firms) and groups within organizations (e.g., business units). As a result, issues specific to broader economic, societal, and/or political concerns were generally avoided. For example, the IT productivity paradox literature was not deeply explored, because it largely addressed productivity measurement at a national economic-level (Brynjolfsson & Hitt, 1998; Willcocks & Lester, 1999; Renkenma, 2000; Anderson, Banker, & Hu, 2002). As such, it exceeded the scope of this literature review.

In analyzing the literature, the researcher examined a number of disparate streams that comprised the overall breadth of the review. In particular, the researcher focused on

identifying, categorizing, and describing seven constructs initially found to be associated with IS/IT evaluation:

- Purpose/reasons → *Why?*
- The subject → *What?*
- Criteria/measurement → *Which?*
- Time frame → *When?*
- People → *Who?*
- The locus of the evaluation → *Where?*
- Methodologies/tools → *How?*

While the researcher attempted to review each of these elements with a similar degree of comprehensiveness, scholars have largely concentrated on the *which* (measures) and the *how* (methods) elements. For this reason, a disproportionate percentage of the literature review focused on those two elements. Moreover, given the scope of both of these sections, the researcher relied upon existing models and taxonomies to better organize the literature.

In the case of evaluation measures (*which*), the researcher organized the metrics based upon published models of IS success, especially DeLone and McLean's (1992, 2003) IS Success Model. As an organizational heuristic, this seemed particularly advantageous to the researcher because much of the IS success literature attempted to describe the relationship between the various metrics (i.e., quality, use, and impacts of use). For easier reference, the researcher included tables to summarize examples of the measures associated with each of the IS success dimensions.

For the evaluation methods (*how*) section, the researcher employed Smithson and Hirschheim's (1998) frequently cited IS/IT evaluation methods framework to help

organize the literature. Given the sheer abundance of IS/IT evaluation methods, the researcher attempted to strike a balance between comprehensiveness and practical feasibility in this section of the literature review. Put another way, there are far too many traditional IS/IT evaluation methods to address them all comprehensively. To that end, the researcher devised an approach for identifying and selecting evaluation methods that were representative of those most frequently discussed or utilized in academia, industry, or both. First, the researcher identified recent literature that contained detailed reviews of IS/IT evaluation methods. In all, seven such sources were found for the period of 1999 through 2005 (Farbey, Land, & Targett, 1999; Hirschheim & Smithson, 1999; Renkema, 2000; Whittaker, 2001; Irani & Love, 2002; Serafeimidis, 2002; Nijland, 2004). Following the procedure described above, the researcher developed a concept matrix of articles (x-axis) and the methods reviewed by each author (y-axis). To be considered representative and thus included in the literature review in Chapter 2, a given method must have been found in two or more of the aforementioned articles. Altogether, seventeen evaluation methods / techniques met this criterion. These methods were then categorized into Smithson and Hirschheim's framework of evaluation approaches (depicted in Figure 7 in Chapter 2). Along with describing each method, the researcher highlighted its respective benefits and limitations, as well as any relevant underlying philosophical, organizational, or technical assumptions. The researcher also discussed alternatives to traditional evaluation methods, particularly those based upon an interpretive epistemology.

In addition to examining the contextual elements of evaluation separately, the researcher explored the literature that provided models for understanding the evaluation process end-to-end, the majority of which were based on Pettigrew's (1985) Context,

Content, Process framework (Symons, 1990; Willcocks & Margetts, 1996; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Walsham, 1999; Klecun & Cornford, 2003). Given these findings, as well as those related to the individual contextual elements, the researcher developed a series of key themes that synthesized the existing body of IS/IT evaluation knowledge. Collectively, the literature review findings served as the critical foundation for the researcher's study, thereby guiding subsequent stages. In particular, the researcher employed the results of the literature review to develop the conceptual model in this study.

Specific Procedures: Literature Review

To briefly summarize, the researcher performed the following procedures in constructing the literature review of this study:

1. The researcher conducted a preliminary literature search.
    a. The researcher sought contributions found in leading journals, both within the discipline (i.e., information systems) and within the specialty (i.e., IS/IT investment evaluation).
    b. The researcher also included searches of IS journal databases, conference proceedings, and related monographs.
2. The researcher examined the literature in order to identify key contextual elements / constructs associated with IS/IT investment evaluation.
3. The researcher reorganized the literature review findings based on these key constructs, moving from an author- to concept-oriented schema.
4. The researcher expanded the breadth and comprehensiveness of the literature review by conducting a secondary literature search.
    a. The researcher explored relevant sources outside of the IS discipline as warranted by the preliminary findings.
    b. The researcher worked *backward* through the literature, reviewing the citations identified in the articles examined in the prior steps.

c. The researcher used citation indexes, such as Thompson's Web of Knowledge, to work *forward* in identifying more recent articles that cited important works uncovered in the previous steps.

5. The researcher integrated the new sources into the existing concept-oriented matrices and wrote the literature review prose based upon this structure.

6. The researcher concluded the review by synthesizing the key themes identified in the IS/IT investment evaluation literature.

Step 2: Develop IS/IT Evaluation Conceptual Model

Based upon the findings of the comprehensive literature review, the researcher developed a conceptual model of the evaluation process. In broad terms, the researcher sought to enhance the discipline's understanding of the IS/IT evaluation process, including its contextual elements and their relationships. In this sense, the researcher attempted to unify disparate and overlooked elements into a comprehensive model for subsequent descriptive or analytical purposes. Whetten (2002, p. 48) described this type of approach as a "contribution to theory," wherein inquiry is used to improve existing understandings. In this manner, the researcher developed a conceptual model as a first step toward a robust, comprehensive theory of IS/IT evaluation.

According to Whetten (2002), models are well-suited to making a theoretical contribution for a number of reasons. In particular, models facilitate understanding by abstractly and graphically describing the relationships between constructs. Moreover, the techniques associated with graphical modeling provide a means to developing complete and systematic conceptualizations. As a result, Whetten suggested that models do extremely well at assisting in the development of new explanations and refining long-standing conceptualizations.

Selecting a Modeling Method

Within the information systems discipline, modeling is a common procedure that has been used in a variety of technical and organizational contexts: domain, enterprise, data, communication, functional, behavioral, and non-functional requirement modeling (Wieringa, 1998). In most of these cases, models described an existing or future world state. To facilitate that aim, academicians and practitioners have developed a number of methodologies for constructing models. One such example is the Yourdon Systems Method (YSM), a methodology for constructing models through structured analysis for real-time systems (Wieringa, 1998). Another example is the CAP (Capture, Analysis, and Presentation) framework, which was developed by Phalp (1998) and designed to facilitate business process modeling.

Formal modeling methods applied to information system development, however, are not ideal for application within this study, as the objective is not to model an existing or future world state. Rather, the researcher developed a conceptual model that provides a graphical representation of a theoretical contribution, describing the relationship between various constructs associated with IS/IT evaluation. Nevertheless, the IS discipline's existing literature on modeling underscored a number of aspects that had to be addressed to accomplish this goal. In particular, Phalp (1998) cited modeling methods and notations as important considerations in model building. Similarly, Frank (1999) discussed the import of selecting an appropriate modeling language and notational scheme in order to ensure model quality. Therefore, in contemplating the development of this conceptual model, the researcher addressed two critical aspects: the selection of a modeling method and a notational scheme.

In examining modeling methods, Phalp (1998) noted that some methods tend to be highly prescriptive in terms of both modeling methods and notations, whereas others provide methodological guidance without prescribing a notational scheme for representing the model. According to Phalp, more prescriptive modeling methods tend to call for specific notational schemes. In contrast, less prescriptive methods tend to ignore the question of notation.

As previously discussed, the researcher identified a number of modeling methods, including many from the information systems discipline. For example, Wieringa (1998) provided a review of twenty-seven software specification methods, both structured and object-oriented, used for developing models of existing or future systems. Along with a detailed description, Wieringa summarized each method (as well as its notational schemes) in a decomposition table. In general, these methods tended to be highly prescriptive in terms of both modeling method and notation. For example, the Yourdon Systems Method (YSM) utilized a number of notational techniques (such as context diagrams, event-response lists, dataflow diagrams, entity-relationship diagrams, and decision tables) in a highly prescribed manner (Wieringa). Object-oriented methods also followed highly prescriptive procedures and notational schemes. For instance, UML (Unified Modeling Language) prescribes a series of notational techniques, such as use case models, collaboration diagrams, sequence diagrams, class diagrams, and state diagrams (Wieringa).

Formal modeling methods found in the information systems clearly literature exhibit many desirable characteristics, such as affording a structured modeling process, guiding the development of complete and systematic conceptualizations, and providing a standardized language that may be applied to a variety of entities. Yet, for all of these

positive attributes, such techniques are ultimately not well-suited to this study. First, the purpose of these methodologies—to model existing or future information systems—differs from the objective of the researcher in this study: to model and explain the relationship between contextual factors in IS/IT evaluations. In essence, the researcher sought to model a business process, not a technological artifact. Thus, the researcher needed a methodology better suited to building conceptual models for use by more diverse (and less technical) audiences. Second, Phalp (1998) argued that models should clearly communicate ideas between the modeler and those reviewing the model. The researcher concurred with this view, recognizing that the conceptual model developed in this study should be understandable to the broadest range of scholars and practitioners possible. To that end, some scholars and practitioners may be unfamiliar with formal IS modeling notations, thereby potentially rendering the researcher's conceptual model incomprehensible for some percentage of its intended audience.

Recalling Frank's (1999, p.696) assertion that modelers are "trapped in a network of language, patterns of thought and action" that they cannot fully transcend, the researcher attempted to remain vigilant against using notational schemes that were familiar and easily accessible to him (such as use cases or entity-relationship diagrams) but that might prove less accessible to others. Moreover, Whetten (2002) argued that scholars should be weary of building unnecessarily complex conceptualizations; ideally, representations should be as clear and succinct as possible. Therefore, the researcher rejected the modeling methods commonly used in the information systems discipline, such as those outlined by Wieringa (1998), as being too complex and inaccessible for use in this study.

In searching for an alternative modeling method, the researcher identified Whetten's (2002, p. 51) theory-development methodology that uses "basic graphical modelling logic

and conventions" to codify the elements of an existing theoretical framework or describe a nascent theoretical perspective. Whetten's methodology consists of four steps:

1. Identify the conceptual elements.
2. Define the relationships between the conceptual elements.
3. Express the conceptual assumptions that explain why the model contains its specific constructs and relationships between constructs.
4. Delineate the contextual boundaries (i.e., conditions) that confine the theoretical contribution.

Overall, Whetten's "modeling-as-theorizing" methodology provides the multitude of benefits associated with information systems modeling techniques, including a structured modeling process, guidance in developing complete and systematic conceptualizations, and a broadly applicable standardized modeling language. But, more importantly, Whetten provided a tool for building sound theoretical contributions. Moreover, by using basic graphical modeling conventions, Whetten's approach overcomes the complexity and peculiarities associated with the techniques traditionally used in modeling information systems. Therefore, the researcher believed that Whetten's approach provided the best opportunity for constructing as clear and succinct a model as possible.

Developing the Conceptual Model

To develop the conceptual model in this study, the researcher followed Whetten's (2002) "modeling-as-theorizing" method. As previously noted, Whetten's approach involves four basic steps: identifying constructs, defining the relationships between the constructs, describing the conceptual assumptions that underlie the model, and delineating the contextual assumptions (i.e., boundaries) of the model. Whetten also stressed that researchers should focus on developing complete and systematic theoretical

contributions. Following these guidelines, the researcher adopted a four-phase approach to developing the conceptual model in this study.

1.) Identification of Constructs

Using the literature review in this study as a guide, the researcher developed a preliminary list of constructs for the conceptual model. This was a highly iterative process of examining the literature (as well as the findings in the literature review of this study), identifying concepts, revising the list of potential constructs, and checking for completeness. In doing so, the researcher was able to identify different patterns of constructs in disparate literature streams. For example, the "IS success" literature tended to focus on measures and metrics, whereas the IS evaluation literature centered more on methods (DeLone & McLean, 1992; Hirschheim & Smithson, 1999). Overall, the researcher identified seven primary constructs for inclusion in the initial draft of the conceptual model: *who*, *what*, *why*, *when*, *which*, *how*, and *where*. In the literature review (Chapter 2), the researcher described each of these constructs in detail. However, in order to reduce the chance of cognitive dissonance in forcing the reader to synthesize these elements, the researcher constructed a table that summarized the list of the proposed constructs by describing each and delineating any identified sub-classifications.

2.) Description of the Relationships between Constructs

Having developed a tentative list of constructs, the researcher turned attention to defining the relationships between these elements. Whetten (2002) described this step as the critical phase of theory building. Moreover, Whetten argued that it is the articulation of the relationships between constructs that separates theoretical contributions from other heuristics. However, before proceeding with this important step, Whetten suggested that

scholars must consider the type of model to be built and the nature of the relationships to be expressed.

With respect to model types, Whetten (2002) presented two alternatives: process or variance models. According to Markus and Robey (1988), variance models forecast outcomes based upon the values of predictor variables. In contrast, process models offer explanations of how outcomes occur over a time sequence, but the constructs while necessary are insufficient (in and of themselves) to cause the outcome. So, which would was best for this study? Whetten argued that neither is preferable; instead, the selection should be based upon the contribution the researcher intends to make. In this study, the researcher sought to define the constructs relevant to IS/IT evaluation and describe their relationships. Moreover, given the lack of theoretical maturity in IS/IT evaluation (Berghout & Remenyi, 2005), the researcher developed a process-oriented model.

When developing a process model, researchers must determine how relationships will be established. Whetten (2002, p. 56) suggested that the relationships between constructs should be thought of as "laws of interaction" and that two are particularly appropriate for social science research: categoric and sequential. According to Whetten, categoric interactions describe associations (e.g., when *X*, then *Y*); in contrast, sequential interactions describe temporal associations (e.g., *Y* follows *X*). Given that the objective is to develop a process-based conceptual model, the researcher will describe interactions in sequential or temporal terms. When developing a sequential path model, Whetten stated that researchers should be able to articulate the rationale for its order in terms of natural law (e.g., *X* logically follows *Y*), historical arguments (e.g., *X* followed *Y* in the past), or a developmental course (e.g., X emerges from the creation of *Y*).

As a starting point, the researcher began constructing the model in this study by rearranging the elements in Klecun and Cornford's (2003) "onion" model of IS/IT evaluation as a series of nested constructs. This process resulted in a revised "onion" model that grouped initially associated constructs. Returning to Whetten's (2002) method, the researcher began to layout the conceptual model in a more linear and graphical form, placing constructs in boxes and establishing relationships using directional lines. Once in this form, the researcher was better able to test the model for completeness and ensure that it was both cohesive and consistent. Following Whetten's suggestion for improved model visualization, the researcher affixed Post-It Notes (PINs) in the pattern of the conceptual model to a wall in his office. While a seemingly quirky and idiosyncratic approach, the researcher found that this enabled him to easily manipulate and visualize the constructs and relationships in the nascent model. During this iterative process, the researcher made a number of modifications to the model: the addition of an "*action*" construct, the delineation of macro and micro contexts, the inclusion of a feedback loop, and the reconceptualization of the "*when*" construct. With each alteration, the researcher critically reflected on the model's composition and compared it to the literature review's findings. After a multitude of iterations, the researcher was satisfied with the proposed conceptual model, including its degree of completeness, cohesion, and consistency.

3.) Description of the Model's Conceptual Assumptions

Having defined the model's constructs and their relationships, the researcher must next define the conceptual assumptions upon which the model was based (Whetten, 2002). In this study, the researcher operated under two important conceptual assumptions:

1. The actions of evaluators are based upon their *perceptions* of reality.

2. The description of the evaluation process should be ethically non-normative.

For both of these assumptions, the researcher opted to put aside philosophical concerns and focus on pragmatically describing the IS/IT evaluation process. Thus, in the developing the conceptual model, the researcher relied on Introna's (1997) post-dualist understanding of managers (evaluators) as "in-the-world" actors, focused on "getting the job done."

4.) Description of the Model's Contextual Assumptions (Boundaries)

Finally, the researcher defined the boundaries (contextual assumptions) of a theoretical contribution (Whetten, 2002). In particular, the researcher defined three contextual assumptions that restrict the conceptual model's interpretation or application:

1. As a process-oriented model, it represents a high-level abstraction of IS/IT evaluation. Therefore, the model subsumes certain lower-order processes and relationships that remain unspecified.

2. As a process model, it cannot—nor is it intended to--predict the effect of a change in one construct on related constructs. Instead, the model merely demonstrates that "*X* precedes *Y"* or that "*A* is associated with *B*."

3. As the model lacks the predictive ability of a variance model, care should be exercised in any attempt to generate normative guidelines for conducting IS/IT evaluations based upon it.

Specific Procedures: Model Development

In developing the proposed conceptual model for this study, the researcher followed the following procedures:

1. The researcher selected Whetten's (2002) modeling methodology based upon findings in the research literature.

2. The researcher identified the model's conceptual elements (i.e., constructs) based upon the findings in the literature review.

a. The researcher followed an iterative process of examining the literature and findings of the literature review in this study: identifying potential constructs; revising the list of potential constructs; and checking for completeness.

b. The researcher also identified sub-classifications of particular constructs.

c. The researcher constructed a table to summarize these findings.

3. The researcher defined the relationships between the conceptual elements in the model based upon the findings in the literature review.

    a. The researcher organized the constructs initially in the form of Klecun and Cornford's (2003) "onion" model of IS/IT evaluation.

    b. The researcher utilized the findings of the literature review to layout an initial draft of the conceptual model in linear form.

    c. The researcher followed an iterative process of refining the conceptual model. This process involved: reflecting on the design of the model, comparing the model to the literature, testing the models cohesiveness and consistency, and refining the model. In all, the researcher produced a total of three versions of the conceptual model in this study.

4. The researcher described the conceptual assumptions that explain the contents of the model, as well as the relationships between constructs.

5. The researcher delineated the contextual boundaries (i.e., conditions) that confine the theoretical contribution of this study.

Summary of Model Development

In summary, the researcher addressed a number of concerns in developing a conceptual model of the IS/IT evaluation process. While the information systems literature details a number of approaches, such modeling methods were ill-suited to the researcher's objective in this study. Instead, the researcher turned to the management research literature that contained a "modeling-as-theorizing" methodology, proposed by Whetten (2002). The researcher utilized Whetten's methodology to develop the conceptual model. In all, the researcher's proposed conceptual model of IS/IT evaluation represents the central artifact of this study. Having developed the model, the researcher

believed that it offered scholars an enhanced understanding of the IS/IT evaluation process and that it could be utilized to improve professional practice by facilitating the development of more contextual approaches to evaluation. Yet, in order to begin to substantiate such claims, the research had to first validate the proposed conceptual model. That is to say, the researcher needed to establish that the model was a "good" theoretical contribution according to rigorous, academic standards.

Step 3: Validate and Apply the IS/IT Evaluation Conceptual Model

Meredith (1993) noted that conceptual models and theories tend to gain credibility through simple face validity; that is to say, researchers and/or practitioners implicitly validate models that intuitively seem to be correct. Unfortunately, this method of validation risks the premature acceptance of an incorrect or incomplete model, thereby reinforcing "incorrect assumptions or beliefs" and perhaps leading to "highly erroneous managerial decisions" (Meredith, p. 11). Frank (1999) supported this view by discussing the tendency for models to be introduced and accepted into a discipline without sufficient critical reflection and review, positing that this may be due to a dearth of heuristics for assessing the quality of both model building techniques and the models themselves.

Defining What Constitutes a "Good" Conceptual Model

Scholars have cited the need for "good" theoretical contributions (Webster & Watson, 2002). Yet, they have struggled to define what constitutes such an artifact. According to Webster and Watson, researchers have argued that good theoretical contributions should: be memorable; be able to explain, predict, and delight; be interesting; or, be parsimonious, falsifiable, and useful. Whetten (2002) claimed that contributions to theory should be both *practical* and *good*. However, according to Whetten, many are neither.

Moreover, bad theoretical contributions often prove to be dysfunctional or detrimental when subsequently applied to research or practice.

Recognizing the need for a clearer definition, Whetten (2002) argued that good theoretical contributions tend to approximate the characteristics of a *strong* theory; that is to say, they exhibit a qualitative difference that distinguishes them as *scholarly* versus *ordinary* explanations. Here again, few explicit guidelines exist for defining what constitutes such a contribution. As a result, Whetten approximated the ideal of scholarly explanation by applying Kant's argument that holds that bodies of scholarship should be both *complete* and *systematic*. According to Whetten (p. 47) that means that:

> *What scholars have to say about a subject should represent a complete, or satisfactory, accounting of the matter in the sense that it should contain no obvious, gaping holes. In addition, the body of knowledge should be organized, coherent and consistent.*

In this manner, Whetten provided scholars with a workable means forward by ensuring that a model exhibits both completeness and a systematic structure. The researcher found this description insightful, especially in light of the challenges associated with evaluating conceptual models. For example, Webster and Watson (2002) noted that the process of evaluating a theoretical contribution is both "difficult and nebulous." Moreover, Frank (1999) asserted that assessing the quality of a model represents an intractable problem, particularly in cases where unobservable states (such as future events) have been modeled. Thus, Whetten's guidelines provided a needed roadmap for the researcher in this study.

Selecting a Research Method for Validating the Conceptual Model

The difficulties associated with model assessment may arise from researchers' tendencies to create false dichotomies between *building* and *testing* theoretical

contributions. In contrast to this dichotomous view, Meredith (1993) and Harrison (2002) conceptualized the research process as a form of analytical induction: an iterative cycle of exploration, description, explanation, and testing. According to Meredith (p. 3), theoretical contributions are tested "to validate and add confidence to previous findings, or else invalidate them and force researchers to develop more valid and complete theories." Therefore, to test the conceptual model, the researcher needed to utilize a method capable of addressing the rich dialogue between the model's abstract conceptualizations and "real-world" empirical evidence.

Selecting an appropriate research method was not a trivial task. In reviewing the literature, the researcher identified many different approaches. The researcher also noted a tendency of in come scholars to consistently and dogmatically ascribe to a single method or group of methods as a result of their ideological predilections. However, in examining the relevant literature, the researcher recognized that each method offered distinct advantages and disadvantages, representing its unique strengths and weaknesses. Accordingly, the researcher ascribed to Benbasat, Goldenstein, and Mead's (1987, p. 369) assertion that "no strategy is more appropriate than all others for all research purposes." Thus, an appropriate research method should be selected based upon the unique context and philosophical basis of a given study.

In attempting to select an appropriate method, Meredith, Raturi, Amoako-Gympah, and Kaplan's (1989) framework of research methods proved helpful. As demonstrated in Figure 10, the framework has two dimensions: the rational/existential and the natural/artificial.

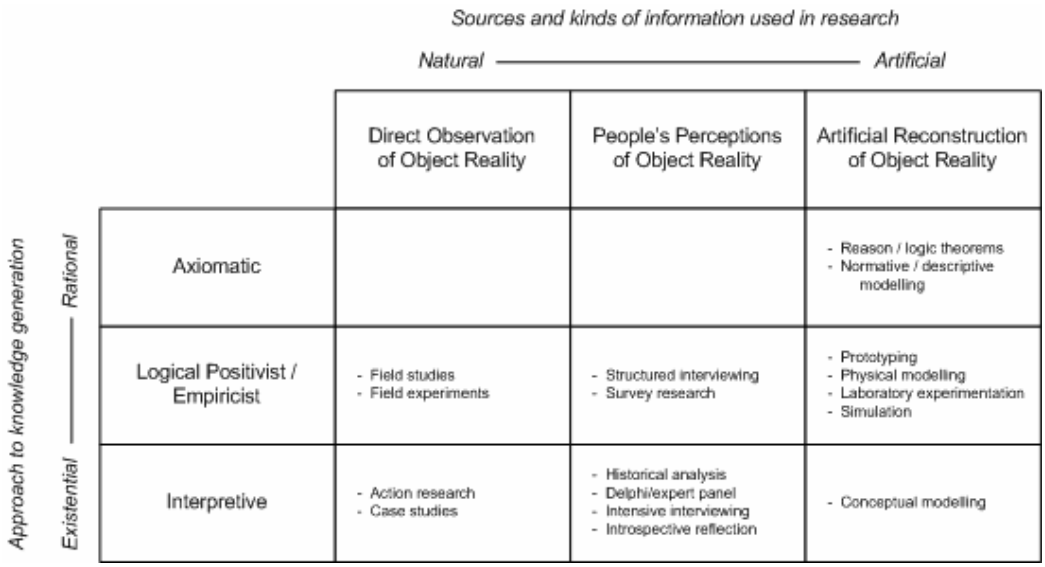

Figure 10. Framework of research methods (Meredith et al., 1989)

According to the authors, the natural/artificial dimension described the origin and type of information used in the research process. A naturalistic orientation implies a greater concern for correctly representing particular "real-world" phenomena, thereby offering contextually rich and often nuanced descriptions. Conversely, an artificial orientation tends to use abstractions and simplified models to represent natural phenomenon, thereby leading to more efficient and controlled research. The findings of artificially-oriented research may be more easily generalized; however, the results may appear overly simplistic and inconsistent when compared to the findings of more naturalistic methods that often yield results that are simultaneously more nuanced and messy.

On the other axis, the author's rational/existential dimension defined the underlying source of truth, ranging between a complete independence from humans' experiences (objectivity) to a sole reliance on individuals' interpretations (subjectivity). Accordingly, rationalistic research tends to be deductive, concerned with cohering to scientific laws, and formally structured. In contrast, existential research tends to be inductive, subjective, and concerned with representing "real-world" phenomena.

In examining the framework of Meredith et al. (1989), the researcher recognized a strong existential orientation in this study. Such an orientation seems both reasonable and desirable given that the objective of this study is to better understand, as well as ultimately improve, the practice of IS/IT evaluation. Moreover, it is equally clear to the researcher that the preceding stages of this study have been more artificially orientated, using a conceptual modeling approach as the research method. Thus, in the interest of multi-modality, the researcher believed it was most appropriate to employ a more naturalistic method for validating the artificially-derived conceptual model. Therefore, the researcher needed to select between two broad categories of alternative existential methods (Figure 15): those based on "people's perceptions of object reality" and those based on "direct observations of object reality."

According to Meredith et al. (1989), methods based on "people's perceptions of object reality" include historical analysis, Delphi/expert panel, intensive interviewing, and introspective reflection methods. Use of these methods by the researcher would have been similar (to a varying degree of robustness) to assessing the conceptual model based upon simple face validity, because the appraisal of the model would have relied on the intuitive and subjective judgments of individuals. Regrettably, such validation methods risk accepting an incorrect or incomplete model, thereby reinforcing "incorrect assumptions or beliefs" and perhaps leading to "highly erroneous managerial decisions" in practice (Meredith, 1993, p. 11). For this reason, the researcher rejected such methods for validating the conceptual model in this study.

Turning to methods based on the "direction observation of object reality," Meredith et al. (1989) offered two alternatives: action research and case studies. Benbasat et al. (1987) described action research as a dual-purpose approach in which the researcher

intends to conduct research while participating in effecting the change that they are studying. Although such an approach may have proved advantageous to investigating the efficacy of evaluation methods based upon the proposed conceptual model, the researcher believed that it would be irresponsible to apply the conceptual model to industrial practice without first establishing its validity by some other means. Turning to an alternative research method based on direct observations of reality, case studies represent an ideographic research strategy designed to understand phenomena in their context (Benbasat et al., 1987). As indicated by Harrison (2002, p. 158), "case study research is of particular value where the theory base is comparatively weak and the environment under study is messy." Moreover, Eisenhardt (1989) stated that case studies could be used to accomplish many aims, such as providing descriptions, generating theories, and testing theories. Recognizing that theories are but one form of conceptual artifact (Meredith, 1993), the researcher extended Eisenhardt's assertion to employing case studies to build or test conceptual artifacts generally, including conceptual models and frameworks specifically. Therefore, the researcher selected a case study method as the most appropriate approach given the immediate objective: the validation of a conceptual model that is grounded in a complex, "real-world" problem in which context is critical.

Having decided on a case study research approach, the researcher determined a number of factors related to the study: the use of a single- or multiple-case design, the specification of the unit(s) of analysis, the selection of individual cases, the choice of data collection methods, and the identification of a process by which the data will be analyzed and presented (Benbasat et al., 1987; Harrison, 2002). In this study, the researcher utilized a multiple-case study design, because scholars have identified such designs as desirable and appropriate for testing theoretical contributions, such as conceptual models

(Benbasat et al.). In addition, Benbasat et al. argued that multiple-case designs provide a means of cross-case analysis and offer a greater opportunity for theoretical extensions, thereby also improving the precision and stability of the results.

To facilitate the design of this study, the researcher employed Willcocks and Margetts (1994) as a model. In their study, Willcocks and Margetts applied a multiple-case study approach to develop and investigate a conceptual framework, based on Pettigrew's (1985) CCP model, designed to guide in the analysis and evaluation of risk in an information systems initiative. In the their project, Willcocks and Margetts applied existing cases—derived from either past studies they had conducted or from the literature—to the conceptual framework of their study. By doing so, they were able to use more cases (and thus improve confidence in their findings) then had they developed new case studies in the field. Moreover, this approach likely improved the efficiency of their research process. Finally, by using existing cases, Willcocks and Margetts could have more easily compared their conceptual framework to alternative models, thereby satisfying one of Lee's (1989) suggested tests of analytical rigor in case study research: the ability to at least explain or predict as well as any competing theoretical contribution.

To make operable the Willcocks and Margetts (1994) research model, the researcher delineated specific procedures for the following tasks (each of which are described in detail in the subsequent sections of this chapter):

- The procedure to be used in selecting a minimum of five case studies from the literature for application in this study as a means of validating the proposed conceptual model
- The methods to be used for conducting the multi-case analysis, including cross-case comparative techniques and conceptual model testing procedures, as well as the rationale for their selection

Approaching Case Study Research

Thoughtful scholars have recognized that qualitative research (such as case studies) demand a no less rigorous research design and plan than empirical studies (Miles and Huberman, 1994; Yin, 2003). However, while they argued in favor of "tight" (i.e., well-defined) research designs, Miles and Huberman (p. 12) also noted that case study analysis is a "continuous, iterative process" carried out "in a more fluid—and in a more pioneering—position." For this reason, the researcher remained open to the possibility that changes to methods and procedures might have been to needed following the initial phase(s) of data collection, display, and analysis. To that end, the researcher carefully documented the procedures associated with each phase of the case study research.

Case Study Validity & Reliability

Before defining specific research procedures, Yin (2003) recommended that a researcher should consider issues of validity and reliability. This is important in all research projects, but it is especially so in case study research that has been criticized for being too subjective and non-measurable (Miles & Huberman, 1994). To combat this challenge, Yin identified four tests for judging the quality of case study research and described tactics appropriate to case studies for addressing each of these criteria. Yin's descriptions of tests of case study quality and strategies for addressing each test are summarized in Table 17. In this study, the researcher applied these strategies to ensure the validity and reliability of this study. In the subsequent sections of this chapter, the researcher described in more detail the application of these strategies to this study. For example, the researcher explained the "replication logic" associated with selecting the multiple case studies that were analyzed to validate the conceptual model in this study.

By employing this replication strategy, the researcher was able to ensure that the study had sufficient construct validity.

Table 17. Case study quality: tests and tactics (after Yin, 2003, p. 34)

Test	Description	Strategies in this Study
Construct validity	- Employing proper operational procedures based upon the concepts under investigation	- Multitude of evidential sources
Internal validity	- Applicable only to explanatory / causal studies - Ensuring relationships between variables are actually causal, rather than coincidental or spurious	- Pattern-matching exercises - Theory-building exercises - Examine rival explanations
External validity	- Defining the scope of the study's generaliability	- Replication logic in multi-case selection
Reliability	- Demonstrating that a study may be repeated with similiar outcomes	- Following documented case study procedure / protocol - Using published / available cases

Case Study Selection Method

Given that the proposed methodology in this study involves a meta-analysis of published case studies, the researcher obviously had to select those cases from the existing literature. According to Miles and Huberman (1994), qualitative researchers may make use of a number of sampling strategies. However, not all sampling methods should be applied to multiple case studies. Yin (2003) argued that researchers should "consider multiple cases as one would consider multiple experiments" rather than as "multiple respondents in a survey." Why should this be the case? By using a multi-case methodology, Miles and Huberman stated that researchers could enhance the *precision*, *validity*, and *stability* of the findings in their study. However, a multi-case approach cannot improve generalizability, because researchers are attempting to generalize "from one case to the next on the basis of a match to the underlying theory, not to a larger universe" (Miles & Huberman, p.29). For this reason, scholars have called for the use of

replication—rather than sampling—logic in selecting cases for multi-case studies (Miles & Huberman; Yin).

Choosing cases based upon replication logic implies purposive selection. According to Yin (2003), the replication procedures should be based upon the theoretical framework of a study (in this case, the researcher's conceptual model of IS/IT evaluation). Using this as a heuristic, the researcher should select cases on the basis of *literal* (i.e., conditions that predict similar outcomes) or *theoretical* (i.e., conditions that predict contrasting outcomes in a predictable manner) replication. Confirmatory results across multiple cases offer a compelling justification for the underlying theoretical contribution. Similarly, disconfirming outcomes provide opportunities to enhance a contribution's robustness by either adding contextual boundaries (i.e., precision) or re-specifying propositions (i.e., revision). Therefore, Yin argued that researchers should select a variety of cases, some of which are similar and others that are more varied. To accomplish this goal, the researcher:

1. Identified existing cases in the research literature that examined the IS/IT evaluation process within an organization (the unit of analysis in this study).
2. Selected five cases from this list by applying replication logic, thereby looking for similar and contrasting cases.

Following the procedure outlined for the literature review in this study, the researcher sought potential case studies to use in this cross-case analysis. In all, the researcher found many examples of case studies citing the deployment of IS/IT in various contexts, as well as the successes and failures associated with IS/IT projects. Additionally, a number of case studies explored the dimensions of IS success. In a similar manner, the researcher identified many process-oriented studies that explored topics such as software development methodologies. In contrast, the researcher found relatively few studies

between 1990-2007 that explored the process of IS/IT evaluation as conducted by practitioners. The researcher also found a handful of evaluation cases in which the academic researcher participated to some degree in conducting the evaluation. The identified cases are summarized in Table 18.

Table 18. Identified case studies of the IS/IT evaluation process (1990-2006)

Source(s)	Case(s)
Symons (1990)	- Selection of new IS infrastructure in manufacturing firm
Markus & Keil (1994)	- Expert system to support salesfunction in computer/ IT firm
Serafeimidis (1997) * also Serafeimidis & Smithson (1999)	Detailed description of three cases: - IS evaluation in an insurance company * - IS evaluation at British Telecom - IS evaluation in UK Post Office
Smithson & Hirschheim (1998)	- Evaluation of outsourcing IS function
Huerta & Sanchez (1999)	Brief description eval processes in four firms (cases): - Information processing firm - Paper tissue manufacturer - Paper & card manufacturer - Cellulose wrapping manufacturer
Irani & Love (2001) Irani, Sharif, & Love (2001) Irani (2002)	- Evaluation of manufacturing resource planning system
Smithson & Hirschheim (1998)	- Evaluation of outsourcing IS function
Clay, Edwards, & Maguire (2003)	- Evaluation of inventory control system
Cordoba & Robson (2003)	- Evaluation of a university's IS infrastructure
Klecun & Cornford (2003)	- Evaluation of an intranet pilot in healthcare
Morell (2003)	- Evaluation of IS investment in US Department of Defense
Nijland (2004)	- Evaluation of IS in an insurance company

Having identified the list of potential cases, the researcher selected five for use in validating the conceptual model in this study. In performing this task, the researcher began pragmatically. Because the published case reports represent the only source of the data in this study, the researcher eliminated cases that contained comparatively limited descriptions, such as Huerta and Sanchez (1999) or Klecun and Cornford (2003). Using a similar rationale, the researcher preferred dissertation-based case studies due to their

more robust descriptions, such as Serafeimidis (1997) and Nijland (2004). Moreover, both of these dissertations contained case studies grounded in insurance companies. Therefore, following Yin's (2003) call for replication, the researcher selected both of these cases. Next, the researcher selected Symons (1990) that offered a description of IS/IT evaluation in the context of a business unit in a manufacturing firm. Symons's study was also selected because it was explicitly based upon Pettigrew's (1985) CCP framework, which the conceptual model in this study has attempted to build upon. In the interest of replication, the researcher also selected the manufacturing case study that was published in a series of articles (Irani & Love, 2001; Irani, Sharif, & Love, 2001; Irani, 2002). Finally, the researcher sought to select a case that would be most likely to result in contradictory findings. In examining the already selected cases, the researcher discovered a pattern involving European private-sector businesses clustered in the insurance or manufacturing industries. Additionally, most of the researchers explicitly used interpretive/contextual frameworks for organizing their findings. In contrast, Morell (2003) examined the IS/IT evaluation practices of a public-sector organization based in North America (the United States Department of Defense). Likewise, Morell did not appear to organize the report around any established, contextualist framework of IS/IT evaluation. For these reasons, Morell's case was selected as the fifth and final report to be analyzed in this study.

Case Study Analysis / Model Testing Method(s)

According to Yin (2003), researchers should examine cases based upon one of three general analytical strategies: using theoretical propositions, considering rival explanations, or creating a case description. Of these, Yin held that an analysis based upon the underlying theoretical propositions in a study was usually most desirable.

However, in some studies other approaches may be more suitable, such as the use of descriptive methods to identify embedded units of analysis or causal links (Yin). Most importantly, the general analytical strategy should match the aims of a study.

Following the analytical strategy in a study, a researcher must select or develop specific techniques for analyzing the data. If a researcher has collected data for more than one case, the researcher must first decide whether to analyze each case individually, examine them collectively (cross-case analysis), or do both. Once this is determined, the researcher may then begin to turn to techniques. Miles and Huberman (1994) divided analysis into two stages. In the early stage, researchers use techniques to initially organize data during or immediately following the collection process. In the later stage, researchers more robustly examine the data using one or more analytical/visualization techniques. In both stages, techniques should be selected based upon the context of a study, including issues such as single versus cross-case analysis, types of data collected, unit(s) of analysis, and the underlying analytical strategy.

Based upon the above discussion, the researcher defined a structured procedure for analyzing the data collected in this study. To clarify the procedure and aid analysis, the researcher bifurcated the analysis into two phases: 1) validating / refining the conceptual model using individual case studies, and 2) developing guidelines based upon the validated conceptual model and a cross-case analysis.

Phase 1: Validating the Conceptual Model as a Descriptive Framework

In this phase, the researcher attempted to establish the validity of the proposed conceptual model and refine the theoretical constructs as appropriate. Given this objective, the researcher followed Yin's suggestion to utilize underlying theoretical propositions as a general analytical strategy. Because this phase was intended to establish

the descriptive validity of the proposed conceptual framework, each case was treated as a discreet subject for analysis. Furthermore, following Yin's (2003) recommendation for a purposive replication strategy, the researcher examined the cases in the following sequence (identified by first published citation): Serafeimidis (1997); Nijland (2004); Symons (1990); Irani and Love (2001); and Morell (2003). This sequence allowed for analysis in one industry vertical (insurance), followed by another industry vertical (manufacturing), followed by a public sector entity (the United States Department of Defense)—thereby provided opportunities to both confirm and disconfirm findings. Moreover, given the composition of the conceptual framework (arranged along a time-line) and a cursory review of the cases (which often describe multiple, sequential evaluation phases), the analysis was structured using techniques designed to follow a time-sequence of events (Yin, 2003).

Specifically, the researcher performed the following steps for each case in this study:

1. Coded (i.e., tag or label) the case's text in order to identify each of the described evaluation phases.
2. Coded the case's text in order to identify each of the proposed conceptual model's constructs in each of the case's recognized evaluation phases.
3. Displayed the coded data in an "event listing" table (see Table 20).
4. Drew conclusions about the descriptive validity of the proposed conceptual model based upon an analysis of the summarized data in the display.
5. Tested alternative constructions of the proposed conceptual model (if appropriate) to explore construct / process refinements.
6. Repeated steps #1-5 for each subsequent case until finished.

As a note of explanation, the example of an event-listing table found below (Table 19) is intended to illustrate this analytical tool's basic structure. Slight variations in the format or additional analytical devices were required in the context of specific cases,

particularly to account for variations in project lifecycles (which are represented by the column headings).

Table 19. Example of an "event listing" table for single case descriptive analysis and reporting (after Miles & Huberman, 1994)

	Feasibility	Analysis / Design	Development	Implementation	Review
Why					
Where					
When					
What					
Who					
Which					
How					
Action					

Phase 2: Applying the Conceptual Model to Cross-Case Analysis

Having validated the conceptual model as a descriptive device for IS/IT evaluation, the researcher applied it to conducting cross-case analysis. In doing so, the researcher attempted to identify patterns of failure and success across the cases presented in this study. Based upon this cross-case synthesis, the researcher endeavored to offer guidelines for conducting more contextually sensitive and appropriate evaluations. Specifically, the researcher performed the following steps:

1. Utilized the single-case event listing tables to construct partially-ordered meta-matrices (see Table 21) for common evaluation phases, such as during the design, development, implementation, or review phases (Miles & Huberman, 1994).

2. Identified patterns (if possible) of IS/IT evaluation success and failure based upon an analysis of the summarized data in the display.

3. Described (tentative / proposed) normative guidelines based on the patterns identified in the cross-case synthesis of data.

As a note of clarification, the example of a partially-ordered meta-matrix listed below (Table 20) provides a depiction of one instrument for structuring cross-case comparisons. During the process of analysis, a number of variations on this basic design were required. Additional means of analysis included more detailed breakdowns of specific constructs in the form of case-ordered descriptive and content-analytic summaries.

Table 20. Example of a "partially-ordered meta-matrix" for cross-case descriptive analysis and reporting (after Miles & Huberman, 1994)

	Case 1	Case 2	Case 3	Case 4	Case 5
Why					
Where					
When					
What					
Who					
Which					
How					
Action(s)					
Outcomes					

Specific Procedures: Model Validation and Application

To validate and apply the model, the researcher followed these specific procedures:

1. The researcher followed Willcocks and Margetts (1994) as a guide in conducting a multi-case study for validating a conceptual model using established case studies in the literature. Selecting appropriate case studies required:

    a. The researcher to identify existing case studies in the literature (following the procedures outlined in the literature review section).
    b. The researcher to select five cases from the list of potential cases by applying replication logic to include similar and contrasting cases.

2. The researcher validated the conceptual model as a descriptive framework following a structured approach for each case study:

    a. The researcher coded (i.e., label) the text in order to identify each of the described phases of IS/IT evaluation.

b. The researcher coded the text in order to identify each of the constructs contained in the proposed conceptual model in this study (if present) for each of the phases of evaluation in the case study.

c. The researcher summarized these findings in a single case "event listing" table (see Table 29).

d. The researcher drew conclusions about the descriptive validity of the proposed conceptual model based upon the text of the case and the data displayed in the "event listing" table.

e. The researcher tested alternative constructions of the proposed conceptual model (as appropriate) to explore refinements to the model.

f. The researcher repeated each of the above steps for subsequent cases until all were completed.

3. The researcher applied the conceptual model to a cross-case analysis following these procedures:

a. The researcher utilized the single-case event listing tables to create a partially-ordered meta-matrix (see Table 20) for common phases of the IS/IT evaluation process.

b. The researcher identified examples of successes and failures in the IS/IT evaluation process based upon an analysis of the case studies and the data represented in the meta-matrix table. These findings were structured into content-analytic summary tables and analyzed for emergent themes and patterns.

c. The researcher identified tentative normative guidelines for conducting more contextually sensitive IS/IT evaluations based on the patterns identified in the cross-case analysis.

Summary of Model Validation Procedure

The researcher recognizes the need for a robust and rigorous means of preliminarily validating the conceptual model proposed in this study. Unfortunately, testing the validity of theoretical contributions is a difficult and non-trivial task. As a result, the researcher has carefully reviewed and discussed numerous research methods that could be applicable in this context. After critically reflecting on the relative advantages and

disadvantages of these methods, the researcher selected a multiple-case study approach. To operationalize this approach, the researcher followed Willcocks and Margetts's (1994) example that employed a similar methodology to accomplish an analogous objective. Based upon Willcocks and Margetts's model and recommended case study practices, the researcher described specific procedures for selecting, displaying, and analyzing this project's case subjects. These procedures were utilized to serve two purposes: 1) validation of the conceptual model in this study, and 2) identification of normative guidelines for conducting context-based IS/IT evaluations.

Step 4: Report Study Results

After reviewing the literature, developing the conceptual model, and conducting a multiple-case study to initially validate the conceptual model, the researcher analyzed the results of the study and discussed the findings in Chapter 5. In particular, the researcher's conclusions consist of an assessment of the conceptual model, including factors such as its falsifiablility, logical consistency, explanatory/predictive ability, and disconfirming evidence (Lee, 1989). In addition, recognizing the limitations of qualitative research generally and case study methods specifically, the researcher exercised caution when attempting to generalize the findings of this study (Benbasat et al., 1987; Harrison, 2002). As a result, the researcher recognized the need to clearly define the underlying conceptual assumptions and contextual bounds of this study (Whetten, 2002).

Beyond analyzing and critiquing the conceptual model, the researcher also focused on developing a series of guidelines that aid organizations in conducting context-based evaluations. Overall, these guidelines should assist evaluators within organizations in selecting or developing context-based evaluation methods. In attempting to achieve this objective, the researcher needed to carefully balance the demand for flexibility based on

contextual factors with the need for prescriptive guidance. Following Renkema's (2000) approach, the researcher offered structured guidance that facilitates context-based evaluation. Furthermore, the researcher discussed in detail the implications of this study for professional practice.

Finally, the researcher elaborated on recommendations and implications for future research. Overall, the researcher believed that this study could significantly influence subsequent IS/IT evaluation research, especially by assisting scholars in better understanding the contextual factors associated with the evaluation process. Moreover, academic research that uses and/or investigates the conceptual model in this stuffy may lead to further improvements/refinements in terms of both understanding the evaluation process and developing better evaluation methods. Indeed, the researcher hopes that subsequent research will apply analytical induction techniques to the model, thereby revising and extending its conceptualization. Like Hirschheim and Smithson (1999), the researcher believes that improving the discipline's understanding of the evaluation process—rather than offering another evaluation method of suspect value—is more likely to create new knowledge, advance the discipline, and ultimately improve industrial practice.

Discussion of Reporting Procedures

In experimental laboratory studies, researchers follow distinct steps for data collection, analysis, and reporting. This type of linear, sequential progression is possible because each phase builds upon the prior and is fairly well bounded. In contrast, the phases of research are inherently more fluid and overlapping in case studies. For instance, Yin (2003, p. 156) asserted that "drafting should proceed even before data collection and analysis have been completed." In this sense, the researcher began reporting the results of

this study by completing the literature review, developing the initial versions of the conceptual model, and documenting the study's research methodology. However, this admonition to draft early also applied directly to the case study analysis as well. For example, Yin suggested that researchers should document the descriptive elements of a case before commencing with the initial analysis. In this study, the researcher followed this advice by developing the analytical tables described in previous section of this document. In this manner, reporting became a tool of analysis. To that end, the ongoing writing process highlighted the need for additional data collection or alternative analytical methods (such as introducing content-analytic summaries). Thus, the researcher allowed the process to build upon itself while maintaining focus on the need for a coherent final report.

Given the iterative nature of this approach, how did the researcher structure the findings in this study? Because the analytical and reporting process was only semi-structured, the researcher believed that it would be unwise to commit to a rigid framework. Rather, the researcher utilized a narrative reporting structure. By telling the "story" of the analytical process, the researcher was able to document findings while concurrently elucidating the rationale for the analysis that gave rise to them. In doing so, the researcher was able to produce a report of the study containing a robust description of procedures and outcomes.

Specific Procedures: Results Reporting

In reporting the results of this study, the researcher performed a sequence of tasks:

1. The researcher analyzed and critiqued the proposed conceptual model, examining factors such as falsifiability, logical consistency, explanatory ability, and any disconfirming evidence. The researcher also attempted to refine the underlying assumptions and contextual boundaries of the conceptual model.

2. The researcher attempted to offer methodological guidelines for conducting IS/IT evaluations based upon organizational context, focusing on the balance between contextual flexibility and structured guidance.

3. The researcher elaborated on the implications and recommendations of this study for practice, research, and pedagogy as appropriate.

4. The researcher utilized a narrative style—following Yin's (2003) admonition—to integrate writing (including considerations about reporting results) throughout the process of conducting this study.

Limitations / Delimitations / Assumptions

Research projects—no matter the amount of funding or the robustness of the design—have certain limitations and delimitations; likewise, each is grounded upon a set of underlying assumptions. Clearly, poor assumptions and excessive limitations may undermine the outcome or value of a study. Nevertheless, "good" scholarship (in terms of validity and reliability) rests upon the crisp and explicit articulation of these elements. Therefore, the researcher has described explicitly the limitations, delimitations, and assumptions underlying this study in detail.

The limitations of this study arose out of its research methodology. As the project is based upon an analysis of multiple published case studies, the researcher was limited by the extant literature base. Specifically, the researcher could control neither the number of published studies nor their quality. In addition, the researcher operated under the constraint of having to synthesize studies that were originally framed in disparate contexts and designed to serve different purposes. Aside from these pragmatic limitations, the researcher recognized the theoretical limitations implicit in the research methodology in this study. In particular, the key outcomes of the study (i.e., the conceptual model and guidelines) were in themselves, or were based upon, simplified abstractions of more complex realities. This suggests that while the outcomes might be

demonstrably valid and reasonably stable, the model or guidelines might not be sufficient to fully explain or address a particular situation. Indeed the design of this study, based upon a small number of cases, limits the generalizability of its results. Therefore, one should exercise caution in any attempt to extend its explanatory or prescriptive abilities beyond the cases explicitly contained in this study.

Aside from the limitations that are beyond the control of the researcher, this dissertation had a number of delimitations associated with it. Foremost, the researcher had responsibility for ensuring the quality and comprehensiveness of each phase of the study. This was critical because each subsequent part of the study built upon the prior phase. For example, the development of the conceptual model rested upon the soundness of the literature review. Thus, the study—like all studies—is delimited by the researcher's analytic and scholarly abilities. The other major delimitation of the study rested in the choice of published case studies, which were used to validate the conceptual model and subsequently develop methodological guideline. Consequently, the researcher has exercised caution and explicitly described the process and rationale for selecting the case subjects in this study.

The researcher has also relied on a set of assumptions to guide this study. First, putting aside philosophical and epistemological differences about the "true" nature of reality, the researcher took a pragmatic position and assumed that it is individuals' *perceptions* of reality that drive their actions. Second, the researcher assumed that the conceptual model of IS/IT evaluation should be (ethically and otherwise) non-normative. In other words, the descriptive model should be able to explain equally well the activities of individuals regardless of their actions' correctness or motives' merits. Finally, in accord with the

pragmatic theme, the researcher also assumed that practitioners need a sufficient degree of methodological guidance in order to "get-the-job-done" effectively.

Summary

In this chapter, the researcher provided a detailed description of the research methodology in this study. Specifically, the researcher adopted a multiphase approach, consisting of four main stages:

1. The creation of a comprehensive literature review.
2. The development of a conceptual model of IS/IT evaluation.
3. The validation of the conceptual model and development of guidelines for conducting context-based IS/IT evaluations by conducting an analysis of multiple case studies.
4. The reporting of results in this study.

While distinct, each stage built upon the contributions of its predecessors in an attempt to assist the researcher in testing hypotheses and answering research questions. For example, the researcher conducted a comprehensive literature review and then used those findings to develop the conceptual model in this study. Next, the researcher validated the conceptual model based upon published case studies (identified through a literature search) and then utilized the nascent conceptual model to develop normative guidelines for conducting evaluations. The researcher then reported the findings associated with each of the hypotheses and research questions in this study and discussed implications for both future academic research and professional practice. For each of these phases, the researcher provided a detailed description of the procedures employed, as well as the theoretical basis and pragmatic rationale for their selection. Finally, the researcher concluded by stating the limitations, delimitations, and assumptions in this study.

Chapter 4

Results

Using the procedures in Chapter 3, the researcher presented a proposed conceptual model of the process of IS/IT evaluation based on the study's literature review, validated the proposed model using a multi-case study analysis, and performed a comprehensive cross-case analysis to identify key observations that informed the researcher's proposed methodological guidelines (see Chapter 5). The subsequent sections of this chapter describe each of these phases in detail, beginning with the genesis of the conceptual model. Following Yin's (2003) suggestion, the researcher utilized a narrative style to integrate the process of conducting this study with the reporting of its results.

Assembling the Puzzle: A Conceptual Model of IS/IT Evaluation

Based upon findings of the preceding literature review in Chapter 2, the researcher has developed a conceptual model of IS/IT evaluation following the procedures outlined in Chapter 3. In the following sections, the researcher described the development of the conceptual model in narrative form. In particular, the researcher has focused on highlighting the iterative or recursive nature of model development. To that end, the researcher presented the sequence of models leading up to the final iteration of the conceptual model validated in this study.

Limitations of Existing Conceptualizations

As discussed in the literature review, the dominating model for describing IS/IT evaluation has been Pettigrew's (1985) contextualist framework of Content, Context and Process (CCP). Symons (1990) first applied Pettigrew's (1985) CCP framework to IS/IT

evaluation and described each of its elements: "content" as the *what* of evaluation, internal and external "context" as the *why* of evaluation, and "process" as the *how* of evaluation. Since its original application to evaluation, researchers have frequently cited or applied the CCP framework (Willcocks & Margetts, 1996; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Klecun & Cornford, 2003). But, does widespread adoption alone sufficiently demonstrate the validity of the model?

Meredith (1993) noted that conceptual models and other theoretical contributions often gain credibility through simple face validity—if a model intuitively seems correct, it is often treated as such researchers, practitioners, or both. However, Meredith (p.11) argued that this premature acceptance of a model risks legitimating "incorrect assumptions or beliefs" and could cause "highly erroneous managerial decisions" when applied by practitioners. Indeed, Frank (1999) noted that models tend to be accepted into a discipline with too little critical reflection and review. This appears to be the case with Symons's (1990) application of Pettigrew's (1985) framework to IS/IT evaluation: it is *credible* but *not valid* in the form presented. Indeed, three factors have demonstrated this lack of complete validity.

Foremost, the model is under-specified—it does not (explicitly) contain many of the constructs that were identified in this literature review as part of the IS/IT evaluation process. For example, it made no specific reference to the individuals conducting evaluations (*who*) or the relationship between time (*when*) and the path of an evaluation. Obviously, some individuals may argue that the model is not under-specified, claiming that these "missing" elements are subsumed within existing constructs. The researcher rejects this view. However, even if this point were granted, it merely helps to demonstrate the framework's second weakness: it failed to sufficiently define existing constructs. For

instance, would an evaluation's criteria or measures (*which*) constitute part of the CCP's "content" or "process" elements? Similarly, if "context" is the "*why*" of evaluation, which of the elements found in this literature review should be subsumed into this category? In both cases, it is impossible to tell. According to Whetten (2002, p. 53), this could result in conflicts between the framework's builder and its empirical testers "because they're not sure if they are talking about the same thing." Finally, the original application of the CCP framework to IS/IT evaluation fails to explicitly define the relationships between constructs. For instance, do individuals create circumstances that lead to evaluations, respond to external events that necessitate evaluations, or both? The CCP framework offers no substantive guidance. Whetten (p. 55) argued that this is the critical difference between a theoretical contribution and "a list of reasons or examples."

In an effort to better apply Pettigrew's (1985) CCP framework, researchers have attempted to extend it. As noted earlier, Willcocks and Margetts' (1996) added a historical "context" category to demonstrate the relationship between past experiences and present decision-making. Likewise, Klecun and Cornford (2003) presented an alternative graphical representation (see Figure 9) and added (or at least explicated) the element of *who* in the "context" category. Nevertheless, all of the extant models based on Pettigrew's CCP framework suffered from the same three limitations: 1) having unspecified constructs, 2) failing to sufficiently define the specified constructs, and 3) lacking a clear description of the relationships between the specified constructs.

Step One: Laying Out the Pieces

The researcher began the development of the conceptual model in this study by examining the constructs identified in the literature review (See Chapter 2). To start, the researcher reviewed the various models based on Pettigrew's (1985) CCP framework. Of

these variations, Klecun and Cornford's (2003) model was the most comprehensive. As depicted in Figure 9, it included four IS/IT evaluation constructs: *who*, *what*, *why*, and *how*. In contrast, Serafeimidis (1997, 2002) identified six elements of IS/IT evaluation in providing a definition of the activity: *who*, *what*, *why*, *how, when*, and *which.* Thus, while not offering a model of IS/IT evaluation, Serafeimidis clearly provided a more comprehensive list of relevant constructs. Indeed, based upon simple face validity, one might characterize it as "complete" or not having any gapping holes. As such, one might be tempted to accept the findings of Serafidimis (1997, 2002) and move on to the next phase of model construction. However, recalling Meredith's (1993) and Frank's (1999) admonitions against accepting theoretical contributions without sufficient critical reflection, the researcher re-examined the literature in search of tacit, overlooked, or underdeveloped constructs. Overall, this process of more finely combing through the literature was enlightening.

In particular, the researcher found a critical element that was often explicitly overlooked in the evaluation literature: the locus of evaluation (*where*). Researchers have recognized that evaluations are conducted in particular organizations, within specific operating units, and under certain competitive, industrial, and economic forces. Yet, IS/IT evaluation scholars have generally failed to explicitly include these factors in their theoretical contributions. Interestingly, scholars focused on "IS success" research and model development have extensively treated environmental conditions both within and outside of an organization (Ives, Hamilton, & Davis, 1980; DeLone & McLean, 1992; Myers, Kappelman, & Prybutok, 1997). More importantly, these researchers found that environmental conditions influence IS outcomes. Therefore, the researcher has included this construct in the conceptual model in this study.

In total, the researcher has initially identified seven unique constructs in the literature: *who*, *what*, *why*, *when*, *which*, *how*, and *where*. All of these are reflected in the IS/IT evaluation literature, "IS success" literature, or both. To summarize the literature review findings, the researcher has developed a summary (Table 16) including a description of each construct and any relevant sub-classifications found in the literature.

Table 21. Proposed constructs for inclusion in the IS/IT evaluation conceptual model based upon findings in the literature

Construct	Description	Sub-Classifications
Why	The purpose of the evaluation	
Where	The environmental conditions under which the evaluation takes place	- Extra-organizational conditions - Intra-organizational conditions
When	The temporal elements that influence the evaluation's process or outcomes	- Conditions-of-the-moment - IS evaluation / lifecycle timeframe
What	The subject of the evaluation	- Direct IT-based infrastructure - Indirect IT-based infrastructure
Who	The individuals involved with, or affected by, the evaluation's process or outcomes	- Evaluators - Stakeholders
Which	The specific elements included in the prediction or measurement process (i.e., the evaluation's criteria / metrics).	- Measures of quality - Measures of use - Measures of impacts of use
How	The specific method(s) or steps used to conduct the evaluation.	- Traditional IS evaluation methods - Efficiency-oriented - Effectiveness-oriented - Economic - Non-economic - Hybrid - Alternative IS evaluation methods - Interpretive

Step Two: Putting the Pieces Together

Having identified the relevant constructs, the researcher next focused on *systematically* describing their relationships based upon findings in the literature review of this study. Following Whetten's (2002) modeling method, the researcher began to locate the central construct by examining and reflecting upon the literature. As a starting point, the researcher turned to existing depictions of the IS/IT evaluation process based

on Pettigrew's (1985) CCP framework. Of particular interest was Klecun and Cornford's (2003) model that used concentric circles—"onion layers"—to provide an illustration of the relationships between elements (see Figure 9). Given the benefits of building upon existing conceptual structures where possible, the researcher tentatively adopted this structure and began populating it with the conceptual constructs identified in the literature review (Table 16). Throughout this process, the researcher checked each refinement for coherence and consistency by theoretically comparing the conceptual model to the findings of the literature review. After multiple iterations and much reflection, the researcher arrived at the initial conceptualization of the model depicted in Figure 11.

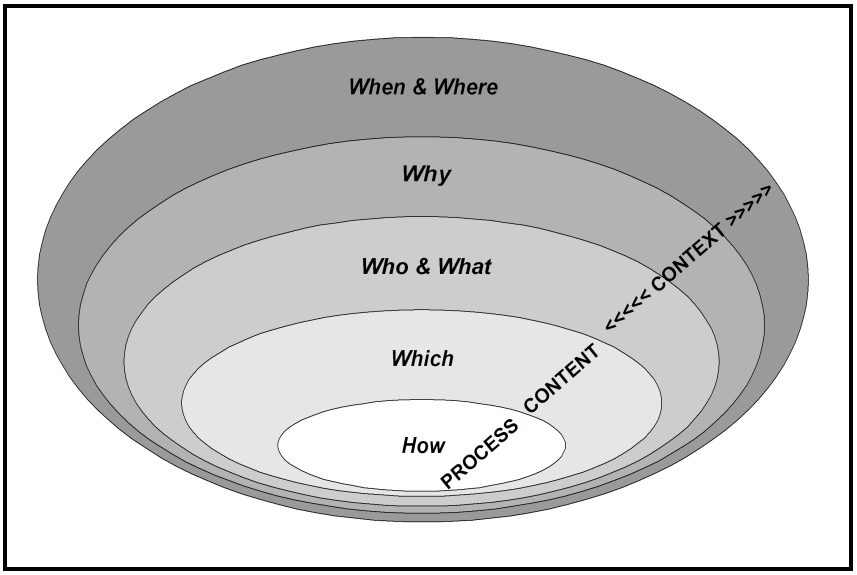

Figure 11. Rings of the revised CCP framework "onion"

This representation of the model (Figure 11) portrayed the IS/IT evaluation process as a series of nested constructs in which the outer contextual elements relate to those inside of them. In narrative terms, the model is easy to describe. Environmental conditions (*where*), both inside and outside of a firm, at a specific point in time (*when*) comprise a particular set of contextual conditions. Put more simply, these constructs represent a situation. And, the response (or set of responses) to this situation is what needs to be

evaluated. In other words, the contextual situation relates to the purpose of the evaluation (*why*). This purpose, in turn, relates to who will be affected by or involved in the evaluation (*who*), as well as that which will be evaluated (*what*). What is being evaluated and the individuals involved in the evaluation process relate to the selection of evaluation criteria or measures (*which*). Based upon the relevant criteria and measures, the method (*how*) of the evaluation is selected. Given that, it appears that the evaluation method (*how*) is fairly deterministic; it relates directly to the criteria or measures (*which*) of an evaluation. Moreover, the metrics (*which*) of an evaluation relate to a confluence of relationships between itself and many other contextual factors. For this reason, the researcher posits that the central construct of IS/IT evaluation is "*which*" criteria and measures are selected.

In terms of Pettigrew's (1985) CCP framework, the researcher has reconceptualized the integrated constructs. Specifically, the "context" of an evaluation consists of five elements: *when*, *where*, *why*, *who*, and *what*. This context, in turn, relates to the "content" of an evaluation: the particular elements to be measured or predicted (*which*). Based upon the content, the evaluator may select an appropriate evaluation method or "process" (*how*).

Proposed Conceptual Model of IS/IT Evaluation (Iteration #1)

Having determined the central construct, the researcher returned to Whetten's (2002) model development method (see Chapter 3). In particular, the researcher began to layout the model by placing constructs to the left or right of the central construct (*which*) based upon findings in the literature review. As a first step, the researcher translated the relationships found in the revised CCP "onion" framework (Figure 11) into the new format. The resulting model is depicted in Figure 12.

In examining the first iteration of the conceptual model (Figure 12), the researcher noted that the model suffered from a lack of completeness. In particular, the literature consistently reflected a sense that IS/IT evaluation is a means to an end, rather than an end in and of itself. For instance, Lagsten and Goldkuhl (2008, p. 97) noted that "evaluations influence the actions taken in the organization." However, both Figures 11 and 12 failed to reflect this sense. The researcher therefore needed to modify the model to explicate this distinction.

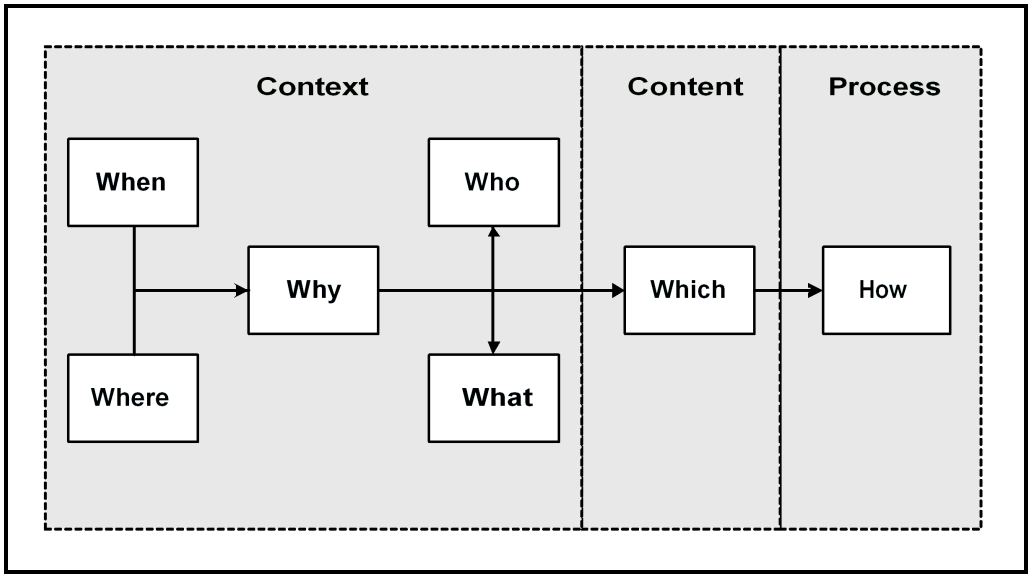

Figure 12. Proposed conceptual model of IS/IT evaluation (first iteration)

In addition, the researcher noted that the distinction found in the literature between an evaluation's *macro* and *micro* context was not distinguished in this first iteration of the conceptual model. As the reader will recall from the literature review, constructs specific to a given evaluation (*who* and *what*) comprise its *micro context*. In contrast, an evaluation's *macro context* (*where*) consists of the environmental conditions that transcend the specific subject of evaluation.

Proposed Conceptual Model of IS/IT Evaluation (Iteration #2)

Due to the limitations cited above, the researcher revised the conceptual model (see Figure 13) to reflect the following change: 1) explain how IS/IT evaluation relates to organizational outcomes, and 2) distinguish between the concept of *macro* and *micro* contexts.

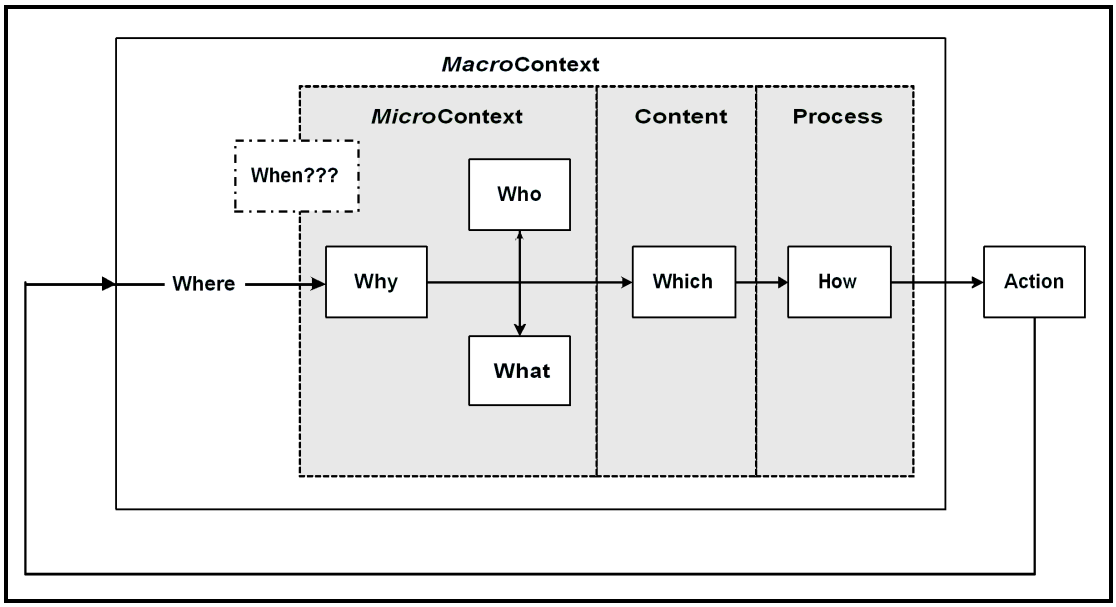

Figure 13. Proposed conceptual model of IS/IT evaluation (second iteration)

However, in revising the model, the researcher discovered a problem with its coherence related to the temporal construct (*when*). As previously discussed, "*when*" relates to the timing of the evaluation on two points: overall environmental conditions-of-the-moment (i.e., the *macro* context), and the IS evaluation / lifecycle timeline (i.e., the *micro* context). Moreover, time is usually represented as a series of points that make up a line (i.e., a timeline). Thus, this iteration of the conceptual model (Figure 13) failed to reflect that linear nature. In addition, while the model appeared complete, the action was placed outside of the organization's context. This seemed nonsensical. Just like the evaluation itself, all actions taken by an organization occur in the frame of some broader context.

Proposed Conceptual Model of IS/IT Evaluation (Final Iteration)

Based upon the aforementioned limitations, the researcher revised the conceptual model (Figure 14) to create a third iteration. Once more, the researcher critically examined the model to assess its degree of completeness and systematic construction. Having added the "*action*" construct, the model now appeared complete. What about its construction? Was the conceptual model, depicted in Figure 14, coherent and consistent?

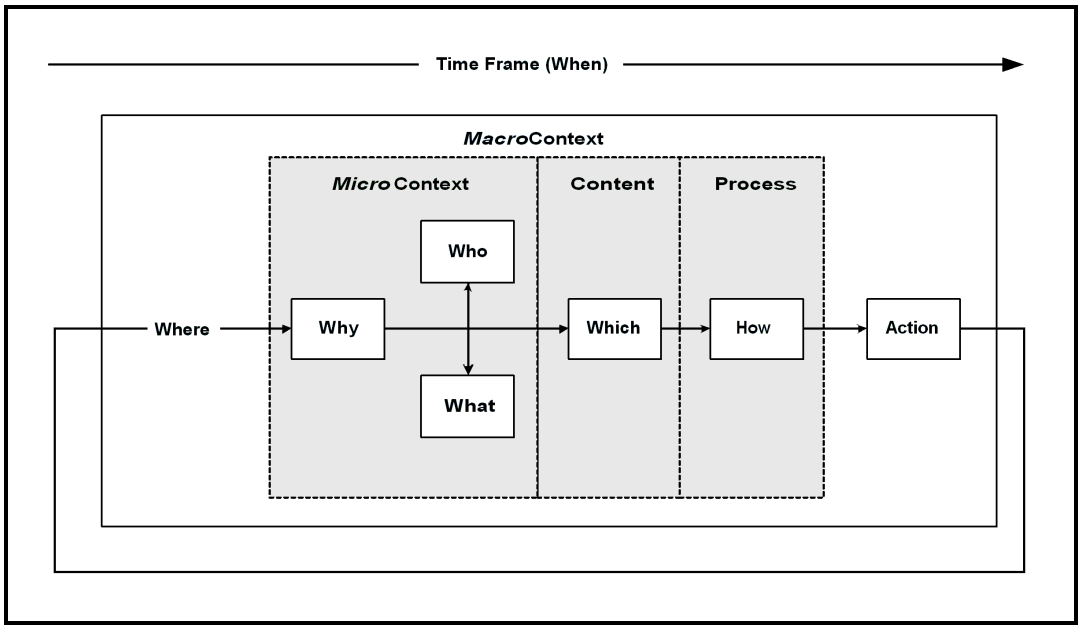

Figure 14. Proposed conceptual model of IS/IT evaluation (final iteration)

To assess its theoretical logic, the researcher has described it in a narrative form below:

> *Evaluations occur for particular reason(s) (*why*) that are shaped by certain extra- and intra-organizational environmental factors (*where*) that occur at specific points in time (*when*). The objective of an evaluation (*why*) relates to the individuals (*who*) involved in, or affected by, the assessment process. Likewise, the purpose of the evaluation also relates to the subject of the evaluation (*what*). Of particular interest, the "*who*" and "*what*" constructs are also related—a change in the subject of the evaluation may precipitate a change in the evaluators/stakeholders, or* vice versa*. Moreover, both the evaluators (*who*) and focus of the evaluation (*what*) relate to the specific evaluation criteria and metrics (*which*). These direct the evaluators (*who*) to the appropriate evaluation methods (*how*) for the given subject (*what*) and criteria (*which*). The outcome of this process leads to activities (*action*) that will ultimately change or reinforce the organization's environmental conditions (*where*) at a later point in time (*when*),*

*thereby leading to a new situation that demands evaluation (*why*). And, thus the cycle of repeats…*

To the researcher, this description seemed to "hang together" and appear consistent with the findings of the literature review in this study. That is to say, it appeared to be coherent and consistent. Therefore, the researcher accepted this of the proposed conceptual model of (Figure 14) for further investigation in this study.

Conceptual Model of IS/IT Evaluation and the Systems Lifecycle

The model depicted in Figure 14 represents only a single phase of the evaluation process. However, evaluation opportunities exist at many different times in an IS/IT project's lifecycle (Remenyi & Sherwood-Smith, 1997). To demonstrate the various opportunities for conducting evaluations, the researcher has provided Figure 15 below. Within each of the phase depicted, the process of evaluation depicted in Figure 14 may occur. Likewise, formative and summative evaluation may occur throughout the IS lifecycle.

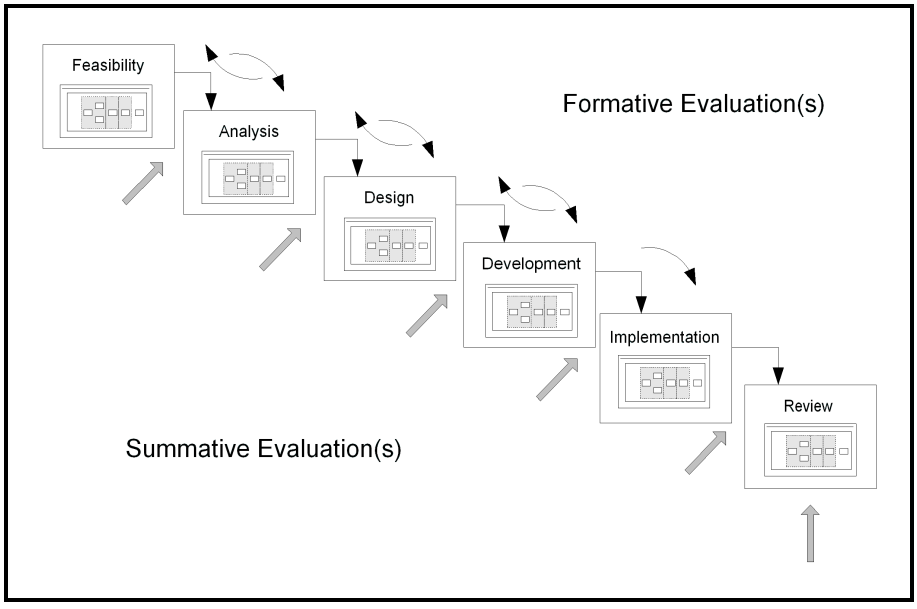

Figure 15. Opportunities for IS/IT evaluation during IS lifecycle (after Remenyi & Sherwood-Smith, 1997)

Of course, throughout the phases of an evaluation the micro or macro context of the evaluation may differ, as well as the methods, measures, and outcomes associated with each stage. Moreover, the outcomes associated with prior phases have a relationship to the context of subsequent phases. For instance, one would expect decisions made at the design phase to cascade to the development phase of an IS/IT project. Thus, while the overall model of evaluation may be consistent, specific constructs may differ over time with respect to their content, implications, and relationships to subsequent phases.

Step Three: Explaining Why the Pieces Fit

Having initially defined and described constructs and their relationships, a researcher should express the underlying conceptual assumptions that clarify the rationale for their inclusion in a model (Whetten, 2002). Following scholars' calls for a better understanding of IS/IT evaluation (Hirschheim & Smithson, 1999; Berghout & Remenyi, 2005), the researcher has attempted to develop a conceptual model that describes the process of assessing IS/IT investments. In doing so, the researcher operated under two important conceptual assumptions.

First, the researcher assumed that individuals' *perceptions* of reality drive their actions. This assumption is critical to explaining the relationship between the macro- and micro-context of an evaluation. As noted in the literature review, individuals (*who*) direct evaluations based upon their surrounding context. In the literature review, the researcher demonstrated that scholars operate under different philosophical assumptions about the nature of reality (i.e., the surrounding context). On the one hand, positivists hold that an objective, measurable reality exists independent from an individual's perceptions (Meredith et al., 1989). On the other hand, interpretivists believe that reality is socially-constructed and therefore knowledge of reality is inseparable from the knower, as it is

based on an individual's interpretation (Meredith et al., 1989). Which perception is correct? In this case, the researcher does not believe it matters. Recalling Introna's (1997) and Whittaker's (2001) post-dualist argument, evaluators operate under the constraints of what Simon (1982) called a "bounded rationality" and a pragmatic need to "get-the-job-done." Thus, even if one accepts that an objective reality exists, evaluators would not likely have either the time or ability (due to their incapacity to isolate themselves from the world) to fully understand it. Instead, evaluators understand situations and make decisions by applying pragmatic thinking, logical reasoning, and intuitive judgment to their personal observations. Thus, the researcher has assumed that evaluators' actions are driven by their subjective *perceptions of reality*, regardless of the actual state of reality.

Second, the researcher assumed that the conceptual model should be non-normative. That is to say, as a descriptive model, it should be able to explain equally well the actions of individuals regardless of the merit of their motives. For example, the conceptual model should be able to explain a situation in which an evaluator (based upon perceptions of the organizational situation) biases the outcome of an assessment for their individual benefit. As previously stated, the purpose of the conceptual model is to facilitate an understanding of the dynamics of an IS/IT evaluation. Thus, from the standpoint of the conceptual model, the prior example's outcome is neither right nor wrong; it is merely the result of the evaluation.

Step Four: Framing the Completed Picture

Having described the conceptual model and its underlying conceptual assumptions, the researcher expressed its contextual assumptions / boundaries per Whetten's (2002) modeling methodology. First, like all models, the researcher's conceptual framework is a simplified abstraction of a more complex reality. In this case particularly, the model is

very high-level and simplified; therefore, many sub-processes are subsumed. For example, the model does not explain how an individual interprets reality. Instead, it merely demonstrates that in the process of IS/IT evaluation they do so. Second, because of its degree of abstraction, the model does not offer guidance regarding the effect of a change in one of the construct's variables. Instead, the model is limited to demonstrating that if *X* changes *Y* and *Z* may also change. For instance, if the subject (e.g., an alternative technology) of an evaluation changes, the evaluator (e.g., a different expert) might also change (along with the evaluation's criteria and method). Indeed, an evaluation that led to the selection of a new disruptive technology could have industry- or economy-wide implications. However, in its present form as a conceptual model, it cannot explain such downstream effects. Third, because models lack predictive ability, care must be exercised in developing normative guidelines based upon them. Indeed, to offer normative guidance, the model must first be validated and then used to develop generalized heuristics, specific contingency approaches, or both for conducting IS/IT evaluations.

Introduction to Case Study Analysis for Model Validation

The subsequent stages of this study provided initial validation of the conceptual model (Figure 14) and offered tentative guidelines for its application to professional practice. To add structure to the presentation of findings, the researcher followed a standard approach for describing, analyzing, and reporting each case. For each of the five cases, the researcher provided a brief introduction, a detailed narrative description of the case study, and a lengthy discussion of the findings related to evidence of the relationships contained in the researcher's conceptual model. To clarify each of these relationships in the conceptual model, the researcher has redrawn the diagram and labeled each of the relationships between the constructs with a number (Figure 16).

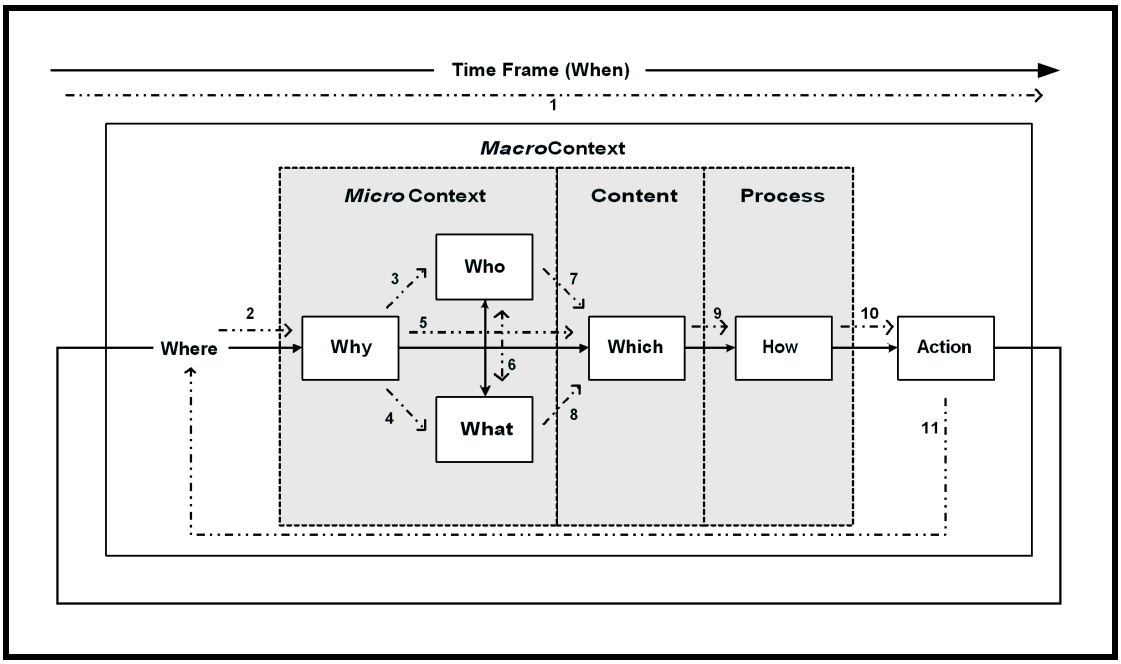

Figure 16. Proposed IS/IT evaluation conceptual model (interactions labeled)

In examining Figure 16, the researcher noted eleven distinct relationships:

1. Time (*when*) relates to the evaluation process
2. Environmental conditions (*where*) relate to the reason to evaluate (*why*)
3. The reason to evaluate (*why*) relates to the participants (*who*)
4. The reason to evaluate (*why*) relates to the subject of the evaluation (*what*)
5. The reason to evaluate (*why*) relates to the evaluation criteria (*which*)
6. The participants (*who*) and subjects (*what*) of evaluation relate to each other
7. The participants (*who*) relate to the evaluation criteria (*which*)
8. The subject (*what*) relates to the evaluation criteria (*which*)
9. The evaluation criteria (*which*) relate to the evaluation methods (*how*)
10. The outcome of the evaluation method (*how*) relates to the next steps (*action*)
11. The resulting activities (*action*) relate to the environmental conditions (*where*)

In each of the five case studies utilized to validate the proposed conceptual model, the researcher investigated each of the relationships between the constructs depicted in Figure 16. In doing so, the researcher sought to determine whether or not the conceptual model accurately described the interactions that took place in the course of conducting an IS/IT evaluation. These findings are discussed in detail under separate headings and also summarized in the form of a chronological event list table (see Chapter 3). In some cases, the researcher also included a diagram (based on Figure 15) depicting IS/IT evaluation events in the context of an IS lifecycle. The researcher adopted this systematic and structured approach to reporting individual case study results in order to provide a suitable basis for cross-case comparisons and analysis.

Case Study #1: UK Insurance Company's IS/IT Evaluation Practices

In this case study, Serafeimidis (1997) described the changing approach to IS/IT evaluation followed by an insurance company based in the United Kingdom between the years of 1990-1995. Rather than focusing on the evaluation of a specific solution, this longitudinal case study mapped the changes to the firm's overall evaluation processes resulting from contextual shifts (both extra- and intra-organizational) and company restructuring (including personnel transfers and reductions). Given the focus of Serafeimidis's case study (as an analysis of the firm's overall evaluation procedures), most of the elements in this study's conceptual model are extensively addressed (e.g., *when*, *where*, *why*, *who*, and *how*) while a couple were by and large disregarded in Serafeimidis's write-up (e.g., *what* and *which*). Nevertheless, the case study offered important confirmation of many of the relationships depicted in the researcher's conceptual model in this study.

Narrative Description: Case Study #1

Throughout most of the 1980s, the company operated in a relatively stable industrial environment, marked by few regulatory, legislative, or competitive changes. This stability was echoed in the firm's bureaucratic structure and "inward-looking" culture (Serafeimidis, 1997, p. 102). During this time period, the insurance industry relied heavily on IS/IT to support back-office applications: policy administration, underwriting, and claims processing (Codington & Wilson, 1988; Melliou & Wilson, 1995). As such, the company primarily focused on "the adequate planning and use of IT resources" (Serfeimidis, p. 89). Evaluation was best described as "efficiency-oriented" during this time period in that it focused on functional/technical analysis, capacity planning, and cost/budget estimation. However, Serafeimidis (p. 89) noted that the firm carried out IS/IT investment evaluation "in an *ad hoc* way." Indeed, the company appears to have largely lacked formal methods to assess the effectiveness (i.e., business contribution) of IS projects, aside from cost-benefit analyses (CBA) conducted by the finance department in an *ad hoc* manner. This finding was consistent with the organization's structure and culture at the time, which clearly distinguished between the "systems" department and other business units.

With the approach of the 1990s, transformations began to occur in the insurance industry as a result of deregulation, globalization, demographic shifts, and changing consumer expectations. At the same time, the pace of change in the industry also significantly accelerated. In response, the company recognized a need to become more flexible, competitive, and market-driven. Throughout the 1990s, this led to a series of internal changes in the firm's strategic plans, management processes, organizational structure, and personnel. In all, these organizational imperatives and their resultant

changes had significant implications for the role of IS—and ultimately IS/IT evaluation—within the company.

Before exploring the evolution of this firm's view of IS, it should be noted that during this same time period IS expenditures ballooned and "massive IT investments took place" (Serafeimidis, 1997, p. 111). In addition, the insurance industry had historically embraced a strong ethos of concern about the performance of investments. Thus, it was not surprising that "a crisis for a new philosophy" to ensure that the "value for money" of "IS investments" occurred in the industry during this period (Serafeimidis, p. 111).

In 1990, the insurance company in this case study came to realize that IT resources should be managed like other capital expenditures and investments. To that end, the company appeared to need an IS evaluation methodology capable of optimizing the IT project portfolio mix, analyzing risks, and managing the delivery of benefits. In searching for this "new philosophy," the Finance Director discovered Information Economics (Parker, Benson, & Trainor, 1988). Following the appointment of a Systems Strategy Manager, who was formerly employed in management consulting, the information systems department initiated a project to develop a standardized IS/IT investment evaluation methodology for company, known as the Project Appraisal Method (PAM).

The primary objective of PAM was to maximize the return associated with the company's investments in information systems. In doing so, the systems department was believed to be better able to demonstrate its importance to the organization. To accomplish this objective, a project team was formed to identify the firm's goal and then develop a process for selecting IS project in support of these targets. At the start of the PAM development project, the project team found that the organization's key

stakeholders viewed the following metrics as most important: “sales effectiveness,” “customer service,” “unit cost,” and “customer base” (Serafeimidis, 1997, p. 92).

In keeping with the multi-attribute nature of the company’s business objectives, PAM was developed as a loose adaptation of Information Economics (Parker, Benson, & Trainor, 1988) and employed a multitude of available evaluation ideas and techniques. To support this endeavor, the systems department worked closely with the various business areas to enhance collaboration and gain insight in their domains. As initially designed, a complete PAM analysis consisted of three main elements: a financial analysis of “hard” (i.e., monetarily quantifiable) costs and benefits, a risk assessment, and an inventory of the strategic and intangible (i.e., “soft”) benefits. Each evaluation component included specific instructions, tools, and deliverables that corresponded to particular phases during the system’s development life cycle (SDLC). Indeed, PAM included unique steps for each of the company’s SDLC phases: “bright idea and initiation,” “feasibility study,” “development and implementation,” and “post-implementation.” To validate PAM, the methodology was initially piloted on a diverse group of twelve IS projects. With feedback from this test round, minor modifications were made to the method. Next, PAM was successfully tested on an additional eighteen projects that had been nominated by the Systems Steering Group. These results appeared very encouraging and few revisions to the methodology were made.

By late 1992, PAM was ready for full-scale deployment and use. However, by this time, the shifting industrial landscape resulted in subsequent changes within the corporation. In particular, the firm become more cost conscious. The IS department, like all business units in the company, was expected to achieve greater outcomes with less resources. Moreover, organizational restructuring ended in the majority of the system

department being either moved to new assignments or "made redundant" (i.e., laid-off), including PAM's project leader and many of its team members. In addition, although agreeing conceptually with the its underlying basis, the division's Finance Director refused to actively support or utilize PAM unless explicitly directed to do so by someone at the corporate level. As a result of the Finance Director's reluctance, additional business units declined to employ the methodology.

While PAM struggled to gain acceptance, the Impact Assessment Group (IAG) was formed to manage IT resources and investments. The four members of the IAG group adopted PAM as a methodology to assist in helping them choose among IS projects proposed by the various business units. In response, the business stakeholders did not perceive the value of a centralized project appraisal method and "felt 'forced' to use PAM as standard communication tool between them and the IAG" (Serafeimidis, 1997, p. 96). Making matters worse, the focus of PAM shifted from managing the overall portfolio of IS projects to assessing individual projects on a case-by-case basis. Given the constraints faced by the company, the IAG were approving projects "that exceeded the resources available to develop them" (Serafeimidis, p. 97).

By 1994, the IS project appraisal situation had grown intolerable. Clearly, the company needed to focus on managing its entire portfolio of IS projects, as originally intended for PAM, rather than just evaluating each on a standalone basis. To accomplish this goal, the company introduced a prioritization process based upon the firm's critical success factors (e.g., cost reduction, legislative change response, etc.). In addition, the application of PAM was largely restricted to financial analysis alone, thereby removing efforts associated with risk assessment and intangible benefits management. These changes dissatisfied business unit sponsors, who had finally learned PAM and were

frustrated by the "more political" method of proposal prioritization (Serafeimidis, 1997, p. 97). The situation worsened over the remaining months of 1994 as the shortage of developers resulted in numerous proposal rejections despite tangible, financial benefits demonstrated by the PAM analysis.

In response to this situation, senior management issued a directive that "the business and systems groups should collaborate more together," thereby ensuring that the evaluation process involved participation from both groups. Under these new guidelines, PAM was originally seen as a tool for facilitating communication and consensus between the various stakeholders. However, the "softer" approach of the systems division resulted in more attention focused on human issues and a decreased reliance on "mechanistic tools and techniques," such as PAM (Serafeimidis, 1997, p. 97). Furthermore, new organizational groups were formed to facilitate communication between the business units and systems department. One such group was the Development Directorate (DD), headed by the Finance Director and comprised of senior business unit and IS managers. The Development Directorate had overall responsibility for prioritizing projects based upon their overall value to the business. In addition to this group, the company initiated a new staff role known as an Account Manager (AM). Each business unit had an Account Manager assigned to it. The Account Managers were responsible for facilitating communication between the business unit and the IAG.

By mid-1995, the IAG was abolished and merged into the systems department project management group. A new role, known as the Delivery Manager, was established that had responsibility for both project evaluation and delivery. Under this new structure, the Delivery Managers communicated with the Account Managers to understand and assess project proposals. In turn, the Delivery Managers' assessments were forwarded to the

Development Directorate that then approved IS projects and set development priorities. With the success of this process, the Development Directorate grew in status and "shifted from IT planning to become more of an overall business planning and advisory board" (Serafeimidis, 1997, p. 100). At the same time, the organization was able to reintroduce a well-defined protocol for evaluation based upon a project's scope (in monetary terms) and phase in the SDLC. Guided by the Finance Department, the new procedures called for the assessment of projects' plans, resources, budgets, and deferrals. In this new approach, financial analysis relied on the traditional techniques based upon NPV, IRR, and payback periods. A financial sensitivity analysis was also required. Intangible costs and benefits should have been identified, recorded, and quantified (if possible). Finally, the new approach called for an assessment of project-specific risks. However, unlike PAM that employed a rigid structure of forms and checklists, the company's new approach called for a simple text-based description of risks, likelihood of occurrence, and possible means of remediation. Finally, the responsibility of benefit delivery was assigned to specific individuals, who were to be held accountable for delivering the anticipated outcomes.

In all, this case study demonstrated the challenges associated with matching an evaluation approach to an organization's culture. For this company, the matching process proved especially painful given the shifting external and internal context it faced. Yet, while PAM was not a direct success, many of its underlying concepts and techniques eventually permeated into the organization's evaluation practices. Moreover, the development of a workable corporate structure and ongoing organizational learning eventually resulted in a higher-quality evaluation process, marked by greater stakeholder involvement and improved evaluator skills and knowledge.

Contextual Elements: Evidence in Case Study #1

Based upon the previous narrative summary of Serafeimidis's (1997) case study, the researcher developed an "event listing" table as described in Chapter 3. Overall, Table 22 (below) orders the events contained in Serafeimidis's case study into a framework based on the contextual elements found in the researcher's conceptual model. In doing so, it provides strong empirical support for the validity of including each of the contextual elements found in the conceptual model of IS/IT evaluation, particularly as every element was addressed to some degree of specificity in Serafeimidis's case study.

Table 22. Chronological event listing for Case Study #1

When	< 1990	1990-1992	1992-1994	1994-1995	1995 >
Where	Period of industrial stability resulting in a bureaucratic, centralized organizational culture to support *status quo*	Destabilizing forces in industry drive changes in company, focus on fiscal returns and competitive position in marketplace	Company continues to evolve, placing emphasis on cost reduction and restructuring	Company continues to experience resource constraints, resulting in growing dissatisfaction with IS in business units	Firm embraces cross-functional communication and collaboration in order to achieve objectives
Why	1. Ensure sufficient IT resources to support back-office operations	1. Maximize return on IS monetary investments 2. Align IT projects with organizational goals 3. Demonstrate value of systems department	1. Focus on reducing cost 2. Significant IS resource constraints, especially developers	1. Acceptance of projects despite resource burdens 2. Must move from single project evaluation to managing entire project portfolio	1. Centralized oversight of IS planning and budget 2. Align IT projects with organizational goals 3. Facilitate communication
Who	1. Systems dept. (for functional analysis / resource planning) 2. Finance dept. (for CBA, if conducted)	1. Business systems coordination group in Systems dept. (for development of PAM) 2. Business units (as stakeholders)	1. IAG in Systems dept. 2. Business units (as stakeholders)	1. IAG in Systems dept. 2. Business units (as stakeholders)	1. Dev. Directorate (DD), led by Finance Director 2. Delivery managers (as evaluators & project managers) 3. Account managers (as liaison to bus. units) 4. Business units (as stakeholders)
What	Systems dept: all IS projects & resources Finance: limited IS projects selected on *ad hoc* basis	All proposed IS projects (limited # piloted with new eval. methodology)	All proposed IS projects	All proposed IS projects + IS project portfolio	All proposed IS projects + IS project portfolio
Which	1. Efficiency-oriented (cost & performance metrics) 2. Financial return (limited)	Historic measures, or PAM based: 1. Financial return 2. Risks 3. Intangible benefits	1. Financial return 2. Risks 3. Intangible benefits	1. Financial return 2. Project priority	1. Financial return 2. Risks 3. Intangible impacts 4. Support of firm's CSFs
How	1. Efficiency-oriented (non-specified) 2. CBA (financial return)	Prior methods, or The new project appraisal method's (PAM) tools and techniques	PAM	1. PAM 2. Cross-project prioritization	Unnamed "new" method: 1. Financial: NPV, IRR, etc. 2. Textual risk description 3. Benefits inventory 4. DD consensus

Moreover, the robustness of the conceptual model was further demonstrated by directly comparing it to the organizational heuristics used in Serafeimidis's (1997) report. For example, while his "summary of main 'events'" table (p. 91) covered the same time period, it provided far less information with respect to extra- and intra-organizational drivers and conditions. Furthermore, it failed to distinguish between the subject of evaluation (*what*), the measures of evaluation (*which*), and the methods of evaluation (*how*). Thus, although a subjective judgment, the researcher believes that the framework of contextual elements presented in this dissertation offers an equally, if not more, robust structure for organizing Serafeimidis's case study of the IS evaluation practices of this UK-based insurance carrier.

Conceptual Model: Evidence in Case Study #1

Having demonstrated the relevancy of the conceptual model's contextual elements to Serafeimidis's (1997) case study, attention was directed to the overall validity of the model in terms of its ability to describe the case's events. In particular, did the conceptual model's interrelationships between context elements (depicted in Figure 13) accurately describe or depict the course of events in this case? What evidence of those relationships existed? To address these questions, each of the relationships expressed in the study's conceptual model (eleven in total) were considered in turn below.

1.) Time (When) Relates to the Evaluation Process

This case study clearly demonstrated that the process of IS/IT evaluation changes over time. Indeed, the evidence supported the researcher's assertion that as time progresses both extra- and intra-organizational environmental conditions change. For example, while the 1980s represented a period relative stability for the UK insurance industry, the later part of the decade saw the introduction of sweeping changes that had significant

organizational implications. Beyond these *conditions of the moment*, this case study also demonstrated the influence of specific SDLC phases on evaluations practices. For instance, Serafeimidis (1997, pp.106-107) noted that the evaluation activities to be carried out by Delivery Managers depended upon the project's "stage in the development life cycle." With PAM, summative reviews at the end of each life cycle phase were viewed as especially important, because a significant number of projects would likely be modified or cancelled due to changes in the company's requirements or circumstances. However, the company generally failed to undertake anything more than cursory functional/technical post-implementation reviews, thereby completely ignoring questions of the actual, rather than predicted, contribution of IS to business performance.

2.) Environmental Conditions (Where) Relate to the Reason to Evaluate (Why)

This case study offered clear and compelling support for the assertion of this relationship. For instance, extra-organizational environmental conditions (e.g., globalization, deregulation, and changing consumer expectations) drove significant shifts in intra-organizational conditions. These, in turn, influenced the motivating factors for conducting IS/IT evaluations. As one example demonstrated in this case, growing technology expenditures and increased competitive pressures forced the company to move from an orientation of "capacity planning" to "maximizing the return on IS investments."

3.) The Reason to Evaluate (Why) Relates to the Participants (Who)

Unlike some of the other relationships between contextual elements, this one appeared more subtly in this case study. Nevertheless, the researcher identified at least two clear examples. First, in the 1990-1992 period, the need to demonstrate the value of the Systems department encouraged the IS staff members to develop a standardized approach

to IS investment evaluation (rather than relying on the Finance department as previously done). Second, by 1995 the demand for better communication between the Systems department and the business units led to the development of the Account Manager role. In both of these cases, existing organizational conditions resulted in specific demands on the evaluation process that influenced the composition of the evaluation party.

4.) The Reason to Evaluate (Why) Relates to the Subject of Evaluation (What)

Like the previously discussed relationship, the connection between the drivers of the evaluation process and its subject appeared less obviously in this case. In part, this was due to the structure of Serafeimidis's case study, which longitudinally explored the company's overall approach to evaluation rather than examining the practices related to one or more particular projects. Nonetheless, the researcher found evidence to support this relationship. As an example, the requirement to better manage overall IS resources in the 1994-1995 period resulted in the evaluation of the entire IS project portfolio. This shift was in marked contrast to earlier periods in which evaluations focused exclusively on individual IS projects.

5.) The Reason to Evaluate (Why) Relates to the Evaluation Criteria (Which)

This case study contained numerous examples supporting this assertion. For instance, returning to the example from the previous relationship, the need to assess projects in relation to one another (*why*) caused the evaluators to consider the relative priority of projects as an assessment metric (which). Likewise, the requirement to align IT projects with organizational goals influenced the Development Directorate to examine projects in terms of their support of the company's critical success factors (CSFs). Of course, as noted in the prior example, other factors (i.e., *who* and *what*) related to the selection of a given evaluation's criteria as well.

6.) The Participants (Who) and Subjects (What) of Evaluation Relate to Each Other

Here again, the researcher found that the level of analysis in this case, which focused on general evaluation practices rather than specific project incidences, masked some evidence of this relationship. Nevertheless, the pre-1990 findings demonstrated this connection. In particular, only certain projects involved the finance department conducting a cost-benefit analysis. However, no evidence supported the rationale for Finance's involvement in one project compared to another; indeed, Serafeimidis described the process as being conducted "in an *ad hoc* way." Nonetheless, the available evidence suggested some form of relationship between these constructs.

7.) The Participants (Who) Relate to the Evaluation Criteria (Which)

Prior to 1990, the finance department's participation in IS/IT investment appraisals implied that some measure of financial return would be utilized. In contrast, the exclusion of the finance department implied that the evaluation of a specific project would be limited to efficiency-oriented measures, such as functional analysis and budget estimation. Nonetheless, the implications of including or excluding a participant may be more subtle. For example, the Finance Director and other senior managers had greater latitude to shape the evaluation process, including the selection of evaluation criteria, based upon their inherent organizational authority.

8.) The Subject (What) Relates to the Evaluation Criteria (Which)

This case study contained two examples to support this relationship. First, during the development of PAM, those projects that were selected to be tested with the new methodology were subjected to a different set of evaluation procedures in comparison to those that were not. Second, the appraisal of overall project portfolios meant that measures needed to be identified to determine and rank each projects' priority. In this

manner, the subject of the evaluation (*what*) related to the applicability of particular measurement criteria (*which*).

9.) The Evaluation Criteria (Which) Relate to the Evaluation Methods (How)

Of all of the relationships specified in the researcher's conceptual model, this one appeared most ambiguous in this case study, providing neither clear substantiation nor disconfirmation. The study clearly demonstrated that a close-knit relationship existed between an evaluation's measures (*which*) and methods (*how*). However, the ambiguity arose with respect to the sequence of events in the relationship. Did the selection of measures lead to the selection of methods or *vice versa*? Perhaps, the interaction of these elements was more complex? For example, might these contextual elements have been selected independently and then rationalized later? Evidence from the 1994-1995 timeframe suggested that the PAM methodology was selected despite, rather than because of, the evaluation criteria. However, in more closely reading Serafeimidis's (1997) description, it appeared that only one element of PAM was utilized to assess the specific evaluation criteria (financial return). Thus, this example supported the researcher's assertion that an evaluation's measures are utilized to select or, in this case at least, shape its assessment procedures. Nonetheless, the researcher found only such tangential evidence of associations between these elements in this case study.

10.) The Outcome of the Evaluation Method (How) Relates to the Next Steps (Action)

Given that evaluators conduct assessments in response to specific organizational demands, one would expect that the findings of evaluations would be used to direct actions in an effort to achieve some objective. Indeed, that was what this case study demonstrated, including instances of what one might call "purposeful inaction" as a form of action. For example, some of the evaluations conducted by the IAG resulted in

findings indicating that a given project should not be undertaken. Such projects were rejected and no further action occurred.

11.) The Resulting Activities (Action) Relate to the Environmental Conditions (Where)

Here again, this relationship followed a logical sequence of events. Moreover, the case study offered unambiguous evidence of this relationship. Whether it accepted or rejected a particular business unit's proposal, the IAG influenced the organization's context. For instance, rejecting one proposal may free the resources needed to support an alternative project. For example, in this case study the rejection of proposals that demonstrated limited, yet insufficient, business value was found to cause dissatisfaction on the part of some business unit sponsors within the organization's environment. Indeed, such alterations to the intra-organizational environment in this led to the subsequent restructuring of personnel assignments and ultimately fundamental changes to the company's IS/IT investment evaluation process.

Case Study #2: Dutch Insurance Company's IS/IT Evaluation Practices

In this case study, Nijland (2004) described the conception, development, and use of an IS/IT evaluation method at IIC, a large insurance company located in the Netherlands. Like Serafeimidis's (1997) case study, Nijland described a longitudinal investigation of the firm's IS appraisal activities from 1996 until 2001. Also like Serafeimidis's description, Nijland's case study focused on the firm's overall approach to evaluation, as opposed to concentrating on the assessment of one or more particular solutions. As anticipated, a direct comparison of the two case studies revealed numerous similarities. Nevertheless, important distinctions existed between the cases as well. In addition, these unique similarities and differences enabled the researcher to add to the validity and stability of the findings associated with Case Study #1.

Narrative Description: Case Study #2

Nijland (2004) began this case study with a detailed description of the extra- and intra-organizational environment of IIC in the mid- to late-1990s. The industrial environment transformed as a result of revised regulations and legislation; increased competition; industry consolidation; globalizations; a more informed and demanding consumer; and the proliferation of the Internet. In addition, the industry faced technical challenges brought about by the introduction of the European Monetary Union's unified currency (the euro) and the Y2K problem. According to Nijland, these issues influenced the operation and behavior of all insurance companies to some degree. Typical responses by companies included revising product portfolios, reorganizing corporate structures, adding new products or services, reducing the time-to-market, introducing improvement and measurement programs, integrating banking and insurance programs, and developing an e-commerce strategy.

From an IT perspective, the insurance industry had long been reliant on technology to assist in "the central administration of huge amounts of data" (Nijland, 2004, p. 141). For many reasons, the insurance industry relied heavily on information systems that were developed decades earlier. These legacy systems were complex, yet vital to the companies' operations. They were also "very difficult and expensive to change" (Nijland, p. 142). As a result, many insurance companies in the 1990s initiated projects to renew, rather than replace, their legacy IT infrastructures.

One of the most pervasive IT trends of the mid- to late-1990s involved the "boom" of the Internet, particularly the World Wide Web and e-commerce. However, some of the inflated projections of the period failed to materialize as quickly and significantly as predicted. Nonetheless, at that time organizations viewed the development of an Internet

and e-commerce strategy as critical for organizational success. In the case of insurance companies, this judgment appears warranted in hindsight, as the Internet provided an entirely new distribution channel and has served as an important sales, marketing, customer service, and communications tool.

Nijland's (2004) case study began reporting on the IS/IT evaluation practices of IIC in 1996. At that time, IIC's management of IS projects was highly chaotic, particularly in identifying and justifying initiatives. As a result, the systems department was "overrun with projects and requests" that often "remained unfinished for years" and resulted in swelling IS/IT expenditures (Nijland, p. 156). Despite these conditions, cost control was not the primary motivation for IIC's interest in IS/IT evaluation. Instead, it was IIC's successes in the mid-1990s that required the company to develop a more mature approach to IS management. According to Nijland (p. 154), the life insurance market in the Netherlands was "booming" during this period and exploiting it "demanded a shorter time-to-market of new products and product changes." However, IIC's existing IS infrastructure was neither sufficiently flexible nor rapidly adaptable. This drove two significant projects to redesign and convert the company's core legacy systems.

To support this initiative, IIC brought in a project manager from one of its parent company's businesses. After some initial investigation, the project manager refused to undertake the legacy system conversions due to the existing conditions at the firm. According to the project manager, the company did not know what projects were underway, the budget allocated to them, their relative priority, or how the capacity to deliver them in the systems department was managed. In fact, the only control structure that existed was the company's system development methodology (SDM). To correct this

situation , the project manager suggested creating a Program Management (PM) department to control and manage IT adoption. Senior management agreed.

In 1996/1997, the PM department attempted to create its first annual "project calendar": a prioritized schedule of projects for the year. This process uncovered the existing prioritization "procedure" that drove the system department's actions by either mandates (required legislative or regulatory changes) or demands (from "managers who shouted the loudest") (Nijland, 2004, p. 156). Based on these insights, the PM department replaced the SDM approach with a structured Project Control Method (PCM) for the 1997-98 time period. Rather than SDM's technical focus, the PCM addressed financial, organizational, temporal, technical, and quality considerations. Despite IIC's lack of a formal organizational strategy, the PM department's introduction of PCM drove a need to associate projects with organizational goals. The search for a project prioritization method, an IS evaluation approach, was begun.

In 1997/1998, a student intern with the PM department suggested a structured method for calculating project prioritization using a relative weighted scoring method. Although the PM department dismissed the model as "too mathematical and theoretical" (Nijland, 2004, p. 158), the suggestion introduced important IS/IT evaluation concepts to the department. In their next attempt, the PM department constructed a one-page Project Characteristics Template (PCT) that provided a uniform description of, and thus limited means of prioritizing, projects. While PCT was viewed as directionally correct, the PM department needed a more robust basis for comparing projects.

Based upon the concepts of Information Economics (Parker, Benson, & Trainor, 1988) and the Balanced Scorecard (Kaplan & Norton, 1992; Kaplan & Norton, 1996), the PM group internally developed their IT Evaluation Method, known as "ITEM." Their

ITEM method relied on the Balanced Scorecard's four perspectives to structure each project's costs and benefits:

- Financial → internal rate of return (IRR) of project
- Client/market → implications of project for independent agent community
- Operational → contribution of project to IS delivery / turnaround time
- Learning/growth → employee efficiency and time-to-market benefits

Recognizing the limitations of appraising just financial costs and benefits, this structure based on the Balanced Scorecard also facilitated the consideration of intangible, non-financial criteria. In addition, ITEM included an examination of urgency (i.e., how vital a project was to organization's success) and risks (i.e., its possible implementation challenges and operational effects). Aside from financial calculations, responses to these items were expected in an unstructured, text format. To reduce the burden on the System Process Support (SPS) managers, who acted as the IS liaisons in the business units, responsible for completing the ITEM forms, the application of the method was restricted to only those projects estimated to require more than 400 person-hours of the System Development (SD) department's time.

Having collected ITEM reports for each proposed project, the next steps in the method involved procedures for prioritizing projects. To start, a diverse group of managers representing multiple business units and functions would score the ITEM criteria for each projects (from –1 to 5) based upon their perceived contribution to the business. Based upon the results of these scores, the PM department and the directors of three primary business units developed a list of recommendations for senior management. The priority assigned to the proposed projects was based upon the project's effects, the organization's strategic objectives, and the year's available IS budget. As the final step, senior

management was responsible for deciding on the initiatives to be included in the upcoming year's project calendar.

Following its development, ITEM's use, as well as the use of the entire PCM approach, was initially very limited. Business managers tended to dismiss the model as being unrelated to their thought processes. More importantly, senior managers demanded quick action on IS projects and continued to fund budget overruns. As a result, no substantive attempt to prioritize activities occurred and the *ad hoc* introduction of projects continued.

This situation changed with the 1999/2000 budget cycle. At that time, SPS managers were informed that that they must complete ITEM reports in order to receive budgetary and system development support. Why the sudden demand for control? According to Nijland (2004, p. 166), starting in 1998 "the market for insurance products had changed and profit margins decreased." As a result, IIC shifted its focus toward IS cost control. In addition, the introduction of a new IT senior executive with "a strong focus on IT costs and benefits" and a shortage of skilled IT labor at the height of the Internet boom in the Netherlands increased the demand for a project prioritization tool (Nijland, p. 167). Finally, IIC reorganized the structure of their business units to be more market-focused. The integration of formerly distinct organizational units and the centralization of support functions (such as IS) meant that IIC needed new tools to facilitate decision-making and communication across its nascent organizational matrix structure.

As part of restructuring, an information manager was assigned to support each business unit and acted as a liaison between the IS department and the business unit. With the assistance of the unit's information manager, business managers accepted ITEM with little disagreement and provided information as requested. The primary responsibility,

however, for completing ITEM reports fell to SPS Managers: most having technical, not business, backgrounds and few having both sets of skills. As a group, the SPS managers had little background in IS/IT evaluation concepts, struggled to complete the reports effectively, and often relied on a handful of peers who were comfortable with ITEM to draft the reports. The Financial Department (FD) also contributed to ITEM reports by providing the IRR calculations. The relationship between SPS and FD proved to be a source of friction, particularly as the FD saw SPS managers as slow in responding to information requests and then only providing suspect estimates and assumptions. Moreover, SPS managers saw ITEM as originating in the SD department. Because it had always been a somewhat strained relationship, SPS managers viewed ITEM as yet another in a long series of programs (such as the Capability Maturity Model) that they did not request yet were burdened with assisting. Finally, SPS managers struggled just to collect the relevant information from the business units and SD department, as they could not alone determine either the organizational benefits or development costs.

Despite these challenges, the SPS managers submitted 52 ITEM reports for the 2000 project calendar. Overall, the PM department viewed the reports as being of poor quality. Costs and benefits were inadequately qualified. Risks were not well explicated (if at all discussed). Nevertheless, the PM department went forward with its scoring and prioritization procedure.

Eight market and department directors participated in scoring the proposed projects. Based upon the results, the PM department created a list of recommended priorities for final approval by senior management. However, rather than accepting the prioritized list, senior management approved all 52 projects and granted more budget to support the initiatives. They reasoned that the majority of projects needed to be done due to

mandatory circumstances (such as the introduction of the euro), leaving only a small number of options. As such, it was easier to grant blanket approval—a decision that resulted (not surprisingly) in budget overruns and human resource shortages.

In 2000/2001, the ITEM process was repeated to set the priorities for the 2001 project calendar. Again, the SPS Managers completed the ITEM reports with assistance from the business units, as well as SD and FD personnel. According to the PM department, the aggregate quality of the reports actually decreased. Although the reasons remain unclear, Nijland (2004) attributed this trend to continuing labor shortages (i.e., the staff remained busy with last year's projects) and the perception that budgets would be easily secured regardless of the report's quality (based on senior management's action in the prior year). Regardless, a group of business unit and departmental directors assembled to score and prioritize the projects. As in the prior year, "the total number of project requests…was twice the capacity" (Nijland, p. 176). However, unlike the prior year, consensus could not be reached. The PM department passed along a non-prioritized list of "must-do" projects to senior management for consideration. Senior management, making little use of the ITEM data, exhausted two days in prioritizing initiatives for the 2001 project calendar. This *ad hoc* approach resulted in decisions that perplexed lower-level managers. For their part, senior management thought it was ludicrous for them to do the job of their managers and therefore demanded that the PM department create a prioritization method.

Of course, prioritization had always been a part of the ITEM process. It simply was not used robustly nor did it benefit from senior management's explicit support. Some of the organization's managers may have viewed it as a threat to their decision-making authority. Whatever the case, the organizational context had changed by 2001, thereby changing the view of project prioritization. Nijland's (2004) respondents cited a

multitude of possible reasons for this shift: the PM department improved their IS/IT evaluation knowledge and skills, the business managers matured in their understanding of IT management, the organization began to operate from more of a cross-functional perspective, or simply the prioritization fiasco faced by senior management had tipped the scale. Regardless of drivers, senior management mandated that project prioritization would be a major focus with the 2002 project calendar. In addition, ITEM's criteria would be changed from the Balanced Scorecard perspectives of Kaplan and Norton (1992, 1996) to measures linked directly to IIC's seven strategic goals, such as product innovations, operational excellence achievements, and e-commerce improvements. In addition, costs were to extend beyond the scope of IT operations to include elements such as marketing and legal fees.

Contextual Elements: Evidence in Case Study #2

Using the narrative summary of Nijland's (2004) case study as a guide, the researcher constructed an event listing table as described in Chapter 3. To that end, Table 23 (below) presents the circumstances and events found in Nijland's case study into a framework based on the researcher's conceptual model's contextual elements. As in the event listing (Table 22) for Serafeimidis's case study, the evidence from this case provided strong empirical support for the validity of including each of the conceptual model's contextual elements of IS/IT evaluation. Once again every contextual element in the researcher's conceptual model was addressed in Nijland's case study, albeit to varying degrees of attention. The event listing table provided an efficient and effective means of summarizing information about a firm's evaluation procedures. It also allowed for rapid comparisons between two or more cases. For example, a review of Table 22 and Table 23

revealed distinct differences with regard to the individuals participating in the evaluation process, as well as the measures and methods of evaluation.

Table 23. Chronological event listing for Case Study #2

When	1997-1999	1999-2001	2001 >
Where	"Booming" industry growth, mandated changes (Y2K, euro), and rise of Internet. Previously, IIC's mgmt of IS was highly chaotic	Insurance market changes and profit margins tighten, shortage of IT skills, and IIC reorganization of business units	Senior executives embrace evaluation; need for project prioritiztion accepted at all levels of firm
Why	1. Industry growth required more flexibility in IS to shorten time-to-market 2. Deadline mandates (Y2K, euro) required better project management	1. Control costs 2. Prioritize projects to address resource (esp. labor) limitations	1. Prior year's prioritization efforts were a fiasco 2. Senior management mandated adoption of project prioritization
Who	1. PM dept. (for managing eval process as part of overall PCM process) 2. SPS managers (for completing ITEM form) 3. Business units (for providing info to SPS mgr.) 4. SD dept. (for providing info to SPS mgr.) 5. Business managers & directors (for initial project prioritization scoring) 6. Senior executives (for final approval of prioritized project calendar)	1. PM dept. (for managing eval process as part of overall PCM process) 2. Infomation mgrs (liaison between IS and bus. units) 3. SPS managers (for completing ITEM form) 4. Business units (for providing info to SPS mgr.) 5. SD dept. (for providing info to SPS mgr.) 6. Business managers & directors (for initial project prioritization scoring) 7. Senior executives (for final approval of prioritized project calendar)	1. PM dept. (for managing eval process as part of overall PCM process) 2. Infomation mgrs (liason between IS and bus. units) 3. SPS managers (for completing ITEM form) 4. Business units (for providing info to SPS mgr.) 5. SD dept. (for providing info to SPS mgr.) 6. Business managers & directors (for initial project prioritization scoring) 7. Senior executives (for final approval of prioritized project calendar)
What	All IS projects requiring 400+ hours of system development; requirement not rigorously enforced	All IS projects requiring 400+ hours of system development; strictly enforced for each "project calendar" period	All IS projects requiring 400+ hours of system development
Which	1. Financial return (IRR) 2. Implications for independent agents (main dist. channel) 3. IS delivery / turnaround time 4. Efficiency & time-to-market benefits 5. Urgency (vitalness to org.) 6. Risk (implementation & opertaional)	1. Financial return (IRR) 2. Implications for independent agents (main dist. channel) 3. IS delivery / turnaround time 4. Efficiency & time-to-market benefits 5. Urgency (vitalness to org.) 6. Risk (implementation & opertaional)	From 2001 onwards, Balanced Scorecard metrics were to be replaced by metrics linked directly to IIC's strategic goals. In addiiton, costs for projects were to extend beyond the scope of IT to include elements such as marketing and legal fees.
How	ITEM (IT Evaluation Method): The first stage of the firm's Project Control Method (PCM) process	ITEM (IT Evaluation Method): The first stage of the firm's Project Control Method (PCM) process	ITEM (IT Evaluation Method): The first stage of the firm's Project Control Method (PCM) process

Conceptual Model: Evidence in Case Study #2

Having demonstrated the relevancy of the conceptual model's contextual elements to Nijland's (2004) case study, the researcher focused on investigating the ability of the conceptual model to describe relationships between the events in the case study. Following the same structure as the analysis of Case Study #1, the researcher examined each of the relationships expressed in the conceptual model of this study in comparison to the events described in Nijland's case study. The researcher discussed each of these relationships in turn below.

1.) Time (When) Relates to the Evaluation Process

In this case, the relationship between the passage of time and changing organizational circumstances was clearly established. For instance, the interval of 1996-1999 was characterized as a strong market for insurance products versus the less favorable conditions of the subsequent time period. However, distinctions in evaluation procedures were not drawn based upon the phase of the project in systems development or project management life cycle, because IIC only utilized evaluation as a mechanism for prioritizing the firm's schedule of IS projects.

2.) Environmental Conditions (Where) Relate to the Reason to Evaluate (Why)

This relationship was well supported in this case study. Indeed, the need to better control IS projects drove the demand for a project management and prioritization (evaluation) method. Moreover, changing environmental conditions, in particular a tightening of the marketplace and margins, created a need for cost control and more stringent project prioritization. In both of these examples, the extra- or intra-organizational environmental conditions were clearly established as the driver for conducting an evaluation.

3.) The Reason to Evaluate (Why) Relates to the Participants (Who)

Unlike some of the relationships between contextual elements, this one appeared less obvious in this case study. Upon closer examination, however, the facts presented in this case supported this assertion. For instance, IIC initiated the evaluation process as part of a larger project management initiative. This explained the involvement of the PM department in directing the overall evaluation process. Similarly, as the purpose of evaluation within IIC was project prioritization, multiple layers of management participated in building a consensus about the scoring and prioritization of the IS project calendar.

4.) The Reason to Evaluate (Why) Relates to the Subject of Evaluation (What)

Here again, the relationship in this case study was subtle, yet nonetheless demonstrable. As previously noted, Nijland's (2004) case study did not investigate a specific evaluation circumstance. Instead, Nijland presented a meta-analysis of IIC's overall IS evaluation process. For this reason, clear examples did not exist (e.g., the company needed a new wide-area network therefore three different networking technologies were investigated). However, evidence supports a link between the reason for conducting an evaluation and its subject. In this case, evaluations were intended to prioritize projects in order to make better use of IS resources. For that reason, projects that were expected to be most resource intensive, specifically those requiring over 400 hours of system development, were subjected to ITEM. Moreover, as the necessity for project prioritization grew over time (*why*) the mandate for evaluating specific projects (*what*) also increased.

5.) The Reason to Evaluate (Why) Relates the Evaluation Criteria (Which)

The researcher found evidence of the relationship between these two constructs in the initial construction of ITEM. At that time, IIC needed to develop a project management method that enabled the company to rapidly deliver IS requirements. As a result, the evaluation method included specific criteria related to the urgency and delivery of such solutions. Examples of these criteria included IS delivery / turnaround times, time-to-market benefits, project urgency, and project risks.

6.) The Participants (Who) and Subjects (What) of Evaluation Relate to Each Other

Based upon Table 23, it appears that little or no relationship existed between an evaluation's participants and its subject in this case study. In one sense this was true, as ITEM called for the participation of specific individuals in particular ways. However, the two factors were nonetheless inextricably linked. For instance, if a business unit's project required less than 400 person-hours of development, the entire evaluation may have been skipped thereby eliminating the need for participation by any of the individuals. Likewise, if a business unit requested a particular project, a set of participants specific to that business unit were engaged in the evaluation. Thus, both of these examples demonstrate the interrelationship between these two constructs.

7.) The Participants (Who) Relate to the Evaluation Criteria (Which)

In this case study, the actions of the senior executives most clearly demonstrated this relationship. Not only did their directives influence the use of ITEM, they possessed the organizational authority to change the method's measures and criteria. For instance, the senior leadership mandated that the PM department replace metrics based upon the Balanced Scorecard (Kaplan & Norton, 1992; Kaplan & Norton, 1996) with those based upon the organization's strategic goals in ITEM.

8.) The Subject (What) Relates to the Evaluation Criteria (Which)

The relationship between the evaluation's subject and its criteria appeared less obvious in this case study. As a methodology, ITEM included an inflexible set of predefined, high-level evaluation criteria. Therefore, these measures were applied generically to each IS project proposal. Only in the final time period from 2001 and later did the researcher find indirect evidence that suggested that the subject of an evaluation shaped its criteria. This finding was based on the conclusion that certain measures, such as marketing costs and legal fees, were not applicable to all IS projects.

9.) The Evaluation Criteria (Which) Relate to the Evaluation Methods (How)

In analyzing Serafeimidis's (1997) case study, the researcher demonstrated that a relationship existed between the constructs of *which* and *how*. However, in that case study it was unclear whether the selection of criteria influenced the development or selection of evaluation methods or *vice versa*. Nijland's (2004) case study offered clearer evidence in support of the relationship depicted in the conceptual model: an evaluation's criteria influence its method(s). How so? Unlike in Serafeimidis's case in which both criteria and methods changed from one period to the next, the firm in Nijland's case study consistently relied on ITEM as the evaluation method. However, as previously discussed, the evaluation criteria changed over time. Consequently, ITEM and its related tools were modified to support the evaluation criteria, thereby demonstrating the ability of the criteria (*which*) construct ability to influence methods (*how*).

10.) The Outcome of the Evaluation Method (How) Relates to the Next Steps (Action)

As in the prior case study, this relationship was unambiguously demonstrated. The purpose of ITEM within IIC was to prioritize projects for the development calendar in the subsequent year. Projects that were selected based upon the evaluation's ranking and

scoring method had resources allocated to them. Unselected projects were excluded from further work. In both cases, the outcome of the evaluation resulted in specific action.

11.) The Resulting Activities (Action) Relate to the Environmental Conditions (Where)

As in the previous relationship, the researcher found clear evidence in this case study to support this assertion. For example, in the first year that ITEM use was mandated, the firm's senior management short-circuited the ITEM process and approved all proposed IS projects. In doing so, the organization's internal context changed with regard to their view of gaining project approval using ITEM. According to Nijland (2004, pp. 175-6), "people thought it would be as easy as the last time, and they would all get the budgets anyway." As a result of this contextual shift, the quality of ITEM reports decreased in the second year, as SPS managers viewed ITEM as more of an obligatory checklist entry than a method for rigorously prioritizing projects.

Case Study #3: UK Manufacturing Company's Evaluation of IS Infrastructure

In this study, Symons (1990) presented the case of a United Kingdom-based wholly owned subsidiary of a multinational manufacturing firm, referred to in the study as the "Processing Company," that attempted to replace a significant portion of the firm's IS infrastructure. The two prior case studies explored in this dissertation focused on describing the development and use of an organization's overall IS/IT evaluation process. In contrast, Symons's case addressed the evaluation of a particular IS/IT initiative. In doing so, Symons highlighted the emphasis placed on functional/technical evaluations of IS, despite the demonstrated influence of social and political elements on the informal assessment of, as well as long-term organizational outcomes associated with, IS-based change. Symons framed this argument in the context of Pettigrew's (1985) CCP Framework (Figure 8).

Narrative Description: Case Study #3

According to Symons (1990), Processing Company manufactured a product that had suffered from shrinking market demand since the 1970s. In the past, the company offered only a limited number of products, had a small number of customers, but enjoyed very large orders placed well in advance of the anticipated delivery date. Processing Company's business activities were controlled though mostly manual processes and used only limited IS resources. In response to weakened market demand, Processing Company was forced to diversify its product portfolio and expand its base of customers. In practical terms, this meant that the company had to manage smaller orders, operate with shorter lead times, and maintain an inventory of saleable products. By 1982, management realized the firm's existing information systems were inadequate and more computer-based systems were needed for order, manufacturing, and inventory control.

After unsuccessfully locating a suitable system already in operation within the holding company, management hired consultants in mid-1984 to work with an internal project leader to craft an Invitation to Tender (ITT) a proposal. According to Symons (1990, p. 196), the ITT called for new systems to support "sales order processing, production planning, shop floor production control, finished goods stock control, packaging stock control, purchasing, and production statistics." Successful responses were expected to demonstrate reliability, cost effectiveness, satisfaction of requirements, experience in similar implementations, and excellence in support and maintenance. The ITT was sent to five firms including IBM, which was the preferred vendor of the parent company. Interestingly, IBM originally opted to not submit a proposal, citing an inability to fulfill the project's requirements. In response, Processing Company encouraged IBM to engage one of its systems integration (SI) partners to submit a joint proposal.

By January 1985, Processing Company had received four ITT responses, including the requested joint proposal from IBM. Symons (1990, p. 197) stated that these were assessed based upon "equipment, application programs, and costs," as well as the vendor's "experience and support available." Two were dismissed out of hand as being either too costly or misspecified. One proposal, from what Symons called "Systems House," utilized ProSys software and Data General (rather than IBM) hardware but required only limited modifications to the standard ProSys software package. A slightly less-expensive proposal utilized low-end IBM hardware, provided limited expandability, and would require significant software customizations. Given these alternatives, the outside consultants recommended the Systems House proposal.

In March 1985, the Divisional Board withheld funding for the project and expressed significant concerns over the lack of IBM hardware or software. Processing Company was forced to conduct an additional evaluation of the solution. Specifically, the Divisional Board mandated that the company demonstrate interoperability between the IBM and Data General mainframe hardware. In addition, the Board required that Processing Company request an additional ITT response from another IBM SI partner, which had prior experience in one of the parent company's subsidiaries. The project leader and one of the consultants conducted the reevaluation, including interoperability testing and a review of the new ITT response. Once again, they found Systems House to offer a clear advantage. Despite their aversion, the Divisional Board approved the plan and the contract with Systems House was signed in August of 1985.

While the Data General hardware was being installed, Systems House specified the required modifications to the ProSys software. These proved to be more considerable than originally anticipated. Throughout the summer of 1986, the project team worked to

test software, create the underlying database, and revise end-user operating procedures for the project's first module: the sales ordering tool. While efforts were made to involve stakeholders, resistance to these changes was considerable. Management became increasingly impatient and wanted to see results sooner. In October 1986, the new sales order entry system was introduced to run in parallel with the existing method. This proved impractical. Sales clerks did not understand the new system and its information requirements, such as new part numbers. By trying to follow dual procedures and use unfamiliar tools, Processing Company started experiencing high error rates. Despite these difficulties and misgivings on the part of project team, which had grown increasingly uncertain about the viability of the new system, management required a complete switch to the new system by January 1987. The results were catastrophic. Symons (1990, p. 197) wrote that "by Christmas [1986] hundreds of orders were late, and a lot of business and several customers were lost."

In response, management introduced training and other measures to improve the staff's accuracy, familiarity, and confidence with the new system. While error rates decreased during the first half of 1987, senior management realized the project had significant implications that extended beyond technical concerns. Outside consultants were brought in to review the ProSys implementation and make recommendations regarding education and training. Soon after the consultants' recommendations were completed, Processing Company merged with another of the parent company's subsidiaries. The senior leadership of Processing Company was entirely replaced. The new business managers viewed Processing Company as being in a "state of chaos" (Symons, 1990, p. 202). The ProSys implementation was delayed until a complete reevaluation was undertaken and appropriate corrective actions were completed.

In all, Symons (1990) identified six stages of evaluation, both formal and informal: creating the ITT, selecting the response, evaluating Data General versus IBM, identifying custom software specifications, reviewing the lessons learned from the sales order system implementation, and reevaluating Processing Company's overall IS infrastructure post-merger. In this analysis, the researcher focused on only the first five stages outlined above, because too little source material was provided regarding the reevaluation of Processing Company's overall IS infrastructure. Indeed, Symons (1990) provided no description of the evaluation criteria, methods, evaluators, or outcomes of this final stage. Rather, the case study simply ended on a note of returning "back to square one" with a complete reevaluation of Processing Company's automation needs (Symons, p. 202).

Contextual Elements: Evidence in Case Study #3

Based upon Symons's (1990) case study, the researcher constructed an event listing table for the five evaluation stages found in this study: drafting the initial Invitation to Tender (ITT), selecting a vendor's proposal, reevaluating the selected proposal, identifying required software modifications, and reviewing challenges associated with the implementation of the sales order processing module. Like the previous case studies, Table 24 (below) presents the events and conditions found in Symons's case study into a framework based on the researcher's conceptual model's contextual elements. Here again, the evidence from this case provides strong empirical support for the validity of including each of the conceptual model's contextual elements of IS/IT evaluation.

As previously noted, Symons's (1990) case study differed from previously presented cases in that it examined the evaluation of a specific IS initiative during the project's lifecycle. This focus was more in line with the researcher's intent for the use of the conceptual model proposed in this study. For this reason, Symons's case study offered

strong evidence that the contextual elements in the conceptual model expressed in this study represent an effective means of describing, as well as facilitating an understanding of, a given organization's evaluation procedures.

Table 24. Chronological event listing of Case Study #3

When	ITT Drafting	Vendor Selection	Vendor Selection II	Customizing Specs	After Sales Order Implementation
Where	Decreased market demand for core product drove firm to diversify product set, increase customer base, and decrease avg. sale amount	Replacement of manual business controls underway; parent company views IBM and/ or DEC as preferred solution providers	Project team selects non-IBM solution as preferred solution. Board rejects decision initially and requests reevaluation.	Having installed Date General hardware, firm needed to start implementing ProSys modules. These required custom modifications.	Chaotic order processing following implementation of ProSys module. High error rates. Lost sales and customers. Staff dissatisfaction and confusion.
Why	1. Need to determine needs & appropriate solution to automate existing manual business control processes.	1. Need to select vendor to implement hardware / software solution	1. Test interoperability between IBM and Data General mainframes 2. Evaluate recommended solution versus another IBM system integration partner's proposal	1. ProSys sales order processing module required modifications to support business processes	1. Management wanted to determine causes of initial roll-out problems and how to best fix issues with subsequent modules
Who	1. Management (with approval authority) 2. Outside consultants (providing advice & recommendations; drafting ITT) 3. Project leader (worked with consultants) 4. Employees (end-user / stakeholder)	1. Outside consultants 2. Project leader& team 3. Divisional board (with approval authority)	1. Outside consultants 2. Project leader& team 3. Divisional board (with approval authority)	1. Systems House staff 2. Project leader & team 3. User department managers (limited)	1. Senior management (requested evaluation) 2. Outside consultants (conducted evaluation)
What	Manual business controls and processes that could be automated using IT	Four proposals that were submitted by vendors in response to the firm's ITT	1. Interoperability between IBM and Data General mainframes 2. Recommended solution vs. alternative IBM SI partner's proposal	ProSys sales order processing module & required modifications	Organizational resources and structure required to avoid failures associated with order processing module in future module roll-outs
Which	1. Functional specification of manual procedures for automation	1. System criteria related to performance and fit to ITT specifications 2. Vendor criteria related to cost and experience	1. Functional / technical specifications of ProSys vs. alternative IBM solution 2. Performance of data communications between IBM and Data General hardware	1. IS-led specification of automation of existing business procedures	1. Identification of company's deficiencies in management and operational support of automation project
How	1. Functional / technical analysis -- relied on evaluation procedures of consultants (i.e., no "textbook" approach applied)	1. Functional / technical analysis of proposals (again, no "textbook" approach applied)	1. Measurement of system performance 2. Functional comparison of alternative proposals	1. No formal / textbook method identified for systems analysis and design of specs	1. Consultant's working procedures / analysis
Action	1. Creation and distribution of Invitation To Tender (ITT)	1. Recommendation of Systems House solutions using Data General hardware and ProSys software	1. Approval of Systems House proposal despite misgivings about lack of IBM participation. 2. Installation of Data General Hardware.	1. Implementation of poorly specified sales order processing system	1. Recommendations directed at holistic management of the firm's overall implementation

Conceptual Model: Evidence in Case Study #3

After investigating the fit of the conceptual model's individual contextual elements to Symons's (1990) case study, the researcher turned attention to the description of relationships in the conceptual model and investigated the interactions expressed in the

conceptual model and compared them to the relationships between events described in Symons's case study. Each association is addressed separately in the following sections.

1.) Time (When) Relates to the Evaluation Process

Symons's (1990) descriptions demonstrated the influence of *conditions-of-the-moment* on an evaluation's context. In this case, changing marketplace demands caused a shift the organization's strategy and operations. In addition, this case also revealed the relationship between stages of the IS lifecycle and changes to an evaluation's other contextual elements. As depicted in Figure 17, the phases of evaluation in this case study occurred at different points during the system development lifecycle.

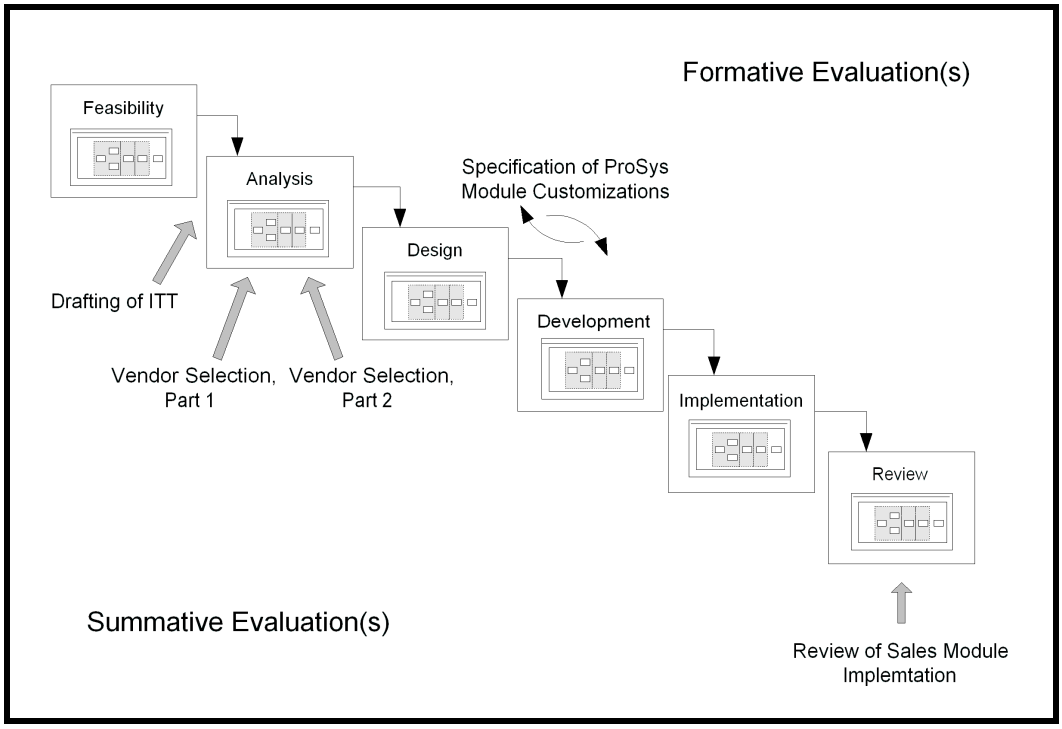

Figure 17. IS/IT evaluation events during IS lifecycle in Case Study #3

2.) Environmental Conditions (Where) Relate to the Reason to Evaluate (Why)

In this case study, numerous examples demonstrated how environmental conditions both inside and outside an organizational related to the reason for conducting an IS/IT

evaluation. For example, the initial recommendation to approve a proposal that failed to use IBM hardware resulted in a second round of evaluations. This outcome was a direct result of an environmental condition, specifically the parent company's preference for IBM as vendor. In other words, the environmental context was such that an additional evaluation was required for *not* selecting an IBM-based solution. In all likelihood, this evaluation phase would have been unnecessary had the consultants initially recommended an IBM-based solution to the Divisional Board.

3.) The Reason to Evaluate (Why) Relates to the Participants (Who)

As a reminder, this tenet holds that the reason for conducting an evaluation relates to the participants involved in, or excluded from, participating in an evaluation. In Symons's (1990) case study, the researcher found ample evidence to support this assertion. For instance, to better understand the difficulties experienced in implementing the sales order processing module, the senior management team engaged outside, and thus theoretically detached or impartial, consultants to assess the circumstances and make recommendations. In another example, outside consultants were utilized to make recommendations regarding the selection of a system vendor. Yet, the authority to accept or reject the consultants' findings rested with the Divisional Board. In both of these cases, the participants were involved based on the objective of the evaluation exercise.

4.) The Reason to Evaluate (Why) Relates to the Subject of Evaluation (What)

Here again, the case of Processing Company unambiguously demonstrated the existence of this relationship. For example, the need to automate manual business processes necessitated the evaluation of those existing procedures in order to be able to determine the elements suitable for computerization. In a similar manner, the organizational failures associated with the implementation of the order-processing

module resulted in an examination of factors that extended beyond technical considerations. Thus, the objective of the evaluation related to the subject of the assessment.

5.) The Reason to Evaluate (Why) Relates to the Evaluation Criteria (Which)

Like other associations, the relationship between these elements was very explicit in Symons's (1990) case study. As an illustration, the chaos associated with the order-processing module resulted in the consultants working to identify managerial and operational deficiencies that allowed the breakdowns to occur. Likewise, the need to customize the ProSys software resulted in an evaluation that focused on functional specifications. Clearly, the purpose of the evaluation related to the specific criteria or measures used in the assessment.

6.) The Participants (Who) and Subjects (What) of Evaluation Relate to Each Other

In the two prior cases studies, the relationship between these contextual elements appeared somewhat ambiguous and was only tangentially supported. In marked contrast, Symons's (1990) case study offered clear and compelling evidence of this association. For example, the need to customize the ProSys software modules based upon the company's existing processes necessitated the participation of both IS professionals and end-users from the relevant business units. That said, the participation of user departments was far too limited, resulting in specifications that effectively "excluded any consideration of the way staff actually carried out their tasks" (Symons, p. 200).

7.) The Participants (Who) Relate to the Evaluation Criteria (Which)

As demonstrated in the previous section, the individuals involved in, or excluded from, participating in an evaluation exercise influence other contextual factors. Returning to the prior example, the limited engagement of user department representatives in the

custom software specification process resulted in criteria based more on technical considerations than on an accurate description of existing business processes. In nearly all evaluation phases in Symons's (1990) case study, the evaluation was conducted exclusively by IS professionals from inside or outside of the firm. Indeed, given the limited participation of business stakeholders, should the nearly exclusive focus on functional / technical evaluation have been surprising? It seemed not.

8.) The Subject (What) Relates to the Evaluation Criteria (Which)

Yet again Symons's (1990) case study provided clear evidence of a relationship that was less obviously supported in the case studies previously examined by the researcher. As noted, this was likely a result of the project-focused nature of Symons's case study. For example, the need to evaluate the interoperability of IBM and Data General mainframes (*what*) necessitated the application of technical performance measures (*which*). In a similar manner, the evaluation of ITT responses influenced the selection of criteria, including functional specifications and vendor considerations.

9.) The Evaluation Criteria (Which) Relate to the Evaluation Methods (How)

Symons's (1990) case study was interesting in that it reported primarily on efficiency (i.e., functional / technical) versus effectiveness (i.e., business value) measures. As a result, the formal IS/IT investment evaluation methods described in the researcher's literature review (see Chapter 2) were largely unutilized. Moreover, Symons primarily focused on evaluation criteria and wrote little about the actual steps in the assessment process. Likewise, the evaluation procedures appeared to follow the evaluation criteria deterministically. That is to say, the evaluators seemed to have identified criteria and then followed whatever steps were required to reach a conclusion, thereby suggesting that the evaluation "method" may have been determined *in situ* as deemed appropriate by

members of the evaluation party. Nevertheless, these findings suggested that an evaluation's criteria (*which*) most likely shaped the selection or use of particular assessment techniques (*how*), as opposed to *vice versa*.

10.) The Outcome of the Evaluation Method (How) Relates to the Next Steps (Action)

Given that an evaluation is conducted for a specific reason, it logically follows that the assessment's outcome would result in some action. In the case study of Processing Company's computerization initiative, each evaluation phase demonstrated this relationship. For example, the evaluation of potential business processes for automation led to their inclusion or exclusion from the ensuing ITT. Likewise, the outcome of the reevaluation of proposed IBM and non-IBM solutions resulted in a contract being awarded to Systems House.

11.) The Resulting Activities (Action) Relate to the Environmental Conditions (Where)

Given that evaluations lead to actions (or the decision to take no action), it is also logical to assume that such actions either change or reinforce existing environmental conditions. Symons's (1990) case study reinforced this assertion. As an illustration, the consultants' recommendation of a non-IBM solution created an environmental condition, specifically the selection of a non-preferred technology provider and the resultant hesitation among management, which ultimately prompted the Divisional Board to mandate for additional assessments. Similarly, the recommendation and subsequent implementation of erroneous specifications for customizing ProSys software modules yielded an error prone sales order processing system that resulted in lost revenue and customers, as well as employee dissatisfaction and frustration.

Case Study #4: UK Manufacturing Company's Evaluation of MRPII System

In this case study, the researchers described the implementation of a Manufacturing Resource Planning (MRPII) system within a small-medium enterprise (SME), referred to as "Company V," based in the United Kingdom. Unlike the prior case studies analyzed in this dissertation, the case of Company V was described in multiple journal articles (Irani & Love, 2001; Irani, Sharif, & Love, 2001; Irani, 2002). The reporting of the case study's facts was consistent throughout the articles and distinctions between the manuscripts related to the authors' desires to focus on specific dimensions. Like Symons's (1990) account of Processing Company, the case of Company V also described a failed implementation of a system designed to automate processes that had been preformed manually. However, the researchers also portrayed the company's successful implementation of an alternative, bespoke system. In doing so, the authors provided insights into the lessons learned by the organization and the resulting changes made to their evaluation methods.

Narrative Description: Case Study #4

According to Irani (2002, p. 16), Company V produced "small quantities of a wide variety of made-to-order parts… for a large number of customers in diverse industries." Demand for Company V's products were driven by customers' needs to off-load manufacturing demands and reduce inventory management costs. Operating under these conditions, as well as with short lead times and in a highly competitive environment, the manufacturing director of Company V recognized a need for an automated production planning and control (PPC) system (Irani, 2002).

Unlike the larger firms represented in other cases studies in this dissertation, Company V had few layers of management and a small executive team consisting of a President, an

Executive Vice President responsible for sales and marketing, a Vice President (VP) of Finance, a VP of Administration, a VP of Engineering to whom IT reported, and the Manufacturing Director (MD). Previously, technology investments were justified using financial techniques, such as cash flow projections and sensitivity analysis (Irani, Sharif, & Love, 2001). However, both the costs and benefits associated with those equipment purchases were directly quantifiable. In contrast, the anticipated benefits of the MRPII system appeared to management as "important for the growth and survival of the firm" yet were largely intangible or non-financial.

Unsure of how to best address the situation, management embarked on a course of "simplistic cost/benefit analysis (CBA)" (Irani, 2002, p. 17). Costs were measured in terms of only direct financial outlays. In contrast, benefits were identified using a taxonomy of strategic, tactical, and operational categories, each of which was further sub-classified as providing financial, non-financial (i.e., quantifiable in terms other than monetary units), or intangible returns. The CBA resulted in a sum of direct financial costs on the one hand; a litany of no fewer than thirty mostly or partially intangible benefits on the other hand; and no obvious, measurable basis for comparing the two aside from the management's intuition or instinct. Lacking knowledge of evaluation alternatives, senior management decided to invest in an MRPII system as an "act of faith" (Irani & Love, 2001, p. 169).

Having determined a course of action, Company V created a team to select and implement a commercial off-the-shelf (COTS) production control system. As in Symons's (1990) case study of Processing Company, Company V focused on mainly functional/technical and vendor considerations in making the software selection. In particular, the COTS software was expected to operate in accordance with ISO 9002

(British Standard 5750) and require minimal changes to the company's existing operating procedures (Irani, 2002). The team also investigated each vendor system's ability to produce detailed route cards. Finally, consideration was given to the experience of the vendor in deploying similar projects. Based upon these criteria, Vendor K was selected.

Problems began to surface during the implementation of Vendor K's software. In particular, Company V's employees had to provide the data required by Vendor K's software in manner and format inconsistent with Company V's operations. As a result, business processes had to be significantly redesigned at a considerable and unplanned cost. Employee resistance and hostility toward "the information system when things went wrong" further hampered the implementation (Irani, 2002, p. 58). Indeed, the production manager wanted to return to the company's previous manual procedures. Eventually, the project team was able to overcome many of the non-technical barriers through effective communication and education. Nevertheless, despite efforts to fix the technical challenges, the core Production Control and Scheduling (PCS) module remained highly unstable due to Company V's inability to provide a continuous stream of "clean" data to Vendor K's software (Irani, 2002). At that point, the manufacturing director, who had previously championed the project, focused attention on other initiatives. Responsibility for the "success of a 'half' implemented information system" was given to the production manager (Irani, p 58). However, by this time the implementation team's focus had morphed from engaging in constructive activities to finding targets upon which to assign blame for the project's failures.

Recognizing the failure of the COTS solution, senior management interceded in the situation and identified the need for a flexible, idiosyncratic solution compatible with the firm's objectives and procedures. To that end, senior management suggested developing

custom software for the company. The project team concurred with this approach and set about developing a business case for a made-to-order system. In developing a revised CBA, the team included both direct and indirect costs for the bespoke system. Of special importance, the project team focused on indirect organizational and human costs, which were critical factors that had been overlooked during the COTS software implementation. In terms of benefits, the previous assessment remained largely unaltered, because the company continued to believe that a successful MRPII system would result in significant strategic, tactical, and operational benefits.

Senior management approved the development of the bespoke MRPII system and deployed resources to enact its creation (Irani, Sharif, & Love, 2001). This time, however, external consultants and university student participants were employed to facilitate the implementation. The project also included a significant amount of continuous education and training for the company's personnel. Functional managers were consulted throughout the implementation to ensure that the software matched existing business processes. As deemed appropriate by functional experts, some business processes were reengineered to introduce efficiencies and remove redundant steps. By addressing personal, organizational, and technical concerns, the deployment of the bespoke production control system was seen as a success within the company.

Contextual Elements: Evidence in Case Study #4

As with the previous studies, the researcher constructed an event listing table of the evaluation stages described in this case study. The results found in Table 25 were based on the previous narrative description, as well as the published case study reports (Irani & Love, 2001; Irani, Sharif, & Love, 2001; Irani, 2002). Although the authors did not distinguish between evaluation phases, the researcher identified four stages present in this

case: the initial CBA of the MRPII system, the selection of a COTS software vendor, the evaluation of developing a bespoke MRPII system, and the specification of standards for the custom system. In all, the results highlighted in Table 25 offered strong empirical evidence of the validity of the celements found in the researcher's conceptual model.

Table 25. Chronological event listing of Case Study #4

When	MRPII Evaluation	COTS Selection	Bespoke MRPII Evaluation	Bespoke MRPII Specification
Where	Large number of orders with short lead times for limited-run production of custom parts in highly competitive marketplace	Project team established to select and implement MRPII system	Failed COTS software implementation results in organization upheaval and dissatisfaction among employees	Project team directed to implement bespoke MRPII solution
Why	1. Automation of production process seen as a mechanism to enhance firm's growth an ensure survival in competitive marketplace	1. Decision to invest in COTS MRPII system results in need to select vendor system	1. Senior management wishes to overcome difficulties associated with COTS system 2. Desire to explore "own" in-house software alternative	1. Having opted for a bespoke MPRII system, project team must ensure correct specification of solution based upon firm's business processes and objectives
Who	1. Executives, especially Manufacturing Director (MD)	1. Project selection and implementation team (includes managers from some functional areas)	1. Executive management 2. Project team	1. Project team 2. Functional area managers and users 3. Outside consultants 4. University student interns
What	Replacement of manual production control system with computer-based alternative	COTS MRPII software packages & vendors	Implementation of custom, in-house MRPII system	Specifications for bespoke MPRII system
Which	1. Direct financial costs 2. Taxonomy of strategic, tactical, and operational benefits categorized as financial, non-financial, and intangible results	1. Technical criteria related to function and fit with existing company processes 2. Vendor criteria related to experience	1. Direct and indirect financial costs, including organizational and individual (human) costs and risks 2. Taxonomy of strategic, tactical, and operational benefits categorized as financial, non-financial, and intangible results	1. Based on existing or optimized business processes, tailored to address the company's idiosyncrasies.
How	1. Cost/Benefit Analysis (CBA) 2. "Act of faith"	1. Functional / technical analysis	1. Revised CBA, lacking financial quantification 2. Essentially still remained an "act of faith"	1. Iterative collaboration between stakeholders to develop specs
Action	1. Decision to implement COTS MRPII system	1. Selection of Vendor K MRPII software modules)	1. Decision to build bespoke MRPII software	1. Development and implementation of tailored software solution -- seen as "success" in firm

Conceptual Model: Evidence in Case Study #4

Having identified the individual contextual elements found in Case Study #4, the researcher focused attention on investigating the relationships between these constructs.

As with the previous case studies, the researcher examined each relationship as defined in the conceptual model and sought confirming or disconfirming evidence in the case study. Overall, the researcher found evidence that supported the validity of the conceptual model presented in this dissertation.

1.) Time (When) Relates to the Evaluation Process

As in Symons's (1990) case study, the case of Company V demonstrated the influence of *conditions-of-the-moment* on an evaluation's context, as well as the differences in evaluating a system necessitated based upon its lifecycle stage. For example, the poor results associated with the COTS MRPII system eventually resulted in a feasibility analysis of developing a bespoke system. Similarly, the decision to move forward with a custom, in-house MRPII solution demanded the evaluation of its proposed specifications.

2.) Environmental Conditions (Where) Relate to the Reason to Evaluate (Why)

The story of Company V demonstrated how environmental conditions, both inside and outside a firm, compelled the organization to conduct evaluations. For instance, the firm's market niche, which involved quickly manufacturing small batches of custom parts for companies, and competitive environment drove Company V to evaluate computerization of the production process as a mechanism to ensure continued success and viability. Likewise the failure of the COTS system, especially its inability to adapt to the firm's existing operating procedures, persuaded Company V to assess the viability of developing a bespoke MRPII system.

3.) The Reason to Evaluate (Why) Relates to the Participants (Who)

The case of Company V demonstrated that the reason for evaluating relates to the composition of the evaluation party. As an example, the executive leadership of the firm was involved in investment decisions, but they entrusted the evaluation of requirements

and specifications to the project team and functional areas' staff. Likewise, when the evaluation's purpose finally turned to validating the specifications of the bespoke MRPII system, Company V ensured that end-users were active evaluation participants and enlisted outside experts to aid in the participative design and development efforts.

4.) The Reason to Evaluate (Why) Relates to the Subject of Evaluation (What)

Irani's (2002) case study provided ample evidence supporting the validity of this relationship. For instance, because management viewed automation as a potential mechanism to ensure the firm's continued success in the marketplace, Company V initially evaluated the production process control system. In another example, Company V evaluated specific COTS MRPII software packages and vendors, because the firm's management had already made the general decision to invest in such a system.

5.) The Reason to Evaluate (Why) Relates to the Evaluation Criteria (Which)

In this case study, the best example of the relationship between the purpose of an evaluation (*why*) and the evaluation criteria (*which*) was provided by the description of the assessments related to the adoption of a custom MRPII solutions. Based upon the lessons learned in the implementation of the COTS system, the purpose of the evaluation focused on developing a system that would be accepted by end-users and compatible with the firm's business processes. For this reason, elements such as indirect or intangible organizational and individual costs were included in the assessment of developing a bespoke system. Similarly, the evaluators were careful to ensure that the specifications of the solution were evaluated based upon the idiosyncrasies of the company, thereby avoiding the difficulties associated with the incompatible COTS system.

6.) The Participants (Who) and Subjects (What) of Evaluation Relate to Each Other

This case study provided a vivid example of the relationship between these two contextual elements. According to Irani, Sharif, and Love (2001, p. 59), the Manufacturing Director (MD) provided the "initial justification for purchasing vendor software" by citing significantly higher costs associated with developing a custom solution. Consequentially, the initial investment analysis by management focused on exclusively on COTS systems. In hindsight, the ill-fitting commercial software package proved a far worse investment. Nonetheless, the researcher's review of the case suggested that either a different MD or different views held by the same MD would likely have resulted in a different subject of evaluation. Of course, this MD had also served as the project's initial champion. Thus, one must question whether or not an evaluation would have even been called for at all had a less visionary individual had held the position?

7.) The Participants (Who) Relate to the Evaluation Criteria (Which)

As one example of this relationship, managers from a number of functional areas were involved in selecting the COTS software. Nonetheless seemingly vital stakeholders—such as the production manager—were excluded from the exercise. The views of end-user stakeholders were also not considered in early phases. As a result, the evaluation criteria focused on technical / functional aspects based upon the project team's perceptions of extant business practices. In contrast, the evaluation of the bespoke MPRII system included more active participation from a larger group of stakeholders. The assessment, therefore, focused on the company's actual, idiosyncratic procedures. This resulted in a system that was better suited for the company's operations.

8.) The Subject (What) Relates to the Evaluation Criteria (Which)

Like many of the relationships in the conceptual model, numerous examples of this interaction were found in this case study. At a high-level, a clear distinction was drawn between effectiveness- and efficiency-oriented evaluations. The former included mostly cost and benefit measures, whereas the later focused on functional/technical criteria. The researcher also noted subtler distinctions between the subject (*what*) of an evaluation and its metrics (*which*). For instance, vendor selection criteria were considered in the assessment of the COTS packages, whereas they were excluded from the bespoke software evaluation as it was developed in-house.

9.) The Evaluation Criteria (Which) Relate to the Evaluation Methods (How)

Once again, this case study clearly demonstrated the relationship between the contextual elements within the researcher's conceptual model. As with the prior association, the relationship between *which* and *how* were clearly established by examining the effectiveness- versus efficiency-oriented evaluation phases. With respect to the investment appraisal stages, the evaluations focused primarily upon cost and benefit measures. As a result, the evaluators applied, or at least attempted to apply, cost/benefit analysis techniques. Interestingly, because the evaluators were unsure of how to compare quantifiable costs to intangible benefits, they eventually changed evaluation methods and adopted an "act of faith" approach based upon their business judgment. In contrast, the more functionalist assessment stages utilized technical criteria supported by requirements engineering or systems analysis techniques to determine the evaluation's outcome.

10.) The Outcome of the Evaluation Method (How) Relates to the Next Steps (Action)

As in the prior case studies, this relationship merely followed a logical sequence of events. Evaluations result in decisions. Likewise, decisions result in one or more actions being undertaken or a conscious choice to take no action, which is in and of itself a form of acting. Therefore, the researcher was not surprised by the instances of this relationship found in this case study. For example, the decision to invest in a COTS MRPII resulted in an investigation of which system to purchase. Likewise, the choice to build a bespoke production control system resulted in an evaluation of its specifications.

11.) The Resulting Activities (Action) Relates to the Environmental Conditions (Where)

As noted previously, evaluations relate to actions based upon their outcomes. And actions, in turn, relate to an organization's context by either bringing about new circumstances or reinforcing existing norms. For example, the implementation of the COTS software resulted in significant tumult within Company V. In marked contrast, the replacement of the COTS PPC module with Company V's own in-house software improved organizational conditions and satisfied stakeholders. In both instances, the actions resulting from an evaluation directly influenced the organization's environmental conditions, thereby demonstrating the validity of this relationship.

Case Study #5: US Department of Defense Evaluation of an E-Business System

As the final study for consideration in this dissertation, the researcher selected Morell's (2003) description of a post-implementation evaluation of an electronic business system operating in the United States Department of Defense. Unlike the two prior pairs of case studies, Morell's research provided a fundamentally different evaluation context. The prior case studies all included for-profit European firms and described evaluation procedures related primarily to *ex ante* investment decisions. In addition, the prior

studies' researchers all made use of, albeit to varying degrees, interpretivist / contextualist research methods. In contrast, Morell's case study was conducted in a public, governmental agency in the United States of America and described an *ex post*, rather than *ex ante*, evaluation procedure. In addition, Morell explicitly claimed participation in the evaluation exercise, whereas it was unclear what, if any, roles were played by the authors in the previous case studies aside from that of academic researcher. Likewise, Morell's writing and citations suggested that, for this project at least, the research was not obviously influenced by the European-stream of IS/IT evaluation literature. For these reasons, Morell's study provided the researcher with an excellent opportunity to disconfirm the findings associated with the four prior cases.

Narrative Description: Case Study #5

Morell's (2003) case study was set in the Defense Logistics Agency (DLA) of the United States Department of Defense (DoD). Within the DoD, the DLA provided worldwide logistics support for combat and other operations. DLA's mission was highly complex given the given the scale and scope of the DoD as "the largest purchaser of good [*sic*] and services in the world" (Morell, p. 430). To improve the efficiency and responsiveness of the organization, the DLA undertook the Business Systems Modernization initiative to replace legacy systems with a more robust COTS software platform based on a comprehensive enterprise architecture and industrial best practices, including the development of electronic business (e-business) systems.

Morell (2003) was involved in conducting three evaluations of e-business systems within the DLA: electronic document access (EDA), the DoD EMALL, and the Central Contractor Registration (CCR). For this case study, Morell reported only on the *ex post* evaluation of the CCR. According to Morell (p. 430), a business case was developed to

justify the investment in the CCR; however, assessment plans "were not in place during the programs' development or initial deployment." This statement suggested that an initial *ex ante* investment evaluation took place, though Morell did not appear to have participated in it, but that the DLA did not undertake subsequent formal evaluations during the development or deployment of the CCR.

Prior to the implementation of the CCR, vendors needed to submit paperwork to each and every site / agency with which they transacted business within the DoD (Morell, 2003). According to the author, this redundant paperwork resulted in numerous administrative errors and represented a significant cost in terms of time and money to both the DoD and its vendors. To reduce errors and ease this burden, the DLA developed the CCR as "the single repository of vendor data for the entire DoD" (Morell, p. 430). Moreover, by centralizing the tool, the DoD shifted responsibility for maintaining accurate records to the vendors that were required to supply the information directly to the registration site.

According to Morell (2003, p. 431), the need to explicate the contribution of IT investments was "well ensconced in the mindset of federal bureaucrats and policy makers." In fact, both legislative mandates (such as the Clinger-Cohen Act) and executive policies (such as the Office of Management and Budget's "Management of Federal Information Resources" memorandum) dictated that agencies must engage in both *ex ante* and *ex post* investment evaluation and performance measurement. Interestingly, Morell claimed that little post-implementation evaluation actually occurred in federal agencies, despite a culture both supportive and demanding of such accountability. In part then, Morell's research was motivated by a desire to demonstrate the benefits, viability, and affordability of *ex post* IT evaluation.

The evaluation began by identifying possible domains that CCR might influence and sources of data for measuring the impact and performance of the system. Morell (2003) described this process as non-trivial due to the diversity of stakeholders and information sources involved. Indeed, completion of the CCR evaluation required participation from individuals within the CCR Program Office, the Defense Contract Management Agency, numerous contract management groups within the DoD, other DLA e-business system projects, the US Treasury Department, and additional members of the DLA staff. Indeed, the evaluators of CCR determined a set of metrics based upon interviews with these stakeholders. These metrics were then organized based upon the Balanced Scorecard's (Kaplan & Norton, 1992; Kaplan & Norton, 1996) four perspectives: financial, customer, internal process, and learn / growth. Although this evaluation of the CCR was not part of ongoing Balanced Scorecard activities within the agency, the evaluators utilized the framework because it had "complementarities that we wished to exploit to the greatest degree possible" (Morell, p. 435). In short, it fit well with the organizational zeitgeist.

The evaluators determined that the CCR had potential impacts on the financial, customer, and internal process perspectives of the agency. However, not all of the dimensions were easily or quantifiably measured. For example, the impact on customers, in this case external vendors, was in all likelihood demonstrable. However, the evaluators concluded that it would be difficult to capture the requisite data. Therefore, this dimension was excluded from consideration. In other cases, the implications of the system could only be measured using qualitative metrics, such as determining individuals' perceptions of the system's influence on report quality.

Ultimately, the evaluators focused on assessing the impact of the CCR on the following dimensions: electronic fund transfer (EFT) adoption, redundant systems,

contract management, systems development / integration, and process improvements. For each of these dimensions, the evaluators utilized one or more success criteria, including both qualitative and quantitative measures. Having already determined the subjects and measures of evaluation, the assessment procedures were fairly deterministic:, involving a straightforward process of data collection and analysis. Nonetheless, Morell (2003, p. 438) cautioned that evaluators should remain open to the possibility of finding "unforeseeable consequences" that might have arisen from organizations adapting the system to address unanticipated needs and unexpected circumstances.

Overall, the evaluators found that the CCR provided numerous organizational benefits. These included both financial improvements and qualitative impacts. In addition, the evaluators posited that vendors also benefited from the CCR. However, a formal investigation of that supposition was beyond the scope of this evaluation. As further evidence supporting their conclusions, the evaluators learned toward the end of their assessment that all federal governmental agencies were scheduled to adopt the CCR. In addition, Morell (2003) also described the lessons learned about *ex post* evaluation as an important outcome of the exercise.

Contextual Elements: Evidence in Case Study #5

Following the pattern of the prior case studies, the author constructed a listing of events contained in Morell's (2003) case study (Table 25). As the evaluation consisted of only one post-implementation phase, the table was significantly briefer than in the other studies. In particular, it contained only a single evaluation phase, unlike the prior studies examined by the researcher that addressed events throughout a company's software development lifecycle. Nevertheless, Morell's study demonstrated the validity of the contextual elements contained in the researcher's conceptual model.

Table 26. Chronological event listing of Case Study #5

When	Post-Implementation Evaluation
Where	Defense Logistics Agency undertook major initiative to replace legacy systems with commercial software; this effort involved numerous e-business projects, including the development of Central Contract Registration (CCR).
Why	1. Legislative and executive mandates call for the evaluation of IT projects at a level commensurate with the investments scope 2. In practice, few *ex post* evaluations are performed 3. Evaluators wanted to establish 1) nature and value of CCR's contribution, and 2) demonstrate feasibility of conducting *ex post* evaluations
Who	1. Evaluators, including outside consultant(s) (and author of case study) 2. Stakeholders from a multitude of DLA / DoD areas, as well as individuals from other governmental agencies (such as the US Treasury Department)
What	Aspects of the CCR, including its impacts on: 1. Electronic Fund Transfer (EFT) adoption 2. Redundant systems 3. Contract management 4. Systems development / integration 5. Process improvements
Which	Numerous quantitative and qualitative measures including: 1. Historical counts of EFT volume 2. CCR timeline and history 3. CCR development costs 4. Costs (before and after) of processing contractor data 5. Historical counts of contract / vendor volume 6. Narrative descriptions of CCR's role in process improvements
How	Process of data collection and analysis based upon identified and selected measures
Action	1. Publication of evaluation findings and lessons learned

Conceptual Model: Evidence in Case Study #5

Having sufficiently demonstrated the suitability of the constructs contained in the conceptual model, the researcher turned attention to the relationships between the elements. Unlike the prior studies, Case Study #5 included only a single evaluation phase and focused exclusively on *ex post* evaluation. Nevertheless, the researcher found compelling evidence that supported most of the relationships described between the elements contained in the researcher's conceptual model.

1.) Time (When) Relates to the Evaluation Process

As the evaluation consisted of only a single phase, many of the temporal characteristics described in the multi-phase studies were not exhibited. Despite this fact, the researcher found evidence that temporal conditions played a vital role in the outcome of the evaluation. For instance, the objective of this evaluation, to assess outcomes after the implementation of a system, differed from those of the previous case studies examined by the researcher. As a result, the evaluation occurred at a very different time in the lifecycle of the system, as an *ex post* rather than *ex ante* evaluation. Likewise, had the evaluation been conducted at an even later date, it might have included the implications of the CCR on departments outside of the DoD, as the system was slated to be adopted by all federal agencies.

2.) Environmental Conditions (Where) Relate to the Reason to Evaluate (Why)

As part of governmental modernization efforts, legislative and executive mandates drove the development of the CCR. Likewise, governmental accountability standards drove both the pre- and post-implementation evaluation of the system. Indeed, unlike in many of the companies described in the case studies found in this dissertation, the US federal government was highly prescriptive in terms of its IS/IT evaluation demands. Indeed, the Office of Management and Budget explicitly called for post-implementation assessments to measure actual versus expected benefits and capture lessons learned. Yet despite such directives, Morell (2003) noted that *ex post* evaluations rarely took place and argued that such assessments occurred too infrequently. For this reason, the evaluators worked to determine the contribution of specific e-business initiatives (such as the CCR), report on the viability of conducting *ex post* assessments, and provide helpful lessons to encourage others to carry out post-implementation reviews.

3.) The Reason to Evaluate (Why) Relates to the Participants (Who)

The purpose of conducting this evaluation was two-fold. First, the objective was to assess the impacts associated with the implementation of the DLA's CCR. Second, the purpose was to investigate the process of *ex post* evaluation itself. It was this second epistemological objective that best demonstrated the relationship between the purpose of the evaluation and the participants involved in conducting the assessment. Morell (2003) both participated in the post-implementation review and then reported on the lessons learned from it in order to advance post-implementation evaluation practices.

4.) The Reason to Evaluate (Why) Relates to the Subject of Evaluation (What)

As previously discussed, laws and regulations mandated US federal governmental agencies to evaluate investments in IT. This requirement included post-implementation reviews. Given this obligation and the deployment of numerous e-business applications, the DLA initiated post-implementation reviews on three of these systems, including the CCR. Although not explicitly stated by Morell (2003), the author's introduction to the case study suggested that the CCR was selected for evaluation due to its scope and centrality to the mission of the Department of Defense's logistical operations. Moreover, the evaluators selected specific aspects of the system for assessment in order to ensure that a comprehensive and accurate review was provided.

5.) The Reason to Evaluate (Why) Relates to the Evaluation Criteria (Which)

First and foremost, the objective of the evaluation was to establish the outcomes resulting from the adoption of the CCR. Given that objective, the success criteria in this case were carefully selected to ensure that the evaluators could credibly and meaningfully assess the effects of implementing the CCR. Furthermore, the researcher inferred that the

stated intention to publish the results of the assessment encouraged the evaluators to be especially diligent in their selection of measures.

6.) The Participants (Who) and Subjects (What) of Evaluation Relate to Each Other

According to Morell (2003), numerous stakeholders participated in the evaluation. In addition to providing access to relevant data, Morell indicated that the stakeholders were also actively engaged in the process of selecting the specific subjects of the evaluation. Indeed, the evaluators interviewed numerous stakeholders to understand both what could and what should have been examined in the post-implementation review. Clearly, those outcomes shaped the direction of the subsequent evaluation. For example, the evaluators determined that the CCR likely had an impact on the DoD's vendors. However, sufficient data was not readily available to explore this dimension. Moreover, the evaluators concluded that it was infeasible, especially given the scope of the assessment, to collect the required information. As a result, the subject was excluded from further consideration during the formal evaluation process.

7.) The Participants (Who) Relate to the Evaluation Criteria (Which)

As described in the previous section, many CCR stakeholders played an active role in defining the specific subjects of the *ex post* evaluation. In a similar manner, their participation influenced the selection of evaluation criteria too. For instance, contract management agencies within the DoD had the opportunity to contribute to the discussion about metrics for investigating contract process improvements. In contrast, participants from other e-business and IT initiatives were able to proffer criteria appropriate for assessing the implications of the CCR infrastructure on other DoD e-business projects.

8.) The Subject (What) Relates to the Evaluation Criteria (Which)

In Morell's (2003) case study, the relationship between the subject of an evaluation and its measurement were very explicitly defined. Indeed, the author provided a series of charts linking the possible dimensions of CCR's outcomes (*what*) with the criteria and data utilized to evaluate each construct (*which*). For example, to assess the implications of the CCR on process improvement, the evaluators used a series of narratives provided by stakeholders. Likewise, the evaluators relied on a multitude of quantitative and qualitative criteria to evaluate the impacts of the CCR on EFT adoption.

9.) The Evaluation Criteria (Which) Relate to the Evaluation Methods (How)

In this case study, the evaluation method consisted primarily of data collection and analysis. Overall, this process was fairly deterministic, as the evaluation criteria guided the identification of required data, from where it was to be collected, and how it was to be analyzed. In this sense, the evaluators did not use a published, formal evaluation method. Instead, they followed the structured data collection and analysis process outlined by Morell (2003). Nonetheless, what was abundantly clear in this case study was that the evaluation criteria drove the methods of collecting and analyzing data.

10.) The Outcome of the Evaluation Method (How) Relates to the Next Steps (Action)

Unlike prior case studies in which the results of the evaluation led to obvious organizational actions, Morell (2003) did not report on any specific activities that arose from this post-implementation review. Therefore, the most obvious action was Morell's publication of the results. Admittedly, this represented only modest proof of the validity of this construct. However, the researcher noted that Morell's write-up of the case study essentially ended with the reporting of the evaluation's results, as the remainder of the paper offered insights into conducting *ex post* evaluations. Therefore, the researcher

lacked sufficient evidence to either confirm or disconfirm the relationship between the outcome of an evaluation and any resulting organizational actions.

11.) The Resulting Activities (Action) Relate to the Environmental Conditions (Where)

As with the prior relationship, the implications for the organization's context based upon the actions that resulted from the outcome of the evaluation were beyond the scope of Morell's (2003) case study. At best, the researcher noted that Morell hoped that the publication of the findings and lessons learned from the evaluation would encourage others to engage in post-implementation reviews. Moreover, Morell (p. 439) intended to demonstrate that such evaluations could "be done at a reasonable cost." Nevertheless, the data provided by Morell was insufficient to establish whether or not the evaluation had the intended effect on the organization. Thus, when validating the conceptual model against Morell's case study, the researcher excluded this relationship, as well as the prior, from consideration due to the lack of sufficient data in the case study.

Validating the Conceptual Model: Is it a "Good" Theoretical Contribution?

As noted in Chapter 3, theoretical contributions, which include conceptual models, often gain credibility in a field based on simple "face validity" and lack sufficient critical review (Meredith, 1993; Frank, 1999). Worse still, the application of "bad" theories could have detrimental results when used to guide research or practice (Webster & Watson, 2002; Whetten, 2002). Nonetheless, it is difficult to define precisely what constitutes a "good" theory. According to Whetten, theoretical contributions should be *strong*, meaning that they should be both *complete* and *systematic*. To determine whether or not the conceptual model of IS/IT evaluation presented in this study represented a good theoretical contribution, the researcher examined the results of its use as a descriptive tool for the published case studies selected in Chapter 3 and described those findings in the

subsequent sections of this chapter. To start, the researcher discussed the completeness of the conceptual model with respect to the contextual elements it included. Next, the researcher demonstrated the validity of the conceptual model by assessing its ability to systematically explain the relationships between the constructs it contains.

Investigating the Model of IS/IT Evaluation: Completeness

In the context of this study, "completeness" referred to whether or not the researcher's conceptual model either lacked any necessary elements or contained superfluous factors. In each of the five cases, the researcher established that the contextual elements found in the proposed conceptual model of IS/IT evaluation were validate and relevant. Indeed, this was demonstrated in each of the chronological event listings (Tables 22-26) located in the prior sections of this chapter. Based upon these findings, the researcher concluded that the conceptual model did not contain superfluous elements.

Completeness, however, also requires that a theoretical contribution should not lack relevant elements. Of course, it is difficult to prove that something does not exist; the possibility always remains that an unidentified or missing construct may be found later. Therefore, absolute certainty with respect to the completeness of the researcher's conceptual model was impractical. Nevertheless, the researcher had a responsibility to ensure that the conceptual model was reasonably or demonstrably complete based upon the given evidence.

To assess completeness, the researcher carefully searched for additional contextual elements while coding each of the five case study manuscripts. In this process, the researcher noted many elements that could be sub-classified within the broader constructs found in the model (as described in Table 21). For example, the environmental conditions (*where*) described in Nijland's (2004) case study could have been sub-classified into

extra- and intra-organizational factors. In addition, the researcher found that previously unidentified sub-classifications might exist for certain constructs. For example, the researcher's review of the literature highlighted no obvious sub-classifications for the purpose of evaluation (*why*); yet, certain reasons for conducting evaluations seemed to emerge out of the case studies, especially evaluations driven by executive decisions or legislative / regulatory mandates. Such additional sub-classification was beyond the scope of this study. However, the researcher found it could prove to be a subject for subsequent research (see Chapter 5). After carefully reviewing all five case studies, the researcher did not identify any contextual elements that were not already included, either explicitly or implicitly, in the researcher's conceptual model. As a result, the researcher concluded that the conceptual model was complete, as it neither contained superfluous elements nor lacked required constructs.

Investigating the Model of IS/IT Evaluation: Systematic Construction & Explanation

The researcher's conceptual model consists of numerous constructs that relate to the course and outcome of an IS/IT evaluation. In the previous section, the researcher demonstrated the proposed model's completeness with respect to the inclusion or exclusion of explanatory constructs. Having done so, the researcher focused next on assessing the ability of the conceptual model to systematically describe the relationship between events found in the case studies. As previously demonstrated in Figure 16, the researcher's conceptual model depicts eleven distinct relationships:

1. Time (*when*) relates to the evaluation process
2. Environmental conditions (*where*) relate to the reason to evaluate (*why*)
3. The reason to evaluate (*why*) relates to the participants (*who*)
4. The reason to evaluate (*why*) relates to the subject of the evaluation (*what*)

5. The reason to evaluate (*why*) relates to the evaluation criteria (*which*)
6. The participants (*who*) and subjects (*what*) of evaluation relate to each other
7. The participants (*who*) relate to the evaluation criteria (*which*)
8. The subject (*what*) relates to the evaluation criteria (*which*)
9. The evaluation criteria (*which*) relate to the evaluation methods (*how*)
10. The outcome of the evaluation method (*how*) relates to the next steps (*action*)
11. The resulting activities (*action*) relate to the environmental conditions (*where*)

In each of the five cases utilized to validate the conceptual model presented in this study, the researcher investigated each of the eleven relationships between the constructs in the conceptual model. In doing so, the researcher sought to determine whether or not the conceptual model accurately described the interactions that took place in the course of conducting an IS/IT evaluation. In other words, did the researcher's conceptual model accurately describe the process of IS/IT evaluation in practice?

To answer this question, the researcher constructed a partially-ordered meta-matrix (Table 27), as described in Chapter 3, to summarize the evidence found in each of the case studies. The columns of the table represented each of the five case studies. The rows represented each of the eleven interactions found in the study's conceptual model. The may be understood as follows: a "+" represents explicit evidence supporting the model's relationship, a "X" represents explicit evidence that contradicts the model's relationship, a "?" indicates an ambiguous finding that neither explicitly supports nor refutes the relationship described in the conceptual model, and a "N/A" indicates that insufficient

data was available in the case study to either support or refute the conceptual model's depicted interaction.

Table 27. Meta-matrix of conceptual model's interactions in case studies

Relationship	Case 1	Case 2	Case 3	Case 4	Case 5
1. When	+	+	+	+	+
2. Where : Why	+	+	+	+	+
3. Why : Who	+	+	+	+	+
4. Why : What	+	+	+	+	+
5. Why : Which	+	+	+	+	+
6. Who : What	+	+	+	+	+
7. Who : Which	+	+	+	+	+
8. What : Which	+	?	+	+	+
9. Which : How	?	+	+	+	+
10. How : Action	+	+	+	+	N/A
11. Action : Where	+	+	+	+	N/A

Based upon the findings depicted in Table 27, seven of the relationships described in the researcher's conceptual model of IS/IT evaluation were found in all five case studies. Two of the relationships (#8 & #9) were found to be unambiguously present in four of the five case studies. In addition, two additional associations (#10 and #11) were found to be present in all four of the case studies pertinent to those relationships, as the post-implementation Case Study #5 did not explicitly address subsequent actions. Finally, the researcher did not find evidence in any case that directly contradicted the relationships depicted in the conceptual model. Based upon these findings, the researcher has

concluded that the conceptual model in this study provided a complete and systematic description of the process of IS/IT evaluation in all five case studies. Moreover, the findings depicted in Table 27 offered significant qualitative support that the researcher's conceptual model provides a reasonably "good" explanation of the IS/IT evaluation process in general. That is to say, the conceptual model passed Whetten's (2002) test of a strong theoretical contribution. Given these findings, the researcher used the conceptual model as an analytical tool for cross-case analysis in an effort to offer methodological guidelines to practitioners for conducting contextually appropriate IS/IT evaluations.

In Search of Normative Guidelines: Cross-Case Analysis

Having built a conceptual model, used it as a means of analyzing published cases, and demonstrated that it served as an effective tool for exploring the relationships between contextual elements in particular cases, the researcher turned to identifying recurrent themes found across the cases analyzed in this study in an effort to suggest some initial guidelines for conducting context-based IS/IT evaluations. As noted in Chapter 3, cross-case analyses should be undertaken with care, particularly related to any epistemic claims arising from so-called "findings." Case-based research operates under a tension between trying to balance the uniqueness of a particular case on the one hand with a need for a more holistic, general understanding that encompasses multiple cases on the other hand (Miles & Huberman, 1994). The goal of a cross-case analysis therefore should not be to seek "generalizability," which is widely recognized as an inappropriate aim of qualitative research, but rather to deepen the understanding of a phenomenon in a manner that both values uniqueness in individual cases and facilitates comparisons across multiple cases (Noblit & Hare, 1988). Therefore, the knowledge claims associated with the findings of the researcher's cross-case analysis, while valid in this context, should be considered only

as generalized, directional guidance with respect to their applicability to alternative cases in differing contexts, as the uniqueness of other cases could result in additional findings.

Cross-Case Analysis: In Search of a Meta-Narrative

To begin this analysis, the researcher sought recurrent themes across the individual cases. Four of the five cases were instances of *ex ante* evaluation; the final case (Case Study #5) was an example of *ex post* evaluation. In their construction, the four *ex ante* evaluation cases followed a similar discursive pattern: early failures or problems followed by subsequent successes or improvements. As demonstrated in Table 28, these cases mirrored a familiar "before and after" storyline and were reinforced by descriptions of encountered challenges. The *ex post* evaluation case did not follow this narrative model, as it had only one phase and thus lacked "before and after" elements.

Table 28. Case-ordered descriptive summary

Case #	Source(s)	Description
1	Serafeimidis (1997) Serafeimidis & Smithson (1999)	Longitudinal study of *ex ante* IS evaluation in an insurance company highlighting modification of method(s) driven by the firm's changing organizational context. Evaluation evolved from using "textbook" financial approaches to bespoke multi-dimensional method. Resulted in improved IS outcomes and stakeholder satisfaction.
2	Nijland (2004)	Longitudinal study of *ex ante* IS evaluation in an insurance company (different firm and time period than Case Study #1) highlighting transformation of dysfunctional IS evaluation process into streamlined "project prioritization" process supported by all levels of firm. Success achieved through increased contextuality, strong leadership support, and improved stakeholder communication / participation.
3	Symons (1990)	Longitudinal study of the selection process (*ex ante* IS evaluation) for a new IS infrastructure in manufacturing firm. Case highlights subjective and political nature of evaluation. Phases of evaluation utilized *ad hoc* methods driven by senior management demands. No definitive outcome as the final phase of case study indicated firm would embrace on more holistic approach toward IS implementation and management.
4	Irani & Love (2001) Irani, Sharif, & Love (2001) Irani (2002)	Longitudinal study of the *ex ante* evaluation of a manufacturing resource planning (MRP) system through multiple phases of life cycle. Case demonstrated beneficial outcomes of opting for more contextual and communicative method of evaluation, following the early failure associated with less inclusive approach.
5	Morell (2003)	Study of *ex post* evaluation of IS investment in US Department of Defense to highlight outcomes and lessons learned from implementation of Central Contract Registration (CCR) systems, as well as to highlight the benefits of conducting an (all too infrequent) formal *ex post* evaluation.

In looking across these cases, the researcher examined the factor(s) that appeared to explain the transitions from failure to success. In three of the four *ex ante* cases, the researcher found that success arose when the organizations increased their contextual awareness and based subsequent actions on their findings. Over time, the firms adopted an organizationally-specific orientation to evaluation and decision-making: opting for in-house versus off-the-shelf solutions; selecting tailored as opposed to one-size-fits-all methods; and valuing individuated over prototypical approaches. In doing so, the firms appeared to have engendered a sense of ownership and agency within their organizations. In short, their approaches to IT evaluation became their own rather than someone else's.

Case Study #3, which was the only *ex ante* example to deviate from the narrative storyline of progress, demonstrated the contextual, subjective, and political nature of evaluation. Yet the firm seemed to merely conduct a series of evaluations, each of which resulted in actions of dubious benefit. Moreover, the organizations in the other *ex ante* cases more steps toward increasing the contextual-sensitivity and organizational-specificity of their evaluations. Symons (1990) concluded the case by noting that the firm planned to take a more holistic view of IT management, thereby implying that future successes or improvements would likely result from a more contextual approach as well.

Although it did not focus on increased contextual-awareness as a means to improve IT outcomes, the importance of context was also highlighted in the *ex post* evaluation example of Case Study #5. Indeed, the author explicitly noted that the outcomes presented were from the perspective of a particular set of stakeholders, thereby implying that the perceptions of other stakeholders might have differed given their unique context. Like most of the other examples, Case Study #5 also followed a narrative of "success." In particular, it highlighted the benefits associated with the successful implementation of the

Central Contract Registration (CCR) system in the United States Department of Defense. In doing so, the researcher found that the case also underscored the secondary role of *ex post* evaluation as a rhetorical, that is to say persuasive, device.

Cross-Case Analysis: Discovering Normative Guidelines

In a sense, the findings described this far regarding normative guidelines returned the researcher to one of the central themes that fostered this inquiry. An anticipated based on the literature review, the researcher demonstrated that context was clearly important to successful IS evaluations and, by extension, to IS outcomes in general. However, the findings presented thus far have not overcome what the researcher referred to as the "conceptual-prescriptive paradox" in Chapter 2. Namely, what specific steps should one follow in order to evaluate in a more contextual manner?

To answer this question, the researcher re-examined the case studies for particular examples of activities that led to more contextual evaluations. To do so for the *ex ante* cases, the researcher coded the text of each study for instances of such actions. The examples found in the cases were then broadly categorized into "drivers" and then more granularly subcategorized as secondary "patterns of application" for a particular driver. The researcher counted and recorded the number of occurrences of the newly identified "drivers" and "patterns of application." Keeping in mind the caution warranted by any attempt to generalize qualitative research results, the researcher included as "drivers" only those themes present in all four of the *ex ante* cases and included as "patterns of application" only those instances in which the authors of two or more studies cited a particular phenomenon. Following this method carefully, the researcher excluded certain occurrences that appeared to improve evaluation in a specific case, such as the senior executive sponsorship of evaluation found in Case Study #2, because such findings were

not generally observed in the majority of the case studies. In doing so, the researcher did not intend to question the validity of the results in the particular instance of the reported case study. Rather, these occurrences simply did not meet the standards set forth by the researcher for knowledge claims based on the cross-case analysis in this study.

The researcher's findings based on this analysis are summarized in Table 29. Across the four *ex ante* case studies examined, the researcher identified four "drivers" associated with more contextual evaluation: increased stakeholder participation, an improved alignment between an evaluation's criteria and the organization's broader context, an improved fit between the methods used for an evaluation and the organizations broader context, and a demonstrated application of the lessons learned in prior evaluation activities. As shown in Table 29, each "driver" had two or more "patterns of application" that reflected its role in professional practice in the case studies.

Table 29. Content-analytic summary: *Ex ante* evaluation method enhancement

Driver	Patterns of Application in *Ex Ante* Case Studies (# of Instances)
Increased stakeholder participation	Fostered cross-functional participation in evaluation (3)
	Increased stakeholder communication and education (3)
Improved fit between evaluation criteria (*which*) and organizational context	Selected criteria specific to organizational objectives and/or circumstances (4)
	Selected criteria based on or that makes use of stakeholder (end-user) input (3)
	Adopted holistic (multi-dimensional) criteria for evaluation (3)
Improved fit between evaluation method (*how*) and organizational context	Selected/developed methods (*how*) after determining criteria (*which*) (3)
	Linked methods (*how*) to micro-context of evaluation (*who, what, why*) (4)
Utilized "lessons learned"	Applied lessons learned from prior succeses (2)
	Applied lessons learned from prior failures (4)

In contrast to the *ex ante* evaluation examples, Case Study #5 did not provide insights into how organizations improved their evaluation processes. Nevertheless, the case did underscore two important issues. First, the *ex post* evaluation provided an opportunity to discover "lessons learned." Second, organizations frequently fail to undertake such evaluations altogether. Given that applying "lessons learned" was related to the improved outcomes of other cases, the researcher believed that organizations ought to conduct formal *ex post* evaluations in order to catalogue their experiential knowledge, which may then be applied and leveraged in future situations.

Given the prior discussion, the researcher used the *ex ante* "patterns of actions" and *ex post* "lessons learned" as a starting point for providing practitioners with normative guidelines on how to evaluate IS/IT investments in a more contextual manner. The researcher recognized that this assertion bends, if not breaks, the proscription regarding generalizing qualitative research findings. Nevertheless, as highlighted in the literature review of this study, the improvement of IS evaluation practice requires a pragmatic approach. Therefore, the researcher set aside legitimate, yet largely theoretical, concerns and attempted to provide pragmatic guidance to help advance professional practice. In doing so, the researcher sought to answer the somewhat nebulous call for more contextual evaluations into concrete recommendations found in the literature. To that end, the researcher has included specific, albeit tentative normative guidelines for practitioners in Chapter 5, including a "Checklist for Tailoring Your Firm's IS/IT Evaluations."

Summary

Throughout this chapter, the researcher reported the results using a narrative style. The researcher intended for this to reflect the iterative and cyclical processes associated with analyzing, writing, and reflecting that was endemic throughout this study. Moreover, the

researcher selected this reporting structure in response to Yin's (2003) call to use the writing and editing process as an analytical tool and mechanism to clarify thoughts.

In this chapter, the researcher described the construction of a conceptual model of the process of IS/IT evaluation based on the findings from the researcher's literature review (see Chapter 2). The researcher began by describing the limitations associated with existing conceptual models. Next, the researcher identified seven constructs associated with the context of an evaluation. Finally, the researcher developed these constructs into a conceptual model, which resulted after multiple iterations of model development.

Having developed the conceptual model, the researcher validated it using a multi-case study analysis. Following the procedures outlined in Chapter 3, the researcher reviewed and coded five case studies in an effort to find confirming or disconfirming evidence. In doing so, the researcher demonstrated that the conceptual model represented a "good" theoretical contribution based on Whetten's (2002) standard, which required the conceptual model to be both *complete* and *systematic* in its explanation.

Finally, the researcher performed a cross-case analysis to identify elements that could serve as the basis for methodological guidelines for conducting more contextually appropriate IS/IT evaluations. As part of the cross-case analysis, the researcher described similarities and differences between the narratives of the case studies. Likewise, the researcher also identified four "drivers" of contextual evaluations, as well as two or more examples of how each driver was implemented in practice (see Table 29). Based upon these findings, the researcher constructed IS/IT evaluation guidelines that are described in Chapter 5, which included a checklist for practitioner support.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Having conducted a comprehensive literature review, defined a research method, and discovered a number of findings; the researcher finalized this study by drawing a number of conclusions and recommendations. The researcher also considered the implications of the study's outcomes for both practitioners and researchers. The subsequent sections of this chapter present these conclusions, recommendations and implications. In addition, the chapter includes a summary of the study at the end.

Conclusions

At the outset of this study, the researcher stated a number of objectives, hypotheses, and research questions. In particular, the researcher sought to investigate IS/IT evaluation methods and practices, develop a conceptual model of the evaluation process, and then utilize the conceptual model to provide guidelines for conducting more contextual evaluations. In support of this objective, the researcher developed the following hypotheses and research questions:

H1. Existing models of IS/IT evaluation are inadequate because they fail to include all of the relevant constructs: the purpose of conducting the evaluation (*why*); the subject of the evaluation (*what*); the specific aspects to be evaluated (*which*); the particular evaluation methods and techniques used (*how*); the timing of the evaluation (*when*); the individuals involved in, or affected by, the evaluation (*who*); and the external and internal environmental conditions under which the organization operates (*where*).

Q1. What models of the IS/IT evaluation process are presented in the literature?

Q2. How do the constructs (identified in H1) relate to the process of IS/IT evaluation?

H2. An improved conceptual model of IS/IT evaluation provides an effective tool for describing and analyzing evaluation practices.

Q3. Is the researcher's conceptual model valid for describing IS/IT evaluation practices?

Q4. What guidelines may be derived from using the researcher's conceptual model as an analytical tool to existing IS/IT evaluation case studies?

To draw conclusions, the researcher examined each of the hypotheses and its underlying research questions in turn. The subsequent sections contain the researcher's conclusions with respect to each hypothesis. The format of the section for each hypothesis includes:

1. Descriptions and discussions regarding the hypothesis.
2. Findings related to the research questions underlying the hypothesis.
3. Conclusions related to the hypothesis.

In addition, the researcher offers this brief summary of conclusions to aid the reader:

- The literature contains numerous incomplete models of IS/IT evaluation.
- The researcher's conceptual model (Figure 16) describes the interactions between the unique conceptual elements (Table 21) that comprise the process of IS/IT evaluation.
- The researcher's findings demonstrated the validity of the conceptual model developed in this study.
- Based upon the findings in this study, the researcher utilized the conceptual model to develop a comprehensive checklist (Table 30) for conducting IS/IT evaluations based on an organization's unique context.

Hypothesis #1: The Contextual Elements of an Evaluation

Based upon an initial survey of the literature, the researcher identified a number of conceptual elements that appeared to be associated with the process of IS/IT evaluation: the purpose of conducting the evaluation (*why*); the subject of the evaluation (*what*); the specific aspects to be evaluated (*which*); the particular evaluation methods and techniques

used (*how*); the timing of the evaluation (*when*); the individuals involved in, or affected by, the evaluation (*who*); and the external and internal environmental conditions under which the organization operates (*where*). However, the researcher's preliminary analysis of published models of the IS/IT evaluation process suggested that such extant models lacked one or more of these elements. Where this occurred, the researcher posited that existing evaluation models were inadequate due to their misspecification.

Research Question #1: What Models of IS/IT Evaluation are Presented in the Literature?

To make such a determination, the researcher sought to identify conceptual models of the context and process of IS/IT evaluation. It is important to note that the researcher distinguished between these meta-models of evaluation versus more specific models of a particular evaluation method. That is to say, the researcher sought models that attempted to explain how one approaches evaluations generally, as opposed to how one might conduct a particular form of evaluation (such as a Cost/Benefit Analysis). Given this limitation, the researcher found relatively few instances. Moreover, the vast majority of the examples were rooted in the work of Symons (1990), who developed a conceptual model of IS/IT evaluation based on Pettigrew's (1985) Content, Context, and Process (CCP) framework of organizational change. In all, the researcher found five meta-models of the process of IS/IT evaluation: Symons (1990); Willcocks and Margetts (1996); Serafeimidis (1997); Hirschheim and Smithson (1999); Klecun and Cornford (2003). In each of these models, one or more of the seven evaluation constructs identified in the researcher's literature review were missing. For example, Klecun and Cornford's (2003) model excluded the elements of *when* (the timing of an evaluation), *which* (the specific aspects to be evaluated), and *where* (the intra- and extra-organizational conditions in which the evaluation takes place).

Research Question #2: How do Contextual Elements Relate to the Evaluation Process?

In Chapter 3, the researcher presented a rationale for including each of the seven identified conceptual elements of IS/IT evaluation, as well as a comprehensive literature review specific to each construct. Based upon these findings, the researcher followed Whetten's (2002) methodology for developing theoretical contributions, such as conceptual models. Following a number of iterations and revisions, the researcher produced a conceptual model of IS/IT evaluation that appeared consistent with the findings of the literature review (see Figure 14). As such, the researcher's model appeared to offer a more complete understanding of the process of IS/IT evaluation.

Hypothesis #1: Conclusion

Based upon the findings summarized above, the researcher has concluded that the results support the first hypothesis in this study. The process of IS/IT evaluation consists of seven contextual elements (Table 21). While a number of existing models of IS/IT evaluation are found in the literature (Symons, 1990; Willcocks & Margetts, 1996; Serafeimidis, 1997; Hirschheim & Smithson (1999); Klecun & Cornford, 2003), these authors' models failed to explicitly include all of the relevant constructs. Therefore, the authors of the existing models have neither adequately nor completely explained the process of IS/IT evaluation in organizations. In contrast, the researcher in this study utilized these existing models, as well as the findings of the literature review, to devise an alterative conceptual model of IS/IT evaluation that included all seven contextual elements (Figure 14).

Hypothesis #2: Validity and Usability of an Improved Conceptual Model

Having devised an alternative conceptual model of IS/IT evaluation, the researcher focused on the second hypothesis and set of research questions in this study. To satisfy

this hypothesis, the researcher needed to establish that the proposed conceptual model was an effective tool for describing and analyzing evaluation practices. To that end, the researcher had to first establish the descriptive validity of the model and then utilize it as an analytical tool.

Research Question #3: Is the Researcher's Conceptual Model of Evaluation Valid?

As noted in earlier chapters, conceptual models—like most theoretical contributions—are often subjected to too little critical review and instead gain credibility based on simple face validity (Meredith, 1993; Frank, 1999). In this study, however, the researcher sought to ensure that the proposed conceptual model represented a "good" theoretical contribution. To that end, the researcher applied Whetten's (2002) standard for *strong* theoretical contributions: models should be both *complete* and *systematic*. To assess whether or not the proposed model of IS/IT evaluation represented a good theoretical contribution, the researcher explored its descriptive ability with respect to the previously published case studies selected in Chapter 3.

To test the validity of the model, the researcher sought to determine whether it either lacked necessary or contained superfluous contextual elements. In all of the examined cases, the researcher established that the conceptual model's constructs were valid and relevant, as demonstrated in each of the chronological event listings (Tables 22-26). Thus, the researcher concluded that the conceptual model did not contain superfluous constructs. In addition, the researcher attempted to identify any missing contextual elements while coding each of the case studies' manuscripts, granting that it is logically impossible to establish with absolute certainty that no construct is missing. The researcher discovered many contextual elements that could be sub-classified under the model's existing constructs (as described in Table 21) during this process. Yet the

researcher was not able to identify any additional contextual elements that were not either already explicitly included in the model or subsumed in an existing construct. Therefore, the researcher concluded that the conceptual model was sufficiently complete.

With respect to the "systematic" structure of the model, the researcher deconstructed the model into a series of eleven componentized relationships (Figure 16):

1. Time (*when*) relates to the evaluation process
2. Environmental conditions (*where*) relate to the reason to evaluate (*why*)
3. The reason to evaluate (*why*) relates to the participants (*who*)
4. The reason to evaluate (*why*) relates to the subject of the evaluation (*what*)
5. The reason to evaluate (*why*) relates to the evaluation criteria (*which*)
6. The participants (*who*) and subjects (*what*) of evaluation relate to each other
7. The participants (*who*) relate to the evaluation criteria (*which*)
8. The subject (*what*) relates to the evaluation criteria (*which*)
9. The evaluation criteria (*which*) relate to the evaluation methods (*how*)
10. The outcome of the evaluation method (*how*) relates to the next steps (*action*)
11. The resulting activities (*action*) relate to the environmental conditions (*where*)

In the case studies examined by the researcher, seven of the conceptual model's relationships were identified in all five case studies. In addition, two of the relationships (#10 and #11) were only found in (and applicable to) the four *ex ante* evaluation case studies. Thus, only two relationships (#8 and #9) were not confirmed unanimously; however, both of these relationships were unambiguously present in four of the five case studies. Moreover, the researcher found no evidence that directly contradicted the

relationships established in the conceptual model. The researcher concluded that the model provides a systematic description of the process of IS/IT evaluation.

The researcher has presented qualitative support that the conceptual model provides a reasonably adequate explanation of the IS/IT evaluation process. Given these findings, the researcher believed that the conceptual model passes Whetten's (2002) test of a "strong" theoretical contribution. Therefore, the researcher concluded that the conceptual model of IS/IT evaluation was valid.

Research Question #4: What Guidelines May Be Derived from the Conceptual Model?

Having established the descriptive validity of the conceptual model, the researcher investigated its application as an analytical tool. To accomplish this task, the researcher performed a cross-case analysis using the conceptual model as a framework, thereby facilitating comparisons across the various instances. In doing so, the researcher found clear evidence supporting the assertion that improved IS/IT evaluations were related to increased contextuality in the process. In addition, the researcher found four "drivers" associated with an increased contextuality in the *ex ante* evaluation cases: increased stakeholder participation, an improved alignment between an evaluation's criteria and the organization's broader context, an improved fit between the methods used for an evaluation and the organizations broader context, and a demonstrated application of the lessons learned in prior evaluation activities. The researcher also noted that each of the "drivers" appeared to have two or more "patterns of application" demonstrating how it was manifested in the *ex ante* case studies (Table 29). The researcher also confirmed that *ex post* evaluations provide an important opportunity to discover "lessons learned," thereby suggesting that organizations ought to conduct *ex post* evaluations. Assembled

collectively, these findings serve as the foundation for the recommendations included later in this chapter on improving professional IS/IT evaluation practices.

Hypothesis #2: Conclusion

Given the outcomes summarized above, the researcher believes that there is sufficient evidence supporting the second hypothesis in this study. Based upon these initial findings, the researcher's conceptual model represents an effective tool for both describing and analyzing evaluation practices. As discussed later in this chapter, the researcher's application of the conceptual model to the cases examined in this study has yielded a number of normative guidelines for contextually appropriate IS/IT evaluation practices. However, before turning to those recommendations, it is appropriate to review the strengths, weaknesses, and limitations of the researcher's methodology and design for this study, thereby providing boundaries for all subsequent knowledge claims.

Reflections on Validity: Limitations, Assumptions, and Philosophical Concerns

The validity and reliability of a researcher's claims—no matter how consequential or trivial—rest on the soundness of the research design and procedures, as well as the inherent assumptions and limitations of the study. Therefore, sound scholarship demands that researchers articulate their positions on these elements. To that end, the researcher has attempted to highlight throughout this document the assumptions and decisions that might have influenced the reliability or validity of the findings. A brief review of these concerns is appropriate.

In this study, limitations arise primarily from the researcher's methodological choices. For example, the researcher's analysis is based largely on the existing IS/IT evaluation literature that the researcher could not control in terms of either quantity or quality.

More broadly, the researcher recognizes the theoretical and philosophical limitations inherent in the research methodology employed in this study. In particular, the key outcome of the study—the conceptual model of IS/IT evaluation—is a simplified abstraction of more complex realities. Thus, while the outcomes presented are demonstrably valid in the scope of this study, the conceptual model may not sufficiently or completely describe an alternative case. Indeed, as noted throughout this dissertation, the researcher's selection of a qualitative, case-based design limits the generalizability of the results. Therefore, caution should be exercised by anyone attempting to extend the descriptive or prescriptive abilities of the researcher's conceptual model beyond the cases explicitly contained in this study. Taken to the extreme, however, this position precludes the possibility of solving the very problem that initially motivated this research project: how to overcome the contextual-prescriptive paradox. That is to say, how does one translate scholars' nebulous calls for more context-based IS/IT evaluations into feasible, actionable normative guidelines?

To address this issue, the researcher put aside philosophical concerns about the dualistic arguments regarding the "true" nature of reality. Instead, the researcher has assumed that:

1. Practitioners' *perceptions* of reality—whether "true" or not—drive their actions.
2. Practitioners need some degree of methodological guidance in order to "get-the-job-done."
3. Practitioners prefer valid but incomplete guidance to no methodological guidance at all.

Everyday experiences support these assertions. For example, a tourist unfamiliar with a locale is likely to avoid an area that he or she perceives as dangerous. Likewise, the same tourist is far more likely to find a destination with incomplete directions than had he or

she arrived at an airport with no knowledge of how to locate a desired destination. Indeed, one would fully expect the tourist to seek out directions (i.e., methodological guidance) in order to reach a destination (i.e., "get the job done").

In practical terms, this means that the researcher has been willing to bend the strict prohibition on generalizing qualitative research findings. However, as highlighted in the literature review of this study, the improvement of IS evaluation practice demands a pragmatic approach. Moreover, any attempt to build an abstract representation of reality by definition demands some degree generalization. Thus, the researcher has opted to err—if err at all—on the side of practical relevance versus academic rigor in offering normative guidelines based on the findings in this study. Nevertheless, the researcher has taken numerous steps to ensure the highest degree of validity and reliability as possible.

Implications

The results of this study are significant to the IS discipline. In particular, the researcher believes that the study both advances knowledge and improves professional practice. In particular, specific implications of this study include:

1. Enhances understanding of IS/IT evaluation process
    - Identified relevant contextual elements
    - Developed comprehensive conceptual model
2. Provides basis for additional IS/IT evaluation research
    - Development of new contingency approaches
    - Foundation for comprehensive theory of IS/IT evaluation
3. Improves professional practice of IS/IT evaluation
    - Provided guidelines and checklist for tailoring evaluations to specific organizational needs and circumstances

By developing an improved conceptual model of the IS/IT evaluation process, the researcher extended the work of scholars who applied Pettigrew's (1985) contextualist framework to IS/IT evaluation (Symons, 1990; Willcocks & Margetts, 1996; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Klecun & Cornford, 2003). In particular, the researcher's model included important contextual elements that were either explicitly or implicitly overlooked in prior conceptualizations. To that end, the researcher addressed the fundamental, long-standing epistemological concern identified by Hirschheim and Smithson (1999): the need for a better understanding of the evaluation process itself. In doing so, the researcher has contributed to the advancement of IS/IT evaluation theory and helped to inform subsequent research. Moreover, the researcher has provided a series of recommendations for subsequent research that outlines the development of a more robust causal model, thereby providing a pathway to a comprehensive theory of IS/IT evaluation

In addition to the aforementioned theoretical contributions, the researcher utilized the conceptual model developed in this study to generate normative guidelines for better conducting evaluations within a specific organizational context. As a scholar in an applied discipline (which focuses on the application of IS/IT in practice), the researcher believes that such a contribution is essential. To that end, the researcher produced an artifact directly applicable to practitioners: a checklist for conducting better IS/IT evaluations (see Table 30). In doing so, the researcher attempted to blend the practitioner's need for methodological guidance with sufficient flexibility to allow for contextual variability. Despite the difficulties inherent in trying to strike such a balance, the researcher believes that this approach offers numerous benefits for the practice of IS/IT evaluation for three reasons. First, the researcher's guidelines are based upon a

theoretically sound and validated conceptual model of the evaluation process. Second, numerous researchers have demonstrated the efficacy of structured (i.e., model-driven) approaches to IS/IT evaluation (Boloix & Robillard, 1995; Böckle et al., 1996; Tatsiopoulos, Panayiotou, & Ponis, 2002), including scholars that have called for post-modern or interpretive methods (Remenyi & Sherwood-Smith, 1997; Hirschheim & Smithson, 1999). Third, scholars have called for methodological approaches that provide contingencies for addressing a multitude of contextual variables (Farbey, Land, & Targett, 1999; Serafeimidis, 2002). By addressing these requirements, the researcher's normative guidelines and checklist (Table 30) offer the potential for significant advancements to professional practice.

Recommendations

Having reflected on conclusions and their limitations, the researcher considered recommendations that have resulted from this study for both researchers and practitioners. For future academic study, the researcher presented a proposed stream of studies based upon this project:

1. Further validate the conceptual model
2. Refine the conceptual model and expand the conceptual framework
3. Develop an evaluation theory based on the conceptual model
4. Examine the implications for pedagogy

For the improvement professional practice, the researcher offered guidelines to make IS/IT evaluation in organizations more effective:

1. Engage in critical and reflective practice
2. Increase stakeholder participation
3. Align evaluation criteria with the organization

4. Align evaluation methods with the organization
5. Learn from experience

In subsequent sections, each recommendation is discussed in the order presented above. As appropriate, the researcher included more detailed steps and procedures based upon the results of this study. Likewise, the researcher included checklist (Table 30) to aid practitioners in implementing researcher's recommendations.

Recommendations for Future Research

In this section, the researcher presents four areas of future research that the researcher believes should stem from this study. These include further validation of the conceptual model, refinement of the conceptual model, theory development based on the conceptual model, and the exploration of implications for pedagogy. Each of these topics is addressed separately below.

Recommendation #1: Further Validate the Conceptual Model

Within the scope of this study, the researcher validated the conceptual model following the method developed by Willcocks and Margetts (1994) that relied on published case studies to assess a new theoretical contribution. This procedure allowed the researcher to validate the conceptual model using more cases than would have been practicable had the researcher directly collected case studies in the field. Yet this method also limited the researcher to working with the materials as presented. Thus, the conceptual model has been shown to have good descriptive and analytical capabilities with respect to published case studies, but the researcher has not yet demonstrated how precisely the conceptual model would function as a framework for conducting primary, field-based research. As such, the researcher recommends that subsequent studies focus

on the application and validation of the IS/IT evaluation conceptual model in a real-world, field-based context.

Recommendation #2: Refine the Conceptual Model & Expand the Framework

The conceptual model presented in this study is an abstraction—that is to say, a simplification or generalization—of a far more complex reality. In constructing the model, the researcher selected a certain degree of abstraction. The conceptual model of IS/IT evaluation presented in this study was intentionally built to be fairly abstract. The researcher did so in order to increase the likelihood of the model's applicability to a given circumstance and to enhance its comprehensibility for individuals that utilize it.

Throughout the course of building and validating the conceptual model, the researcher also discovered a number of more granular constructs that could be included in a less abstracted version of the model. For example, Table 21 included a number of sub-classification of contextual elements, such as a distinction between "stakeholders" and "evaluators" within the "*who*" construct (i.e., individuals involved in, or affected by, an evaluation). Thus, a more detailed conceptual model could portray the relationships between such sub-elements.

In addition to refining a generic archetype, researchers could also build more detailed models specific to a particular set of circumstances. For example, future researchers could define an evaluation model for particular types of technologies, companies, industry segments, or other organizational conditions. These models could then, in turn, be utilized to develop more specific normative guidelines for conducting evaluations in more particular organizational situations. As such, this recommendation follows in the contingency approach stream of IS/IT evaluation research advanced by authors such as Farbey, Land, and Targett (1999) and Serafeimidis (2002). The researcher believes that

this type of inquiry tends to span the dogmatic dualism of rationale/objective versus interpretive methods and therefore offers a pragmatic way forward in the endeavor to advance professional practice.

Recommendation #3: Develop an Evaluation Theory Based on the Conceptual Model

The conceptual model that the researcher developed as part of this study is just that: a model that describes relationships between concepts (in this case, contextual elements). While such a model represents a theoretical contribution to the field of IS/IT evaluation, it should not be confused with what it is not, namely a *theory* (Whetten, 2002). In its present form, the model demonstrates that if *X* changes *Y* and *Z* may (or may not) also change. The researcher recognizes, however, that a conceptual model lacks predictive ability. That is to say, if *X* changes the researcher does not know what effect (including no effect) it will have on *Y* and *Z*. This lack of predictive ability restrains the use of the conceptual model as a normative guide. Yet the creation of this validated, conceptual model could serve as an important step toward unified and holistic theory IS/IT evaluation. For that reason, the researcher recommends that the conceptual model be utilized in subsequent research as a foundation for theory development.

Recommendation #4: Examine the Implications for Pedagogy

The researcher has previously focused primarily on IS/IT evaluation issues related to either academic research or professional practice. In so doing, the researcher has overlooked issues related to pedagogy. Moreover, in conducting the literature review for this study, the researcher found relatively few articles that discussed IS/IT evaluation in the context of pedagogy. Given that a number of authors have lamented the apparent disconnect between evaluation research and practice (Willcocks & Lester, 1999; Jones & Hughes, 2000), the researcher believes that pedagogy—teaching existing or new IS

professionals—offers a potential for bridging this divide. Indeed, a myriad of possible research questions exist. What are IS/IT students taught about evaluation today? What should they be taught? In what classes and at what levels would this be appropriate? Is this (or should it be) a topic covered in IS survey courses offered as part of the core curriculum in non-IS programs (such as to MBA students or undergraduates majoring in accounting or finance)? These important questions remain unanswered. Therefore, the researcher recommends the exploration of these issues in future studies.

Recommendations for the Improvement of Professional Practice

In addition to developing recommendations for future studies, the researcher also developed a series of recommendations for the improvement of professional practice. One of the research questions in this study centered on what normative guidelines to improve IS/IT evaluation could be ascertained from the application of the researcher's conceptual model. In responding to this question, the researcher confirmed a seemingly simple and widely cited answer: practitioners should be more contextual. In short, they should conduct evaluations that are grounded in their organizations' unique objectives and circumstances. However, it is not simply enough to tell practitioners to "be contextual." In fact, even strident post-modernists have cited the need for practitioners to have sufficient methodological guidance (Remenyi & Sherwood-Smith, 1997). This is the contextual/prescriptive paradox discussed in previous chapters. To overcome it, the researcher has developed an initial series of specific, normative guidelines for practitioners (including a "Checklist for Tailoring Your Firm's IS/IT Evaluations") that seek to balance adequate methodological guidance with sufficient flexibility to allow for an assortment of organizational contexts.

Recommendation #1: Engage in Critical and Reflective Practice

To increase contextuality, practitioners must increase the understanding of their environment and the dynamics at work within it. To do so, practitioners should engage in what might be called "critical" or "reflective" practice, whereby they would actively examine the contextual elements that could influence the outcome of their evaluation. In making this recommendation, the researcher does not intend to suggest that practitioners should spend vast amounts of time sitting cross-legged under a tree while contemplating philosophical difficulties. Rather, the researcher believes that practitioners should orient themselves to remaining open to alternative possibilities, asking probing questions of themselves and others, and attempting to learn from past experiences. In short, contextuality demands an expansive, integrated, and holistic view of reality. Thus, keeping the general need for critical reflection in mind, the researcher offers specific methodological guidance to increase the contextuality of practitioners' evaluations, including:

1. Asking probing questions of oneself and others
2. Identifying and validating implicit and explicit assumptions
3. Remaining open to alternative suggestions, methods, and outcomes
4. Applying lessons learned from prior evaluation experiences

Recommendation #2: Increase Stakeholder Participation

As discussed in the literature review, IS/IT evaluation is often a socio-political activity, whereby a result is negotiated through a dialogic process between various parties. Numerous researchers have asserted the central role of individuals as agents in evaluations (Walsham, 1999; Whittaker, 2001; Klecun & Cornford, 2003). Scholars have also described the tendency for stakeholders, whether involved in the formal evaluation

process or not, to craft personal assessments of proposed or realized IS/IT objects (Serafeimidis, 1997; Walsham). Stakeholders due so because they have a vested interest in the organizational changes brought about by IS/IT-related activities.

In this study, the researcher found that the organizations in the examined case studies increased stakeholder participation to enhance the efficacy of their *ex ante* evaluations and resultant outcomes. These firms did so by fostering cross-functional participation in evaluations and/or increasing stakeholder communication and education. In so doing, the researcher believes that these organizations are better leveraging the multiplicity of perspectives in their organizations, helping to shape the informal assessments of stakeholders by sharing information, or both.

To that end, the researcher recommends that organizations increase stakeholder participation in their evaluations. As a first step, evaluators should identify the individuals that may be affected by an evaluation's outcomes. These may include executives, managers, and employees across a myriad of functional areas and business units. In some cases, stakeholders may extend beyond the border of the enterprise: vendors, suppliers, and customers. Having identified the stakeholders, the organization should make an explicit determination about their roles, whether formal or informal, in the assessment. Where feasible, the researcher recommends creating cross-functional teams to provide a more robust and holistic approach to evaluation. Evaluators should understand the organization's assessment approach and methods. Formal or informal training should be provided as needed. Likewise, all stakeholders should receive regular communications on the evaluation's objectives and outcomes. Finally, the researcher recommends that organizations encourage and respond to feedback from those stakeholders not included in the formal evaluation.

Specific recommendations include:

1. Fostering cross-functional evaluations

    - Identify stakeholders (those affected by the evaluation's outcome)
    - Determine the role of each stakeholder in the assessment
    - Create a diverse evaluation team

2. Increasing stakeholder communication and education

    - Educate evaluators on organization's evaluation methods and techniques
    - Communicate to all stakeholders the objectives and outcomes of an evaluation
    - Encourage and respond to stakeholder feedback
    - Involve stakeholders that are not formally participating on the evaluation team

Recommendation #3: Align the Evaluation Criteria with the Organizational Context

To rework a well-known phrase from the late Peter Drucker: what gets selected, gets evaluated. That is to say, if one selects the wrong criteria, the resulting evaluation will be fundamentally flawed. Such an assessment will yield results that are superfluous at best, deleterious at worst. Evaluators must therefore select criteria and metrics that align with their organization's context.

First, evaluators should explicitly associate assessment criteria with organizational objectives. This is important because IS/IT-related activities are known to be a source of organizational change (Symons, 1990; Williams & Williams, 2004). Thus, objectives should arise from an agreed upon desire to change or reinforce an organization's existing circumstances. Evaluators must understand or agree to a set of organizational objectives as the basis for an assessment. Once understood, evaluators should be able to select criteria or create metrics with relative ease based on the organization's goals.

Second, recognizing the benefit of their involvement, evaluators should select suitable criteria based upon the feedback solicited from stakeholders. In particular, end-users'

functional needs and requirements should be considered in order to enhance the "perceived usefulness" of a system, thereby increasing acceptance rates and end-user satisfaction (Davis, 1989). Likewise, evaluators should seek to incorporate the demands of relevant executives and managers in the organization. Finally, evaluators should consider the implications and success criteria for external stakeholders, such as customers, vendors, and partners.

Third, evaluators should select criteria and measure across a multitude of functional, technical, financial, and strategic IS/IT success dimensions. Recall Seddon's (1997) admonition to not confuse the "usefulness" of a system with its "net benefits." An information system that enhances end-user performance may not yield sufficient productivity gains to justify its cost. Similarly, if functionally or technically inadequate, a solution that appeared economically viable will struggle to achieve its projected returns. Therefore, the researcher recommends that evaluators assemble an assortment of appropriate criteria and measures to address the complex multi-dimensionality of IS/IT investment success.

Specific recommendations include:

1. Define the link between criteria and specific organizational objectives

    - Understand organizational objectives
    - Consider criteria / measures for assessing achievement of objectives

2. Select criteria based on stakeholder feedback

    - Solicit expectations of relevant executives and managers
    - Seek functional needs and requirements of end-users
    - Consider implications for extra-organizational stakeholders (such as customers, vendors, or partners)

3. Select criteria and measures for multiple dimensions, as relevant

    - Functional specifications

- Technical criteria
- Financial measures
- Strategic implications

Recommendation #4: Align Evaluation Methods with the Organizational Context

If there was a single "ah ha" moment for the researcher during this study, it was with the realization that a context-based evaluation demands the careful and purposive selection of criteria *before* the adoption of the method(s). As discussed in the literature review, many evaluation methods and techniques prescribe the use of one ore more metrics. By prematurely selecting a method, evaluators risk short-circuiting the context alignment process, thereby precluding the application of criteria better suited to their organization's goals and circumstances. Indeed, in the cases studies examined by the researcher, less successful assessments typically employed the pre-selection of evaluation methods; in contrast, more successful evaluations generally involved a careful definition of desired outcomes and relevant criteria first.

To align evaluation methods with the organizational context, the researcher recommends that evaluators first determine a suitable set of criteria and metrics for assessment following the guidance provided above. Once these are selected, the researcher recommends that evaluators identify or create (if none are available) the methods, techniques, or tools by which the criteria may be assessed. In some cases this process will be fairly deterministic; for example, many financial metrics may be calculated using extant formulas and ratios. In other instances, evaluators may need to employ significant ingenuity to estimate or measure a given criteria's outcome.

In addition to assessment criteria, the researcher also recommends that practitioners should explicitly consider the underlying micro-context (the *who*, *what*, and *why*) of the evaluation during the selection of methods, tools, and techniques. Indeed, in each of the

ex ante cases in this study, the researcher identified a pattern whereby evaluators linked methods back to the micro-context of the evaluation. Having established that a relationship exists between an evaluation's micro-context and its assessment metrics (i.e., *which* criteria are or should be selected), the researcher posits that by doing so the evaluators were helping to ensure the proper alignment of the micro-context, criteria, and methods of the evaluation.

Specific recommendations include:

1. Avoid prematurely selecting the evaluation method(s)
2. Select methods based on the established evaluation criteria
3. Create in-house techniques for estimating/measuring unique criteria, if required
4. Consider the micro-context of the evaluation (who, what, why) before selecting a method

Recommendation #5: Learn from Experience

Given its complexity and ever-changing context, the researcher believes that the practice of evaluation is as much an art as it is a science. That is to say, it is highly unlikely that an individual set of detailed, step-by-step procedures will ever be sufficiently robust to handle all possible complications and contingencies. As such, the researcher believes that practitioners should utilize their experiential knowledge to refine their craft. To do so, evaluators should engage in summative and *ex post* evaluation exercises.

To learn from past experience, one must have a record or knowledge of it. To that end, the researcher urges evaluators to carefully document their appraisals, using the researcher's conceptual model as a guide. Of particular importance are the evaluation's participants, objectives, criteria, methods, assumptions, and projections/measures. Such

documentation can ease the process of conducting *ex post* evaluations, especially in determining the reasons for divergences in estimated versus actual outcomes. In addition, it can help to facilitate an analysis of the evaluation process itself.

In each of the *ex ante* cases in this study, the firms utilized (to varying degrees) lessons learned from prior failures or difficulties as a means to improving subsequent evaluation practices and outcomes. Through this process, the organizations were refining their approach to evaluation by improving its fit in their unique organizational context. In this manner, *ex post* evaluations offer a significant opportunity for organizational improvements and maturation. Of course, firms—and the people within them—must be open to the possibility of learning from experience. In many organizations, summative or ex post evaluations are not without perceived risks. For example, evaluators may be concerned that documentation (i.e., the proverbial "paper trail") could be used as evidence to assign fault for undesired outcomes. Likewise, employees might fear that post-implementation reviews could degenerate into a form of communal blame placement sessions. To mitigate such concerns, organizations should develop a culture in which the focus in on learning lessons and improving practices, rather than on delivering public appraisals and identifying scapegoats. Likewise, practitioners should be careful to not allow ex post evaluations to devolve into "groupthink" sessions that undermine the benefits of postmortems and may ultimately discourage such assessments in the future (McAvoy, 2006). In addition, the researcher suggests that evaluators should strive to learn lessons from prior successes. In fact, the researcher identified instances in three of the cases in this study in which organizations learned or reinforced lessons rooted in positive outcomes and experiences.

Specific recommendations include:

1. Document all evaluations completely, including participants, assumptions, objectives, criteria, methods, and estimates/measures.

2. Develop a culture focused on learning lessons and improving practices

    - Conduct summative reviews following all projects
    - Consider lessons learned from both failures *and* successes
    - Avoid using review sessions to deliver blame or identify scapegoats
    - Discourage "group think" and encourage diverse opinions

Summary of Recommendations for the Improvement of Professional Practice

In previous sections, the researcher outlined a series of recommendations for improving the professional practice of evaluation. In doing so, the researcher sought to provide guidelines for conducting evaluations that are grounded in the unique objectives and circumstances of a given evaluator's organization. Moreover, the researcher attempted to balance the practitioner's need for specific, normative guidelines with sufficient flexibility to allow for an assortment of organizational contexts and contingencies. The results of this exercise are summarized in Table 30 below, entitled a "Checklist for Conducting Better IS/IT Evaluations." The checklist includes a number of specific steps and helpful reminders to assist professionals in conducting rigorous and holistic evaluations. While the need for flexibility to suit individual circumstances is recognized, the researcher encourages practitioners to utilize this checklist as a guide for conducting IS/IT evaluations suitable to their organization's unique context. To that end, the prompts in the checklist are open-ended with respect to prescribing specific procedures. This was intentional on the part of the researcher. Indeed, the researcher expects and encourages practitioners to use tools and follow procedures that are best suited to their organization. Thus, while the checklist is designed to be "one-size-fits-all," the underlying evaluation procedures should be tailored in their fit.

Table 30. Checklist for conducting better IS/IT evaluations

Checklist for Conducting IS/IT Evaluations
1. Engage in critical and reflective practice
☐ Identify and validate assumptions
☐ Ask probing questions of self and others
☐ Remain open to alternatives
☐ Apply lessons from past experiences
2. Increase stakeholder participations
☐ Foster cross-functional evaluations
☐ Identify stakeholders
☐ Determine the role of each stakeholder
☐ Include diverse perspectives on evaluation team
☐ Communicate with and educate stakeholders
☐ Educate stakeholders on organization's evaluation methods
☐ Communicate objectives and outcomes to all stakeholders
☐ Encourage and respond to all stakeholder's feedback
☐ Communicate to stakeholders not participating in the formal evaluation process
3. Align evaluation criteria with the organization
☐ Define the link between criteria and specific organizational objectives
☐ Understand and document organizational objectives
☐ Consider criteria / measures for assessing achievement of stated objectives
☐ Select criteria based on stakeholder feedback
☐ Solicit expectations of relevant executives and managers
☐ Seek feedback on functional needs and requirements of end-users
☐ Consider implications for extra-organizational stakeholders (e.g., customers)
☐ Select criteria and measures for multiple dimensions, as relevant
☐ Functional specifications
☐ Technical criteria
☐ Financial measures
☐ Strategic implications
4. Align evaluation methods with the organization
☐ Consider the micro-context (who, what, why) before selecting methods
☐ Select methods based on previously determined evaluation criteria (see item #3)
☐ Create techniques for estimating / measuring unique criteria, if required
☐ Avoid prematurely or haphazardly selecting the evaluation method(s)
5. Learn from experience
☐ Document all evaluations completely
☐ Include participants, assumptions, and objectives
☐ Note all criteria and methods, as well as estimates / measures
☐ Develop a culture focused on learning lessons and improving practices
☐ Conduct summative reviews following all projects
☐ Consider lessons learned from both failures *and* successes
☐ Avoid using sessions to deliver blame or identify scapegoats
☐ Discourage "groupthink" and seek divergent opinions

Summary

Evaluation is a vital yet challenging part of IS/IT management and governance. The benefits (or lack therefore) associated with IS/IT investments have been widely debated within academic and industrial communities alike. Investments in information technology *may* or *may not* result in desirable outcomes. Yet, to remain competitive in today's marketplace, organizations must rely on information systems. To ensure success, the effective evaluation of IS/IT investments appears to be an important component. Yet, despite an ever-growing multitude of evaluation measures and methods, practitioners continue to struggle with this intractable problem.

Responding to the limited gains of IS/IT evaluation research to date, some scholars have argued that academicians should first develop a better understanding of the process of IS/IT evaluation (Hirschheim & Smithson, 1999). In addition, scholars have also recommended that IS/IT evaluation practice should be tailored to fit a particular organization's context (Farbey, Land, & Targett, 1999; Serafeimidis, 2002). Nonetheless, one cannot simply tell practitioners to "be more contextually sensitive" when conducting assessments and then reasonably expect such an admonition to result in improved outcomes. Instead, researchers should articulate unambiguous, structured guidelines to practitioners (Remenyi & Sherwood-Smith, 1997; Hirschheim & Smithson, 1999). However, this demand creates a further complication problem: how does one balance the need for concrete recommendations while preserving sufficient flexibility to address a nearly limitless supply of contextual variables.

In this study, the researcher addressed this need using a multi-phase research methodology. To start, the researcher conducted a comprehensive literature review to

identify and describe the relevant contextual elements operating in the IS/IT evaluation process. The list of conceptual elements included:

- Time frame → *When?*
- The locus of evaluation → *Where?*
- Purpose/reasons → *Why?*
- The subject → *What?*
- People → *Who?*
- Criteria/measurement → *Which aspects?*
- Methodologies/tools → *How?*
- Outcomes of the evaluation → Action?

In all, the researcher thoroughly reviewed the existing literature with respect to each of these contextual elements. Additionally, the researcher identified a number of conceptualizations, based primarily on Pettigrew's (1985) contextualist framework for organizational change, that attempted to describe the process of IS/IT evaluation (Symons, 1990; Willcocks & Margetts, 1996; Serafeimidis, 1997; Hirschheim & Smithson, 1999; Klecun & Cornford, 2003).

Based upon these findings, the researcher followed Whetten's (2002) modeling-as-theorizing approach to develop a conceptual model of IS/IT evaluation. In particular, the researcher sought to develop a *strong* theoretical contribution: one that was both *complete* and *systematic* (Whetten). To assess the soundness and strength of the theoretical contribution, the researcher validated the conceptual model by applying it to five case studies selected from the extant literature. In doing so, the researcher followed an approach similar to that of Willcocks and Margetts (1994), who were also attempting to validate a conceptual framework. In addition, the researcher applied the guidelines and

recommendations of Miles and Huberman (1994) and Yin (2003) for operationalizing a qualitative, multi-case study research design. Throughout this process, the researcher was always mindful of Webster and Watson's admonition regarding the difficulties and complications in evaluating theoretical contributions.

Once validated, the researcher utilized the model to develop a series of guidelines and a checklist (Table 30) to aid organizations in conducting context-based IS/IT evaluations. In particular, the researcher provided recommendations to assist evaluators in:

- Engaging in critical and reflective practice
- Increasing stakeholder participation
- Aligning evaluation criteria (which) with the organizational context
- Aligning evaluation methods (how) with the organizational context
- Learning from experience

In addition to providing guidelines for improved professional practice, the researcher set forth a series of recommendations for subsequent academic research. These recommendations included a call for further validating the conceptual model, making additional refinements and/or extensions to it, developing a comprehensive theory of IS/IT evaluation rooted in the conceptual model, and the exploring the implications for pedagogy of the researcher's findings.

Overall, the researcher believes that the development of a holistic and robust conceptual model that resulted from this study serves as an important step in advancing of IS/IT evaluation theory. In addition, the researcher's guidelines and checklist to assist practitioners in conducting context-based IS/IT evaluation (Table 30) offers a significant contribution to industrial practice. Therefore, the implications of this study come full circle, which is appropriate for an applied discipline such as information systems: the

researcher's improved theoretical understanding of IS/IT evaluation has yielded a mechanism for improved professional practice.

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